IBM

IBM @server iSeries Handbook

Version 5 Release 1

- The authority on expanding iSeries CPUs
- Provides fast facts on iSeries features and requirements
- Includes OS/400 V5R1 enhancements

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IBM @server iSeries Handbook Version 5 Release 1

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Take Note!

Before using this information and the product it supports, be sure to read the general information in “Special Notices” on page 821.

Twenty-second Edition (August 2001)

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Note

This IBM Redbook reflects the introduction of IBM @server iSeries. iSeries servers are Models 270, 820, 830, 840, SB2, and SB3 announced in May 2000 (supported by OS/400 V4R5). Throughout this Redbook, we use “iSeries” to refer to these models. AS/400e servers are all RISC models announced from June 1995 to May 2000, as well as the Model 250. Many software names and other product names have changed with the V5R1 announcement on 23 April 2001.

Integrated xSeries Server for iSeries

Throughout this book you can find many references to a new integrated adapter named the *Integrated xSeries Server for iSeries*. The shortened named is Integrated xSeries Server, which is abbreviated in some charts as IXS. In this book, the name is also used to refer to the predecessor technology of integrated server adapters. That includes, the name is used to indicate the Integrated Netfinity Server (INS), Integrated PC Server (IPCS), and Integrated File Server IOP (FSIOP).

This *iSeries Handbook* is written for use by IBM System Specialists, Marketing Representatives, Business Partners, and IBM customers to answer first-level questions. It is designed for *guidance* only. Use this Handbook as a reference for the options available. Refer to the companion manuals *iSeries and AS400e System Builder*, SG24-2155, and *AS/400e to iSeries 400 Migration*, SG24-6055*,* for more detailed information and configuration rules. Refer to IBM online publications and systems, such as ViewBlue and PartnerInfo (or their equivalent outside of the United States), and your IBM marketing and support representative for final confirmation.

You can also consult the *iSeries Pocket Handbook*, SG24-9406, a new publication with V5R1 that is anticipated for publication later this year, as a quick reference to product and feature numbers.

Periodically, the content of the Handbook is revised to keep readers informed about changes between IBM printed hardcopy editions. Incremental editions are annotated as -21a, where “a” represents a level of update. They are orderable in hardcopy from a print-on-demand vendor at: `http://www1.fatbrain.com`

The latest update to the *iSeries Handbook* is always available in softcopy on the World Wide Web. To view, search, or download in PDF or HTML formats, enter a search parameter of `iSeries Handbook` or `GA19-5486` on the Web site: `http://www.redbooks.ibm.com`

Or you can access the Handbook directly at:
http://www.redbooks.ibm.com/pubs/pdfs/redbooks/ga195486.pdf

Note: The Handbook provides much of the technical hardware and software information available from an HTML format document, which is pointed to from the iSeries home page at:
http://www.ibm.com/eserver/iseries

Acknowledgements

In this twenty-second edition of the *iSeries Handbook*, we provide a comprehensive guide to the iSeries hardware and software that is currently marketable by IBM representatives. Any comments or suggestions on the content, layout, and usefulness of this book are encouraged from all users of this book.

Many people contributed to the production of this April 2001 edition. I admire the dedication, hard work, and attention to detail of each of the associated teams with whom I have worked. I am especially grateful to the following people:

- **Louis Cuypers**, AS/400 Technical Support Specialist, has been with IBM Belgium for 23 years. He specializes in technical support and problem determination hardware/software for the iSeries server. His previous experience includes working with the S32, S34, S36, S38, and AS/400 system. He has participated in several residencies in the ITSO since the release of OS/400 V4R1.
- **Glen McClymont** is a Senior AS/400 Techline Specialist with IBM in Canada. Since 1988, he has worked with the iSeries server in customer hardware support, software support, and most recently in pre-sales marketing support. Glen has 30 years with IBM and is an alumni resident from previous Handbook and Builder residencies, providing sustained expertise between updates.
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- **Axel Lachmann** is a Project Manager and Senior Systems Engineer with FoxCom, an AS/400 Business partner in Germany. He has nine years of experience in the OS/400 field. He is an IBM Certified Solutions Expert - AS/400 Technical Solutions and Domino R4.6 for AS/400 Technical Solutions. His areas of expertise include e-business enablement of LOB applications and Lotus Domino planning and implementation. Axel also extensively teaches TCP/IP for IBM Learning Services in Germany.

- **Kendall Kinnear** is a System Consultant for Data Systems International in Dallas Texas. Kendall has 26 years experience in the IBM midrange solution, from the System/3, through the System/34 and System/38, to the iSeries server. Kendall brings substantial experience from his tenure at companies like IBM, EDS, StorageTek, and Jack Henry and Associates. He has experience as a System Programmer, Systems Analyst, Systems Engineer, Systems Administrator, Application Programmer, Application Designer, educator, and speaker. He also is an alumni resident from previous Handbook and Builder publications.
- **Miklos David** is the iSeries Product Manager from IBM Hungary. He is responsible for iSeries marketing and configuration support countrywide. He has worked for IBM for five years. He holds a Faculty of Science degree from Eotvos Lorand University.
- **Michael Harper** is an Advisory I/T Specialist from Brisbane, Australia with 24 years of IBM experience. He has worked with the AS/400 and its iSeries successor since their inception in 1988 and also their S/34, S/36, and S/38 predecessors. His previous experience is in both hardware and software technical support and problem determination and now involves pre-sales support in the Australian Techline group. This was Michael's first ITSO Residency.
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Susan Powers, Senior I/T Specialist
ITSO Rochester, MN

Comments Welcome

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Introduction

Introduction

Introduction

The iSeries features a unique design that delivers the benefits of today's innovative technology without complexity. With V5R1, this design has been extended to take advantage of the latest industry leading technology and new OS/400 capabilities.

In the year 2000, the IBM @server iSeries Models 270 and 8xx were introduced to significantly accent the evolution of the IBM server product line. SStar processors refreshed the iSeries models to run faster than the iStar processors.

With V5R1, there are new, more powerful processor features based on IBM's industry leading Copper/Silicon on Insulator (SOI) technology, and increased disk and memory capacities provide increased performance and scalability. New Capacity Upgrade on Demand options on the Model 840 allow the activation of processor performance as it is needed.

Storage options are enhanced. The Storage Area Network (SAN) environment is supported using Fibre Channel disk and tape adapters. Faster, less expensive, system-to-system clustering with High Speed Link (HSL) OptiConnect brings increased high availability. With switchable disk clusters, the need for redundant data is reduced.

OS/400 V5R1 provides some of the industry's foremost application flexibility, with support for Linux, Lotus Domino, Java, Microsoft Windows, Unix, and iSeries applications. High availability is combined with superior workload management and logical partitioning.

OS/400 V5R1 and the iSeries server stand out with robust reliability and scalability for the fast growing open source Linux environment. Users can quickly deploy PowerPC Linux applications while taking advantage of iSeries reliability and scalability.

Up to thirty-two partitions on a single iSeries server and dynamic resource allocation permit different applications to run safely and efficiently side by side. Options for managing windows application serving are greatly enhanced with the new integrated server options. An iSeries server can be attached to up to sixteen direct attach n-way xSeries servers, or up to thirty-two internal Integrated xSeries Servers, and provide SAN functions for these directly attached Windows 2000 servers.

OS/400 V5R1 includes a broad range of enhancements for e-business and application enablement, OS/400 PASE, XML, Client Access, directory services, IBM HTTP Server (powered by Apache), database, Java, Internet printing, Extreme Support Personalized (ESP) enhancements. These enrichments include:

- Faster processors to boost top performance on Models 270, 820, and 840.
- Three new base processors on the Model 820 designed for compute-intensive workloads.

- Main storage is doubled on Models 270, 820, and 830 and increased 33% on the Model 840.
- Operations Navigator with Management Central adds extensive GUI enhancements in Visualization, Wizards, and Integration.
- Switchable DASD towers, used in conjunction with Independent Auxiliary Storage Pools (iASP), to provide high availability and redundant data options for integrated file system applications, such as Lotus Domino and Web serving.
- Operations Console with LAN connectivity to deliver more flexibility for distributed and LPAR environments.
- Fibre Channel Adapters allow attachment to external tape and disk subsystems, and enhance the iSeries ability to participate in Storage Area Networks (SAN).
- Logical Partitioning (LPAR) is now available on selected uni-iSeries processors, including the Model 270. LPAR now supports dynamic resource movement, resource sharing and virtual LAN.
- Linux on iSeries brings iSeries integration, scalability, and robust availability to Linux. Linux enables a new generation of Web based applications with resource sharing and management via Logical Partitions.
- Windows Server Integration is enhanced to allow the connection of external 4-way xSeries servers with an Integrated xSeries Adapter via HSL, and the ability to run up to 32 Integrated xSeries Servers inside a single iSeries server.
- Lotus Domino Server for iSeries now supports iNotes access for Microsoft Outlook clients. This allows those iNotes clients to take advantage of the additional functions and reliability of a Domino server running on iSeries. Lotus Domino Server for iSeries is enhanced with support for incremental Domino saves, improved BRMS, EZ-Setup Wizard for Domino, TCP/IP Autostart, and an incremental installer.
- WebSphere Development Studio for iSeries has all the key tools for e-business development in one “attractively priced” package. It includes the WebFacing Tool as a quick, easy to use tool to convert 5250 applications to Web GUI applications.
- WebSphere Transcoding Publisher to optimize the wireless Web experience. Extend existing Web content to new devices and markets without re-authoring expenses. Deliver efficient content to a variety of users across wireless networks.
- Connect for iSeries extends business to business capabilities. Plug into e-marketplaces, integrate into existing back-end systems, take advantage of new trading protocols, and add incremental B2B function to applications.
- Client Access family now allows access to the iSeries with a new Web browser and to enable 5250 applications for the Web.
- Print support of new capabilities to address the print and communication requirements of e-business and network applications, namely:

  - *Internet Print Protocol (IPP)*: Enables business travellers, telecommuters, and other remote users to submit and manage print jobs on a distant iSeries.
  - *Infoprint Server for iSeries*: Converts any standard iSeries output file into PDF format.
- Extreme Support Personalized to provide high speed connectivity and VPN support via the Internet.

The new technologies behind iSeries Models 270 and 8xx expand the range for processor power, main storage, DASD storage, and communications speeds far beyond the current range of scalability – to extreme scalability. With this expanded range of scalability, you have the power and flexibility to integrate a variety of modern computing environments, from core business to e-business, in a very cost effective way, without concern for limits within a single server. The broad range of hardware migration support protects the investments you have with the iSeries.

This Handbook provides an overview of both the hardware and software for the newly refreshed iSeries servers. Included are the 9406 250, 270, 820, 830, 840, SB2, and SB3 models. OS/400 V5R1 operating software supports these models.

iSeries Technology in Stride

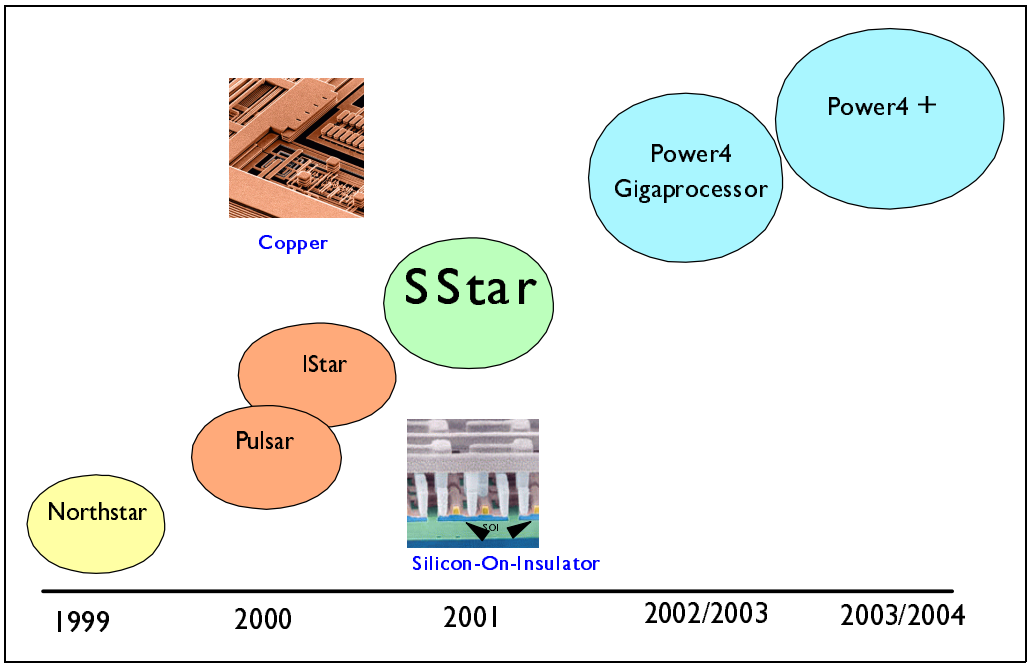
The iSeries server delivers tremendous capacity growth in its product line. The iSeries Layer (also known as Technology Independent Machine Interface (TIMI)) has made it possible to completely change the underlying hardware with minimum, if any, impact to iSeries applications. TIMI helps condition the iSeries to bring new technology to market.

The first AS/400e models based on the 64-bit RISC PowerPC AS processors were announced in June 1995. The ease with which customers have migrated to these powerful systems is a testimony to the fundamental strength of the server's architecture.

In 1997, the 12-way AS/400e system was delivered using Power PCA35 microprocessors. Known as Apache technology, the Power PCA35 microprocessors provided a growth of 4.6 times.

In September 1998, the 12-way AS/400e system was delivered using the Power PCA50 microprocessor. Known as code name Northstar, the Power PCA50 microprocessors nearly doubled the high-end capacity. This set of processors provided the fourth generation since the AS/400 system's inception in 1988 with 64-bit AS/400 Power PCs microprocessors.

The advance in processor technology is shown in the following figure.



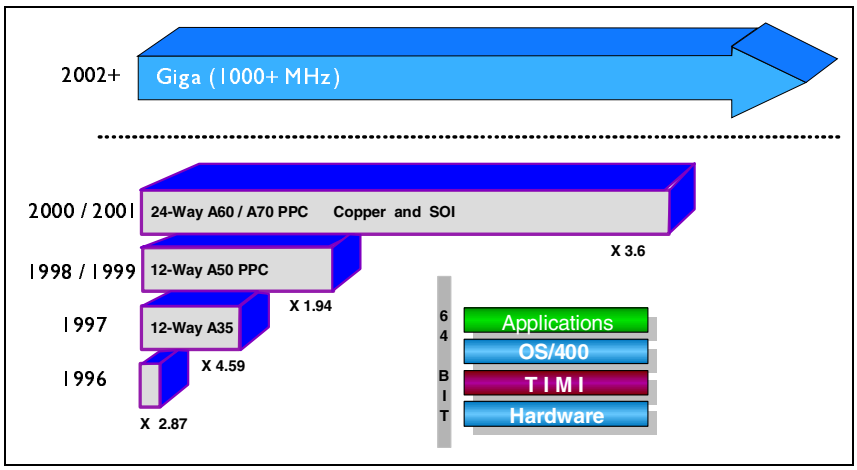
Again in 2000, the iSeries lead the industry by delivering the first server with the new “Silicon-on-Insulator” (SOI) technology. SOI represents a fundamental advance in the way chips are built. IBM's unique SOI process alters the design of transistors, essentially “turbo charging” them, so they run faster and use less power. For example, a microprocessor designed to operate at a given speed can instead be built using SOI technology to achieve higher speeds. At the same time, if performance levels are held constant, SOI chips can require as little as one-third the power of today's microchips. Silicon on Insulator is technology used by the iStar processors. The transistors are built within and on top of a thin layer of silicon that is on top of an insulating layer. The insulating layer is fabricated by implanting a thin layer of oxide beneath the primary silicon surface of the wafer.

Pulsar, iStar, and SStar processors use on-chip copper-wiring technology. The Pulsar processors integrate IBM CMOS7S technology. iStar and SStar processors integrate CMOS8S technology. Previously, Northstar technology used aluminum for on-chip wiring. Copper's better conductivity permits thinner wires to be used, which enables the transistors to be packed closer together. The denser new technology permits additional micro-architecture methods to improve performance.

Keeping multiple levels of high speed cache is still necessary to keep the processors busy. Denser processor technology permits more on-chip cache. All this new technology is implemented on the new iSeries servers.

This growth and implementation of new technology is possible because of the iSeries TIMI layer. TIMI allows the system to incorporate significant new hardware technology quickly and transparently.

The following figure shows this change of hardware processor technology and previews what is planned in future generations.



Advanced Technology

Advanced Technology

iSeries Architecture: Fundamental Strength of the iSeries

The iSeries servers and supporting software offer important advanced capabilities in such key areas as Java, Web serving, Lotus Domino, integration with Windows NT, managed availability, database, and Business Intelligence solutions. The iSeries solution continues to be a strong performer in such growing areas as data warehousing and the Internet. To gain an appreciation of these technologies and of the particular strength of the iSeries server in delivering them, this chapter provides a summary of each prime element.

With over 650,000 systems shipped worldwide, the iSeries and AS/400e servers have the highest customer satisfaction index in the industry, as measured by IBM internal studies. Ten major factors contributing to this include:

- Offers state-of-the-art 64-bit relational database processing.
- Leads the industry in delivering the first server with Silicon on Insulator (SOI) technology.
- Allows the deployment of Java, UNIX ported applications, Windows 2000, Domino-based applications, and Linux on a single server.
- Directly (natively) supports different file structures, such as PC files, UNIX files, NetWare files, Domino files, ASCII files, and EBCDIC files.
- Can ship with over 200 processor chips under the covers of a “single” large system.
- Can have 32 Windows NT servers in a single system while sharing host systems disk storage, tape, and CD-ROM resources.
- Its object-based design makes it highly virus resistant.
- Has proven it can deliver over 99.9% availability.
- Its operating system can operate for more than one year without ever requiring a re-IPL, in hundreds of customer shops.
- Delivers vector coded indexes for Business Intelligence applications offering up to ten times the improvement in performance.

Why should the system architecture matter to a business person? This section helps you understand why.

Business leaders do not grow their business by simply choosing a computer system. They start by choosing an application to fit their business goals and needs. The iSeries and AS/400e have tens of thousands of proven business applications worldwide. Because of that, very often the computer system is considered first.

If you compared an application running on an iSeries server to the same application running on a non-iSeries server, you would continue to choose the iSeries. Why? Because, although

two systems can appear to be equivalent today, the accelerating rate of change of both hardware and software technologies necessitates that the server you select is designed with the future in mind. The iSeries accommodates inevitable, rapid, and dramatic technology changes with minimum relative customer effort.

Paradoxically, the characteristic of the most advanced design and technology is that you do not notice it... you are not meant to do so. It accommodates rapidly-changing hardware and software technologies in stride — permitting you to fully exploit the latest technologies.

Ask any system manufacturer: *What is future-oriented in the system? Does recovering from a failure typically involve a re-start of the hardware and operating system? What has your reliability rating been in the past few years as technologies have changed?* We believe the iSeries server will be your number one choice.

System Concepts

The iSeries and AS/400e servers are designed and built as a *total system*, fully integrating all the hardware and system software components that a business demands. As a general-purpose business and network system, it is optimized for the required environment with these unique benefits:

- The iSeries architecture is a brilliant, technology-neutral architecture, enabling businesses to readily exploit the latest hardware and software technologies, typically without causing disruption to existing application software. iSeries architecture is described in “iSeries Architecture” on page 13.
- The single purpose pervading each aspect of the iSeries architecture is to *empower a business* with the most advanced technology available, *without encumbering it* with the complexities that such technologies inevitably contain. In other words, the iSeries and AS/400e allow you to rapidly deploy advanced business applications and facilitates your business growth.
- Customers typically decide on the required application software first and then select an environment in which to run it. The iSeries and AS/400e models have tens of thousands of business applications worldwide of which thousands are client/server applications. These applications are written by thousands of IBM Business Partners across the globe. In addition, the iSeries and AS/400e provide excellent platforms for Windows NT and Lotus Domino applications. iSeries and AS/400e models have national language support for over 50 languages, available in 140 countries. Support across the world is provided by an impressive network of global partners.

A concise and expanded explanation of the AS/400e server architecture is contained in the renowned book *Inside the AS/400,* written by the AS/400 system's Chief Architect, Dr. Frank G. Soltis.

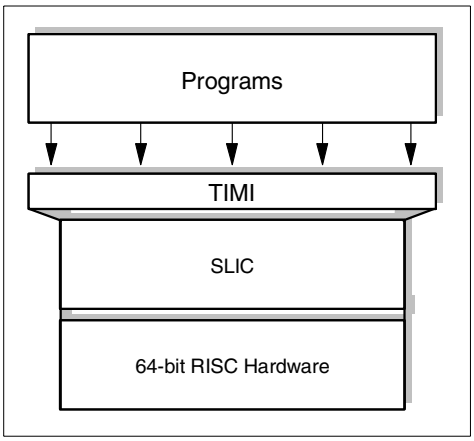
iSeries Architecture

Technology Independent Machine Interface

The iSeries servers are atypical in that they are defined by software, not by hardware. In other words, when a program presents instructions to the machine interface for execution, it “thinks” that the interface is the system hardware. But it is not! The instructions presented to that interface pass through a layer of microcode before they are “understood” by the hardware itself.

This comprehensive design insulates application programs and their users from changing hardware characteristics. When a different hardware technology is deployed, IBM rewrites sections of the microcode to absorb the fluctuations in hardware characteristics. As a result, the interface presented *to the customer remains the same*.

This interface is known as the iSeries Layer, or Technology Independent Machine Interface (TIMI). The microcode layer is known as the System Licensed Internal Code (SLIC).



Many of the frequently-executed routines run in SLIC. Supervisory resource management functions in SLIC include validity and authorization checks. On a customary system, these routines reside in the operating system. Because SLIC is closer to the silicon, routines performed there are faster than routines placed “higher” in the machine.

The brilliance of this design was dramatically illustrated when the AS/400 system changed its processor technology from Complex Instruction Set Computing (CISC) processors to 64-bit Reduced Instruction Set Computing (RISC) processors in 1995. With any other system, the move from CISC to RISC would involve recompiling (and possibly some rewriting) of programs. Even then, the programs would run in 32-bit mode on the newer 64-bit hardware.

This is not so with the iSeries and AS/400e server, because of TIMI. Customers were able to *save* programs off their CISC AS/400 systems, and *restore* them on their RISC AS/400e models. *The programs run as 64-bit programs*. As soon as they made this transition, customers had *64-bit application programs* that ran on a *64-bit operating system,* containing a *64-bit relational database* that fully exploited the *64-bit RISC hardware*.

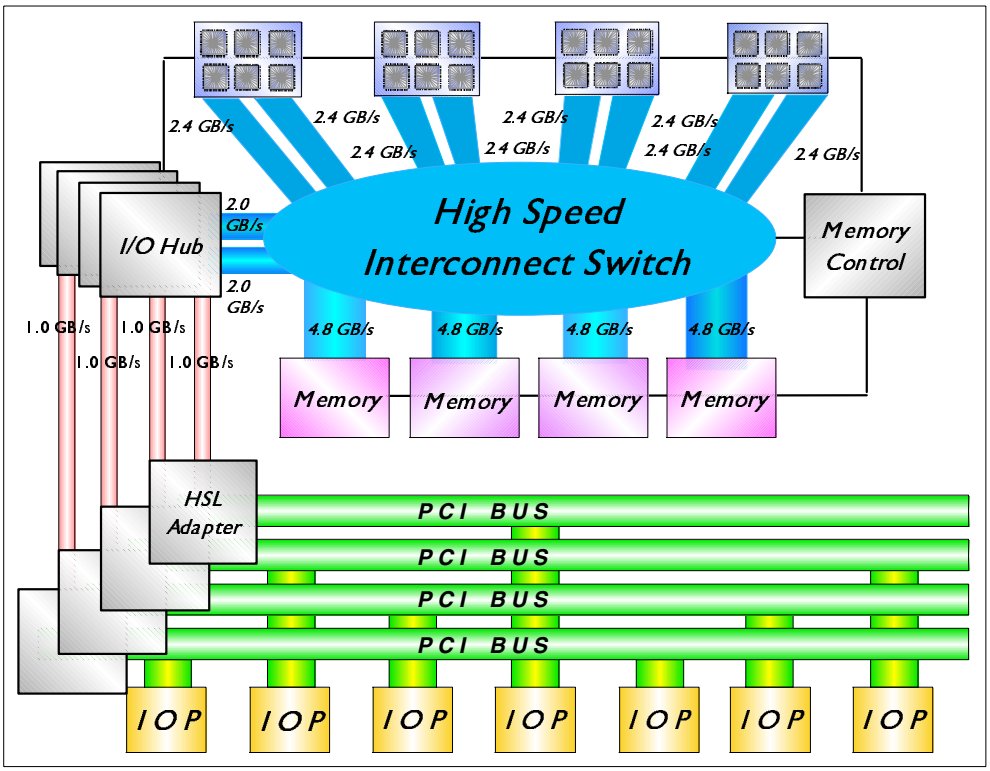
TIMI and SLIC take 64-bit RISC processor technology in stride. These same architectural features will be exploited to fully accommodate post-RISC technologies, which may incorporate 96-bit or 128-bit processors.

Hierarchy of Microprocessors

The iSeries and AS/400e servers are designed for business computing. One of the fundamental characteristics of that environment is that it is I/O-intensive, rather than compute-intensive. In addition to outstanding performance in the business environment, the microprocessor hierarchy design gives the iSeries and AS/400e an elegant method of integrating diverse environments into a single, harmonious customer solution.

The microprocessors that look after a particular I/O device are accommodated on I/O cards that fit into slots on the system buses. One of these cards may be the Integrated xSeries Server. This is a PC on a card, which enables the iSeries to run a Windows NT server, for example.

The following figure shows a range of iSeries processors dedicated to a particular input/output (I/O) device type.



A single large iSeries configuration can have well over 200 processors. The main system processor complex (can be comprised of 24 separate processors) can encounter a request for data to be read from or written to any I/O device. That request for data is delegated to the particular microprocessor dedicated to that I/O device. Meanwhile, the main system

processor continues executing another application program. Nanoseconds (10^{-9} second) is the unit of time used to measure main storage access times. I/O operations are measured in milliseconds (10^{-3} second).

The previous figure shows a high-level overview of the structure of the iSeries 840 model. Central in the figure is the extremely high speed memory-processor-I/O interconnect switch at 43.2 GB/sec. This allows for data transfers between components connected to the switch to proceed at a very high rate. Separate connections to the switch are provided for each group of six processors, each of four banks of memory, and two connections for I/O traffic. These independent paths result in much superior performance than previous designs with a single common shared memory bus path, for which all components contended.

With the new design, there are many paths to the high speed switch, which can operate separately. Its high bandwidth characteristics allow for connecting source and destination quickly and efficiently to allow for significant benefit in overall processor speed and system performance enhancement. This design provides the iSeries and AS/400e with outstanding performance in the commercial, transaction-based environment.

Single-level Storage

Application programs on an iSeries or AS/400e server are unaware of the underlying hardware characteristics, because of the iSeries Layer (or TIMI) (see “Technology Independent Machine Interface” on page 13). Applications are also unaware of the characteristics of any storage devices on the system because of single-level storage.

As with TIMI, the concept of single-level storage means that the knowledge of the underlying characteristics of hardware devices (in this case, main storage and disk storage) reside in the SLIC. All of the storage is automatically managed by the system. No user intervention is ever needed to take full advantage of any storage technology. Programs work with objects (see “Object-based” on page 18). Objects are accessed by name, not by address.

The iSeries and AS/400e server address size is vast. iSeries and AS/400e models can address the number of bytes that 64 bits allows it to address. The value 2^{64} is equal to 18,446,744,073,709,551,616. Therefore, the iSeries and AS/400e models can address 18,446,744,073,709,551,616 bytes, or 18.4 quintillion bytes. To put this into more meaningful terms, it is twice the number of millimeters in a light year. Light travels at approximately 6,000,000,000,000 miles in one year.

Single-level storage also enables another extremely important iSeries and AS/400e benefit, *object persistence*. Object persistence means that the object continues to exist in single-level storage (unless purposely deleted by the customer). Memory access is extremely fast. A customary machine requires that information be stored in a separate file system if the information is to be shared or retained for a long time.

Persistence of objects is extremely important for future support of object-oriented databases for data accessibility and recovery. Objects continue to exist even after their creator goes away. The iSeries and AS/400e models are uniquely positioned to exploit this characteristic of object persistence, where customary systems use a less-elegant mechanism that requires them to store their persistent objects in a separate file system, with all the attendant performance implications.

SOI

The Silicon on Insulator (SOI) technology was applied for the first time for the iSeries with OS/400 V4R5. This technology is used by the iStar processors of the iSeries. The transistors are built within and on top of a thin layer of silicon that is on top of an insulating layer. The insulating layer is fabricated by implanting a thin layer of oxide beneath the primary silicon surface of the wafer.

On-chip Copper-wiring Technology

Pulsar, iStar, and SStar processors use on-chip copper-wiring technology. Pulsar processors integrate IBM CMOS7S technology. iStar and SStar processors integrate IBM CMOS8S technology. Northstar technology used in prior AS/400e processors deploys aluminum for on-chip wiring.

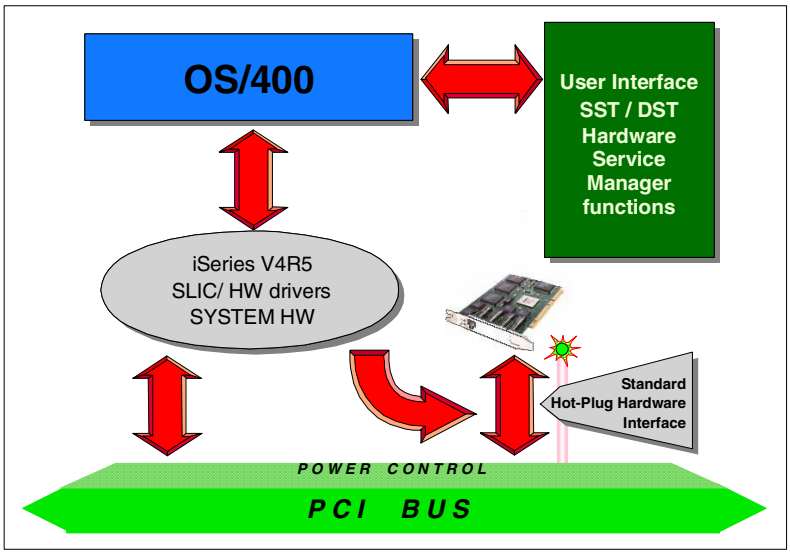
Copper's better conductivity permits thinner wires to be used, which enables the transistors to be packed closer together. This new denser technology permits additional micro architecture methods to improve performance. Denser processor technology also permits more on-chip cache. Keeping multiple levels of high speed cache is enables efficient utilization of the processors.

Hot-plugging

The term “hot-plug PCI” is used by the computing industry for a wide range of purposes. Primarily, hot-plug PCI refers to the technology that allows users to install and remove PCI devices while the computer is running. For iSeries servers, “hot-plug” is known as concurrent maintenance.

A method must be in place to inform the operating system of insertion and removal events. Driven by the demand for the highest possible availability, PCI hot-plugging is available beginning with OS/400 V4R5 on all iSeries 8xx models and some of the 270 models. A brief description of how hot-plugging is implemented on the iSeries follows.

Hot-plugging in the iSeries is made possible by power control to individual card slots, so that PCI IOPs or IOAs can be added, removed, or replaced while the system remains active. In most cases, IOA configurations can be changed while other IOAs on the same IOP remain operational. Hot-plug implementation for the iSeries with OS/400 V4R5 or later is illustrated in the figure on the right.



Beginning in OS/400 V4R5, the interface for hot-plugging actions uses the Hardware Service Manager in the System Service Tools, or a subset of Dedicated Service Tools (depending on which tool you have started). In limited paging environment, Dedicated Service Tools communicates directly with System Licensed Internal Code (SLIC).

Operating System OS/400

One of the single most dramatic points about the iSeries and AS/400e servers is that the operating system, OS/400, is a single entity. This section describes the meaning of this concept.

Once you buy an iSeries or AS/400e server, you do not have to continue shopping for system software components before it is ready to run your business. All of the software components for a relational database, comprehensive security, communications with a broad range of diverse systems, including Internet capabilities, and many more are already there in the operating system. They are all fully integrated into OS/400. By “fully integrated”, we mean fully tested, too. All components and prerequisites for running business applications in the 2000s work together, and are fully tested together. OS/400 operates as a single entity.

A customary machine does not have this approach to its operating system design. A customary operating system, which does the basic system housekeeping, needs a range of software products added before the environment is ready to support modern business applications. Examples of this are software for the relational database, support for various communications environments, software for security, support for an interactive environment, for multimedia, for availability, recoverability, and so on.

On a customary machine, many of these software modules are provided by third parties. A customer has to assure that someone integrates all these modules and performs the tests necessary to verify that they all function together. When one of the software components has a new release, a customer again needs to ensure that component is replaced, plus any other software modules on which it depends. The modules need to be at compatible release levels. Should a software malfunction occur, how do you establish precisely which modules are causing it? Can you be certain that multiple third-party software vendors agree with your diagnosis when you blame their software?

OS/400 does not have any of these problems. To achieve the functionality that is standard in OS/400, a customer would need to integrate typically between 10 and 25 different modules of software. OS/400 is installed with all these capabilities as standard. When software is updated, a new release of OS/400 is made available. OS/400 customers do not have to install individual system software components, nor do they have to check that new releases can co-exist.

Object-based

An object is a container. Everything the system uses—user and system data structures—is packaged in one of these containers. The objects are encapsulated, which means that you cannot see inside. Inseparable from an object is the list of valid ways in which that object can be used.

There are two important consequences of an object-based design. The first is that a system built around an object model supports machine independence. This means that technology changes can be made in the environment without affecting application programs. The second consequence is that an object-based design delivers a high level of system integrity and security.

All objects are structured with a common object header and a functional portion dependent on object type. Therefore, on the iSeries and AS/400e servers, instructions work on only what they are supposed to work. Data cannot be treated as executable code (so that the processor tries, for example, to execute someone's shoe size). Executable code cannot be treated as data (by having something written into the middle of it).

Certain instructions apply to all objects, while other instructions work only on specific types of objects. It is not possible to misuse an object, unlike the situation that exists for non-AS/400 systems without an object-based approach.

Java

Java is a key application development environment for the iSeries and AS/400e. AS/400 Developer Kit for Java supports Sun's Java 2. The Java Virtual Machine, which resides below the iSeries Layer, enables fast interpretation and execution of Java code on the iSeries and

AS/400e servers. In addition, a type of static compiler is available called a *class transformer*, to generate RISC machine code from Java byte codes. This Java transformer enables the direct execution of Java on the system without the overhead of interpretation.

High-performance Garbage Collection is provided by OS/400 to improve the performance and scalability of Java. An advanced Garbage Collection algorithm allows Java to scale to the large numbers of objects expected when running enterprise applications on the server. Over time, Java is planned to become even more integrated with, and tuned for, OS/400 to meet the requirements of performance and scalability on the server without compromising the cross-platform portability of the rich language.

Other technology included in the AS/400 Developer Kit for Java allows GUI applications to run on the system without modification. This support is called Remote Abstract Windowing Toolkit (AWT). It intercepts GUI requests coming from a Java program and re-routes the requests to an attached workstation running its own Java Virtual Machine (JVM). Server programs with graphical interfaces for configuration or tuning run on the system without modification.

Java objects on the iSeries and AS/400e servers can be full-fledged system objects that allow them to be persistent, shared, secure, backed up, and restored. iSeries and AS/400e single-level-storage technology permits Java objects to be stored in their object form without the performance and maintenance overhead of two-level-store operating systems.

Java Deployment Tools are aimed at simplifying the deployment, management, and tuning of Java applications on the system. IBM has tested InstallShield's Java Edition product. InstallShield allows Java application developers to create packages that will install natively on the iSeries or AS/400e. This is the common method used to package and install applications on other platforms, such as Windows NT. InstallShield on AS/400e makes it easier to port applications to the system that are currently targeted for other platforms. A number of Qshell enhancements and utilities are provided to support zip or unzip of Java packages. To aid in performance analysis and tuning of Java applications on iSeries and AS/400e, support is provided to convert data collected by Performance Explorer into standard formats used by popular Java performance analysis tools such as Javation and Hyperprof.

Java applets and applications that access iSeries and AS/400e programs and data from client workstations (or a Java-enabled server) can be written using the AS/400 Toolbox for Java. Java classes on the client can be used to access existing iSeries and AS/400e applications and data using low-level APIs. The AS/400 Toolbox for Java can be used on a client to access AS/400e servers running OS/400 V3R2, V3R7, or V4R1 and later. The ability to run Java applications on the AS/400e requires OS/400 V4R2 or later and V4R5 on the iSeries. The Toolbox requires Java Virtual Machine (JVM) 1.1.6 or later. At V4R4, the AS/400 Toolbox for Java was enhanced to support the Java Database Connection (JDBC) 2.0 specification. Secure Sockets Layer (SSL) specification enable support for data between the workstation and system to be encrypted and the server authenticated.

Java is the environment of choice for programming in today's network computing environment. It allows true portability of applications between platforms without modification or recompilation. The iSeries and AS/400e servers are uniquely positioned to leverage Java as it evolves from its current Web focus to a full commercial application environment. The strengths of the iSeries and AS/400e will be combined with Java's object-oriented, network computing technology to provide solutions in the new millennium.

See “Java for iSeries (5722-JC1 and 5722-JV1)” on page 588 for more information.

Web Serving

An iSeries server can access a vast network of computers as if they are a single entity. Everyone and everything can access and distribute information, applications, and services provided by the network. For Web serving with the iSeries and AS/400e servers, network computing is supported with HTTP Server for iSeries and HTTP Server Powered by Apache for iSeries.

HTTP servers are the core foundation of technology at the heart of all e-business applications. They handle the communication with the client (typically browsers or XML-rendering devices such as palm pilots) and provide the entry point into server resources. These resources can range from simple HTML and GIF files, to e-business and e-commerce applications, all the way to full-blown business-to-business, collaborative enterprises.

iSeries HTTP support includes the Apache HTTP server. Apache, a freeware HTTP server, is open-source software that implements the industry standard HTTP/1.1 protocol with a focus on being highly configure capable and easily extendable. See “HTTP Server for iSeries (5722-DG1)” on page 494 and “HTTP Server Powered by Apache for iSeries (5722-HT1)” on page 501.

OS/400 contains a complete set of base products and features that can be used to create a Web presence. Included are TCP/IP, Java, Virtual Private Networking, Cryptographic Services, Secure Socket Layer, Certificate Management, HTTP Server, Apache Server, and many more. The WebSphere family of products offered by IBM for the iSeries and AS/400e allow you to build a complete e-business Web Site that is secure, easy to develop and maintain, and scale based on your needs.

See “WebSphere and e-business” on page 553 and “WebSphere Development Studio for iSeries (5722-WDS)” on page 597 for more information.

Lotus Domino

Domino for AS/400 is the leading groupware solution available for the iSeries and AS/400e server. It provides unparalleled capability for iSeries customers to use their business data in collaborative e-business solutions, both within their organizations and with their partners over the Internet. Domino for AS/400 provides a critical foundation as companies begin to move from “information overload” into organizational learning and knowledge management. No competitive product offers the ease of use, low cost of ownership, tight integration, and positioning for the future that Domino for AS/400 delivers. Domino for AS/400 is offered with familiar iSeries and AS/400e terms and conditions for purchase, services, and support. See “Lotus Domino Server for iSeries (5769-LNT)” on page 619.

The iSeries Dedicated Server for Domino is specifically designed to deliver outstanding price performance and value when serving a variety of Lotus Domino workloads on a single server. Because the iSeries 270 and 820 models are used as the base models, the iSeries Dedicated Server for Domino is fully configured with all of the same expandability currently available on the iSeries servers 270 and 820.

Refer to “iSeries Dedicated Server for Domino” on page 129 and “AS/400e Dedicated Server for Domino Positioning” on page 45 for more information.

iSeries Integration with the Windows NT Server

Consolidating Servers Inside an iSeries Server

Currently, most companies deploy PC servers by function or service, with each server dedicated and tuned to an individual application such as file, print, or Web serving.

iSeries Integration with Windows NT Server enables Microsoft Windows NT Server Version 4.0 or Windows 2000 to be installed on the Integrated xSeries Server for iSeries. In this single combination server, customers can run their mission critical business applications on the iSeries solution, while also running Windows NT Server or Windows 2000 for file, print, personal productivity, and other applications. Improved hardware control and availability with reduced maintenance costs and simplified user administration and server operations are possible on a combined server.

iSeries is enhanced with additional Windows server integration facilities. These enhancements enable iSeries to support larger and more complex Windows applications and offer additional tools to help reduce the cost of managing Windows server environments.

Attachment of N-way xSeries Servers – New with V5R1

iSeries supports the attachment of external n-way xSeries servers via the High Speed Link. With the new Integrated xSeries Adapter, selected xSeries servers running a Windows 2000

Server can be used to extend Windows application scalability, while retaining the storage consolidation and systems management advantages of the Integrated xSeries Server.

Enhancements for the new Integrated xSeries Server include support for up to 32 servers on selected iSeries models. See “iSeries Integration with Windows Server (Base 5722-SS1 as 5722-WSV)” on page 490.

Benefits of Server Consolidation on the iSeries Server

Server consolidation on the iSeries or AS/400e allows you to:

- Consolidate PC server hardware and operations so you can run up to 32 Windows NT servers in a single server.
- Increase business recovery protection with high-speed backup of the combined iSeries server and Windows NT systems.
- Improve server uptime and error recovery using highly reliable iSeries disk drives with RAID-5 and mirroring options. Use a spare Integrated xSeries Server to replace a failed server without reloading Windows NT.
- Maximize I/O investments by balancing iSeries servers and Windows NT disk resources from a single pool. Switch user data disks between servers. Share the iSeries tape and CD-ROM drives.

Logical Partitioning (LPAR)

Logical Partitioning enhances the role of the iSeries as a consolidated server. LPAR is of value to customers who need server consolidation, business unit consolidation, mixed production, and a test environment, as well as integrated clusters. With LPAR, companies have both the power and flexibility to address multiple system requirements in a single machine.

LPAR lets you run multiple independent OS/400 instances or partitions (each with its own processors, memory, and disks) in an n-way symmetric multiprocessing AS/400e 6xx, Sxx, or 7xx and uni or n-way on 270 and 8xx models. Address multiple system requirements in a single machine to achieve server consolidation, business unit consolidation, mixed production/test environments, and integrated clusters.

Partitions have different system names and may have a different primary or secondary national language, or they may operate using different time zones. Each partition's system values can be set independently. This flexibility is ideal for banks and other multinational companies to centralize operations in a single location, yet retain the national characteristics of each system. Logical partitions are ideal for companies to run mixed interactive and server workloads on a single iSeries. Logical partitions allow the interactive performance of an iSeries to be flexibly allocated between partitions.

With OS/400 V5R1, LPAR is significantly enhanced to allow dynamic movement of processor, memory, and interactive performance between partitions. Up to four OS/400 V5R1 partitions per processor with a maximum of 32 partitions is supported.

Virtual LAN support establishes multiple high speed TCP/IP communication connections between partitions. Additional communication hardware is not required.

Linux is now supported in a logical partition.

You can find more details on LPAR in “Logical Partitions (LPAR)” on page 461.

Virtual LAN

Virtual LAN is new with OS/400 V5R1. Virtual LAN provides 16 independent high speed internal bus-to-bus communication paths between logical partitions and supports TCP/IP protocol.

Virtual LAN provides the additional granularity to set up high speed communications between partitions by being selective on which partitions or applications within a partition are allowed to communicate with other logical partitions on the system. More importantly, it allows high speed bus-to bus communication between OS/400 partitions and Linux partitions. It will be possible to select multiple communications paths between partitions and potentially tie in each of these paths to a specific application.

The enablement and set up of Virtual LAN is easy and does not require an IPL or any special hardware or software. Once a virtual communications port is enabled for a given partition, a communication resource (CMNxx) is created for that partition. The user can then create a high speed 1 GB Ethernet line description over this resource and set up TCP/IP configuration appropriately to start communicating to another partition. A maximum of 16 virtual ports can be enabled for high speed communications per partition.

Virtual LAN does not require any additional software or hardware. It provides the ability to provide multiple communication paths between applications that are executed in each of the partitions.

Extended Adaptive Cache

Extended Adaptive Cache is an advanced read cache technology that improves both the I/O subsystem and system response times by reducing the number of physical I/O requests that are read from disk. Extended Adaptive Cache operates at the disk subsystem controller level. It does not affect the system processor.

Management of the cache is performed automatically within the I/O adapter. It is designed to cache data by using a predictive algorithm. The algorithm considers how recently and how frequently the host has accessed a predetermined range of data.

The design of Extended Adaptive Cache is based on specific data management strategies of the iSeries server. To explain, whether the disks are device parity protected, mirrored, or unprotected, the data stored on the disks has a tendency to occur in bands. This means that there are physically contiguous areas of disk storage that fall under one of the following categories:

- Areas where the data is actively read
- Areas of data that are both actively read from and written to
- Areas that are frequently written to
- Areas of storage that are not frequently accessed

The goal is to cache bands characterized as read or write and read-only. A band that is characterized as write-only, while cached in the storage subsystem write cache, remains largely unaffected by Extended Adaptive Cache. Extended Adaptive Cache is designed to not harm the performance of large blocks of data that are either sequentially written or sequentially read. In this case, the pre-fetch capability of the disks, as well as other caches in the system, ensures a quick response time.

Using Extended Adaptive Cache improves the performance of database-read actions and all read actions. This includes read actions that are generated by other system components such as the Integrated xSeries Server. It also works effectively in storage subsystems that have device parity protection or mirroring.

Extended Adaptive Cache Simulator Restrictions and Considerations

- A storage controller capable of supporting Extended Adaptive Cache is required for Extended Adaptive Cache Simulator. This includes the #2748, #4748, #2778, or #4778.
- The Simulator is enabled and disabled by the user through AS/400 Operations Navigator, Management Central, or Collection Services.
- Performance Tools LPP is required for Extended Adaptive Cache Simulator.
- Activating the Extended Adaptive Cache Simulator does not actually improve your system's performance. It gathers statistical information to predict the performance improvement that Extended Adaptive Cache could offer.
- Extended Adaptive Cache Simulator and Extended Adaptive Cache cannot be active at the same time on the same I/O adapter.

OS/400 Portable Application Solutions Environment

The OS/400 Portable Application Solutions Environment (OS/400 PASE) is a technology designed to expand the iSeries and AS/400e solutions portfolio. OS/400 PASE is an integrated runtime that provides simplified porting of selected solution provider UNIX applications.

The broad base of iSeries and AS/400e server applications are continually enhanced by new applications coming to the platform from a variety of sources. Until recently, the iSeries and AS/400e servers' Integrated Language Environment (ILE) accounted for the majority of C or C++ applications ports, many originating on UNIX systems. Other applications have UNIX system-specific requirements or are designed for highly compute intensive demands that favor a UNIX runtime. With the latest addition of OS/400 PASE, ISVs can rapidly port UNIX applications to the iSeries and take advantage of the extensive iSeries architecture.

OS/400 PASE provides a broad set of AIX interfaces, in a runtime that allows selected UNIX application binaries to run directly on the PowerPC processor of the iSeries or AS/400e server.

Refer to "PASE (Portable Application Solutions Environment) (5722-SS1 Option 33)" on page 483. You can also find more information on the Web at:
`http://www.iseries.ibm.com/developer/factory/pase/index.html`

Reliable, Managed Availability

The iSeries server has a reliable history of designing key functions into the hardware and software. High availability is one reason to select a managed availability approach. Other reasons include minimal disruptive backup solutions and the ability to non-disruptively install and pre-test new versions, releases, or software fixes to make optimum use of all company and system resources.

Hallmarks of iSeries availability include redundant internal hardware features, such as RAID-5 and mirroring. The robustness and stability of OS/400 extends into its multiple, subsystem support (batch, interactive, multi-language, applications). The iSeries server offers managed availability to ensure that it is ready to do business when you are.

iSeries managed availability software is also called *cross-system mirroring*. It provides:

- The ability to have one system act as a "hot" backup system to one or more primary systems. The primary and secondary systems do not have to be the same size or model.
- A rapid switchover to the secondary machine in the event of an emergency.

- System backup that allows data from the primary system to be completely backed up after only a few minutes of down time. While the secondary system has a “static” copy of the “primary” system’s data, the primary system continues to operate. Changes are transmitted to the secondary system and applied when the backup is complete, therefore, providing continuous protection.
- The secondary system can be used for other activities, for example, business intelligence or application development, while it concurrently provides backup to the primary system. The secondary system can also be used to “load balance”, to offload work of the primary system.
- Selection of which items on the primary system to dynamically protect by the secondary system. This can minimize disk capacity on the secondary system or allow a smaller model to be used to “cross-system mirror” the larger system.
- Cross-protection among two or more systems, hundreds of miles apart. Data integrity is maintained in both directions. Backups can be performed at the remote site.
- New software versions and releases (OS/400 and associated software), or fixes on the secondary system can be applied while the primary system continues to function. Testing can occur on the secondary system before non-disruptively updating the primary system.

iSeries servers offers superior technology, service, and support in each of five critical components of availability:

- **Single system reliability**: Architecture and baseline design make the iSeries server one of the most reliable servers in the world. The iSeries serves the small business customer with minimal skill or resource to manage complex environments. From its inception, the iSeries architecture inherits a design where reliability and availability are equal parameters to features like processor speed, memory capability, and number of disk arms.

  iSeries design and development resources enable high levels of availability in a single system environment. This highly reliable design is useful for unplanned outages by the iSeries customer. The single-system iSeries remains the core building block to repeat and extend functions into other areas of the business.
- **Single-system availability management**: iSeries servers have high-availability facilities that are fast, automated, and easy to use. Best availability practices are accessible to help reduce the duration of planned and unplanned outages. These high availability practices include facilities such as:
  - Save-while-active
  - Parallel save and restore
  - Backup Recovery and Media Services (BRMS) for iSeries
  - RAID-5 disk parity protection
  - Disk mirroring protection

  - Automated journal management
  - Access path protection

- **Clusters**: Cluster technology is implemented to reduce downtime due to planned outages and site disasters. System availability during planned outages leads to increased unplanned outage coverage.

  iSeries clustering took a major step forward with the introduction of Cluster Resource Services as part of OS/400 V4R4 (as APIs). OS/400 handles the complexity of managing systems in a cluster and keeping track of data and applications. Protect your business from unplanned and planned outages, as well as site loss disasters. Cluster management and enhanced data resilience applications complete the total solution. Both are provided by high-availability business partners.

  Significant functions are provided with OS/400 V5R1 to allow improved flexibility and availability. New capabilities include Independent Auxiliary Storage Pools (IASPs) that allow access to data independent of the System ASP and other User ASPs. Refer to “Clustering” on page 467.

- **Applications - Cluster Proven**: iSeries implementation of high availability solutions involves the active participation of cluster middleware business partners. The partners provide cluster management and data resiliency tools. Solution Developers design applications to maintain application states across an outage. Cluster management and enhanced data resilience applications to complete the total solution. Both are provided by high-availability business partners.
- **Availability services and support**: As a world leading enterprise computing vendor, IBM has a wealth of products and services to assist the customer to develop and maintain a high availability environment.

Linux for iSeries

IBM supports your choice of platform and operating systems, a commitment now extended to include Linux, the open-source operating system. Linux can enable a new stream of e-business applications to complement the strengths of the iSeries as an integrated core business solution. Linux inherits important strengths and reliability features of the iSeries architecture.

iSeries is enhanced to support Linux running in a secondary logical partition. The primary partition runs OS/400 V5R1. Up to 31 Linux partitions are supported depending on the iSeries model. See “Linux for iSeries” on page 465 for more details.

High Speed Links (HSL)

A new bus structure using High Speed Links (HSL) provides a faster data transportation mechanism for the iSeries 270 and 8xx models. These new systems have faster processors, more on-chip cache, a faster memory bus, a super fast cross-bar switch complex (with speeds *up to 43.2 GB per second*), faster DASD, and much faster IOPs and IOAs. New fibre channel adapters step the iSeries into the world of SAN.

This new bus structure of HSL provides:

- Performance improvements and future system growth
  - 1 GB/sec technology
  - 700 MB/sec maximum deliverable capacity running full duplex
- Simplified implementation
  - Loop technology for redundancy
  - Multiple towers per loop
  - Migration tower attachment to support SPD I/O towers and PCI expansion Towers (#5065/#5066)
- A homogeneous HSL network with V5R1 HSL adapters
  - Simple HSL Clusters (two iSeries)
  - xSeries for iSeries HSL connectivity
  - Switchable HSL connected tower with IASP

For further details, see the product sections within this Handbook or *AS/400e to iSeries 400 Migration*, SG24-6055.

Clustering with Switchable DASD and IASP

OS/400 V5R1 and HSL OptiConnect provide switchable disk capability. Independent Auxiliary Storage Pools (IASPs) and Switched Disk Clusters provide the ability to access content on a set of disk units from a second system. Support for both planned and unplanned outages is improved when the system currently using a disk experiences an outage. Operations are continued on a system even when an isolated controller or disk unit fails.

Data availability is improved with independent auxiliary storage pools (IASP) or switched disk clustering. Within a cluster, users can be switched to an alternate node in the cluster (another iSeries) upon an outage. Data residing in an IASP can be switched to another iSeries server without an IPL. This enables one iSeries to take over data and I/O controller in a disk tower from another iSeries.

Option 41 of OS/400 V5R1 is required to enable independent ASPs and switched disk clusters. It is a chargeable feature.

The primary function in the early stages is to offer coverage for planned upgrades and maintenance on the production system without affecting users accessing data from the switched disk towers - User Defined File System only. Cluster management middleware software, shipped as part of OS/400 option 41, manages the switchover, and for high availability purposes insures that no two system access the disks (data) at the same time. A properly designed switch disk cluster can offer some advantages over a data replication cluster. Because a switch disk cluster does not use data replication, there is slightly less overhead on the systems and more available for processing of transactions. A switched disk cluster can be simpler to operate. Domino 5.0.7 is the first application to take advantage of this support and uses the switched disk architecture to attain ClusterProven specification. Switched disks do not remove the requirement to have application resiliency. The application is critical to the design of a true continuously available environment.

In this first release of Independent ASP, IFS files only are supported. For V5R1, IFS applications such as Lotus Domino or many Web serving applications are supported. This is useful in situations where workstations or communication lines are associated with the IFS data and the associated application is being switched. Planning and setup work are required to make sure the resources being switched are named identically on both servers.

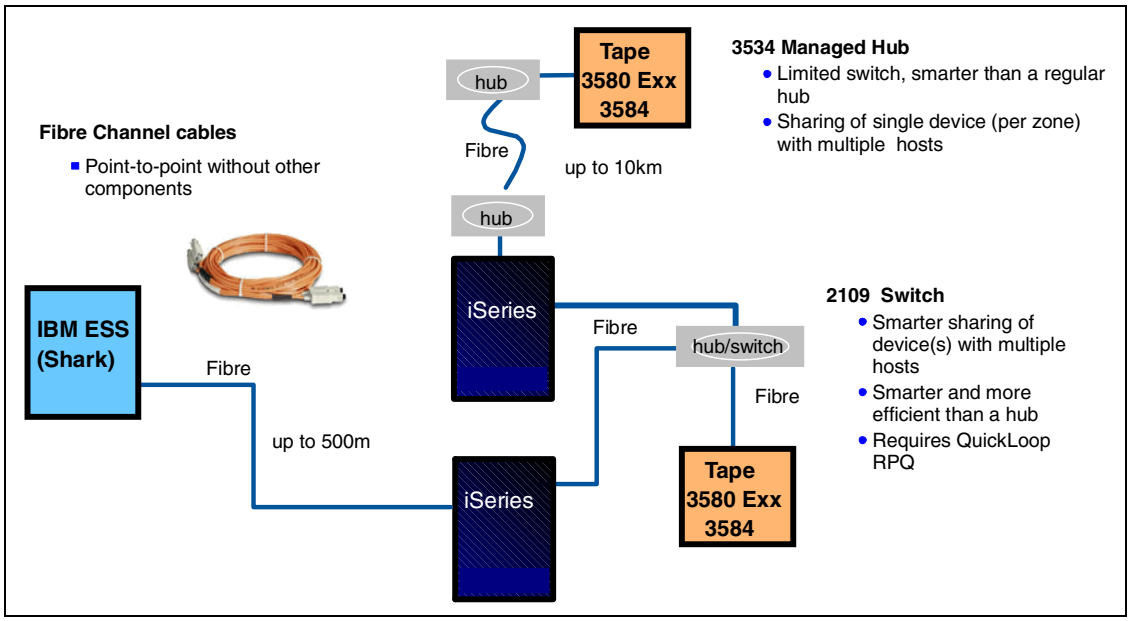
Note: All I/O, not just the disk in the I/O tower, is switched. LAN, WAN, workstation controllers, etc. in the I/O tower are switched at the same time.

Fibre Channel Adapters

With V5R1, the iSeries can attach external disk and tape subsystems via high speed fibre channel disk and tape adapters. This enhances the iSeries' ability to participate in Storage Area Networks (SAN). Storage Area Networks (SANs) may be defined as a combination of technologies – including hardware, software, and networking components – that provides any-to-any interconnection of server and storage elements. Fibre Channel technology is often used in many of the more flexible topologies and is gaining popularity and usage.

Without other components, a Fibre Channel cable runs directly from an iSeries Fibre Channel adapter to a Fibre Channel adapter in a tape drive or IBM ESS (Shark). The cable can be up to 500 meters long. If more than 500 meters is needed, a pair of hubs or switches is added to the configuration, allowing up to 10,000 meters (10 km) distance. The iSeries supports a specific managed hub. A managed hub is a hybrid, a limited switch, but smarter than a plain, regular hub. The iSeries also supports a regular switch in QuickLoop mode.

Refer to "V5R1 System Unit Hardware (PCI)" on page 284 for information on the Fibre channel adapters. See "Peripherals" on page 387 for information on hubs and switches. You can refer to "Removable Storage Media Devices" on page 343 and "Removable Storage Media Devices" on page 343 for tape drive information. For the IBM ESS, see "2105 Enterprise and Versatile Storage Servers" on page 381.



Database

DB2 UDB for iSeries offers state of the art database functions and open systems, standards based technology, while providing the maturity, stability, and ease of use that has become the trademark of the iSeries server. DB2 Universal Database (UDB) for iSeries is fully integrated into the OS/400 operating system software. It is not a separate product.

DB2/400 has been enhanced over the years to include many new and emerging standards. The integrated database is a full function database with features competitive to other widely used databases. The fact that the DB is integrated allows the operating system to control some of its management functions and makes it easier to maintain than competitive DB from other vendors reducing the need for a dedicated Database Administrator. Its security functions are integrated into the operating system. These functions allow a better security model than other DB where additional tools may need to be purchased to provide these functions.

The SQL Client Integration API allows providers of gateways and client/server solutions to integrate their products with DB2 UDB for iSeries. Many iSeries customers have the need for applications that not only access DB2 UDB for iSeries data, but also access data on other databases platforms such as Oracle or Sybase.

See “DB2 Universal” on page 443.

AS/400e Business Intelligence Solutions

What is Business Intelligence?

Business Intelligence (BI) turns corporate data into meaningful business information. It can help you understand business trends and make better forecasting decisions. It can be used to bring better products to market in a more timely manner. It can be used to analyze daily sales information and make snap decisions that can significantly impact your company's performance. Business Intelligence provides a means for you to become familiar with who your customers are.

Business Intelligence turns corporate data into decision support information. Business Intelligence solutions have become much more affordable due to new innovations in software and hardware. One of these key technologies is data warehousing. Data warehouses provide the plumbing for Business Intelligence applications. The advent of data warehouse technology and industry specific Business Intelligence applications have made implementations meaningful and cost effective.

AS/400e Enabling Technology

The iSeries and AS/400e servers offer state-of-the-art 64-bit relational database processing. The system has been optimized for a Business Intelligence environment with customized hardware (iSeries and AS/400e servers) and optimized software (DB2/400, SMP for DB2/400, DB2 Multi-System, and Data Propagator Relational). These hardware and software functions combine to make a powerful Business Intelligence server that is easy to install, manage, and use.

With iSeries and AS/400e server open interfaces, hundreds of tools can be used to provide Business Intelligence solutions accessing DB2/400 data transparently. Such tools include desktop analysis tools (Business Objects, for example) and sophisticated multi-dimensional analysis (commonly referred to as OLAP) tools (Essbase/400, for example), with no special programming required.

SMP for DB2/400 provides parallel query processing. This allows multiple processors in a single AS/400e server to collectively work on a single query, which can improve query performance by as much as 400%. *DB2 Multi-System* support provides clustering for the iSeries and AS/400e and allows up to 32 servers to be “clustered” together into a single system. This clustering provides almost unlimited scalability and unparalleled performance for customers. The combination of all of these advanced features has dramatically improved system performance so much that customers using UNIX systems, PC servers, and even large specialized parallel servers have converted from these machines to iSeries or AS/400e servers.

Data replication is an important technology to facilitate the automated loading of data warehouses while cleaning up or summarizing data for integrity and performance purposes. DataPropagator/400 provides asynchronous data movement between OLTP systems and Business Intelligence systems. Data Propagator allows fields to be summarized, derived, or aggregated into the data elements necessary in your data warehouse.

Data mining is a Business Intelligence application that uses mathematical algorithms to scan potentially large amounts of data to find the golden nuggets of information. Intelligent Miner for AS/400e provides the most advanced data mining application for iSeries or AS/400e customers. It offers optimized computer models to “discover” data relationships previously unknown. The models include algorithms for clustering, information classification, predictions, associations, sequential pattern recognition, and time sequence patterns. This analysis provides executives with insight that can truly be a competitive advantage.

Business Intelligence Solutions

Industry-specific Business Intelligence solutions allow customers to implement off-the-shelf industry applications that are designed for their business. These applications provide a range of functions that are specific to an industry and generally provide users with instant functional application templates that can be customized to meet each businesses unique needs.

Business Intelligence Tools and Applications

Virtually every major Business Intelligence tool is supported on the iSeries and AS/400e servers. That includes such tools as Data Mirror and ETI Extract for moving and cleansing data, and tools for organizing data into a multi-dimensional and relational format as Essbase/400 and DataTracker. It also supports such multi-dimensional analysis tools as Analyzer, Business Objects, and Cognos Powerplay. These tools allow customers unlimited flexibility in building their own Business Intelligence applications. They also allow applications to use OS/400 and non-OS/400 data.

There are many technical advantages of using the iSeries or AS/400e server for your Business Intelligence server. The main reason why customers choose the AS/400e server is the combination of its power and simplicity. The system provides a full range of tools, applications, and hardware in a single integrated platform that helps to make rapid implementation a reality. Large and small businesses alike agree that this is the ideal Business Intelligence server.

iSeries and AS/400e servers provide outstanding database technology that supports rapid access to large amounts of data. OS/400 supports a wide range of Business Intelligence solutions including small departmental applications, and very large Business Intelligence environments. The benefits of this application are measured by the more informed decisions that can be made as a result of having better information and information in a format to support the decision-making processes of a company.

e-business

Success in business today depends on one thing: meeting customer needs, which are unique to each organization. To meet those needs, the best option is to build a computer to do business the way each organization does. That means a server that is flexible, versatile, and can deliver customized solutions, all in a cost effective manner.

The iSeries and AS/400e server have always been designed for business. By tightly integrating hardware, software, middleware, and the operating system. The iSeries and AS/400e servers provide a combination of power and flexibility that organizations can rely on to help them in their business. This design also makes it possible for the system to help ensure that they move with technology as it changes.

The latest AS/400e hardware enhancements are the iSeries 270 and 8xx models. The newest version of the operating system is OS/400 V4R5. OS/400 is engineered to provide the performance and tools needed to help to obtain a quicker return on a business' investment in such critical areas as e-business, enterprise resource planning, Business Intelligence, and server consolidation.

e-businesses require hardware and software solutions with cost-effective computing power. However, more importantly, they need solutions that scale well as workloads grow larger and more complex. To scale well means the computer system grows in capacity to accommodate business growth without changing the customer's applications, hardware, or system software investment. The AS/400e has always been known for its scalability and meeting the needs of a dozen to several thousand users with the same architecture and operating system. The recent outstanding performance of AS/400e as a Domino server in an independent NotesBench audit (10,400 concurrent light mail users on a single AS/400e server) demonstrates that the AS/400e scales just as well with new, advanced e-business applications as it does with a core line-of-business applications.

Characteristics of a Successful e-business

IBM has effectively branded and marketed the term *e-business*. The market is beginning to have a general sense of what e-business means. But an expanded explanation with better examples is necessary. The topics that follow describe the *defining actions* of tomorrow's successful e-business:

- Fully exploiting the latest IT tools and techniques
- Delivering a broad spectrum of applications
- Reaching a broad spectrum of users

These defining actions sound familiar to anyone who knows the fundamentals of using information technology (IT) to achieve competitive advantage. e-business does not change the fundamental rules, but represents a dramatic shift in a typical company's ability to cost-effectively exploit IT on a broad scale. Simply stated, a wide range of affordable tools is

now available to enable even the smallest organization to conduct business electronically on a world-wide scale. This allows them to achieve a competitive advantage in a cost-effective manner. See “WebSphere and e-business” on page 553 and “IBM Licensed Programs: Lotus Products” on page 619.

Advanced User Interface

V5R1 delivers two times more advanced GUI function to iSeries and AS/400 customers than the previous release. Operations Navigator is significantly expanded in this release with industry-leading integrated systems management via easy-to-use graphical interface.

Operations Navigator

The systems management function now delivered via the easy-to-use Operations Navigator GUI includes:

- Work management (Active jobs, subsystems, job queues, memory pools)
- Backup and Recovery (BRMS GUI plug-in)
- Logical Partitions (LPAR)
- System values, including system comparison and update via Management Central
- Distributed user/group administration via Management Central
- Licensed program and fix creation, distribution, and installation via Management Central
- Enhancements to performance monitors and collection services to graph extended time periods
- New monitors and events for managing jobs and messages
- Complete DASD management: Disk balancing, compression, management of disk pools, and units
- Simple two-node cluster configuration
- Integrated xSeries Server: Windows user/group and disk administration
- Database Navigator: Provides a pictorial view of the database showing the relationships between objects.
- Graphical command prompting
- TaskPads: A user interface extension that allows easy access to key administrative tasks.

Other ease-of-use initiatives for V5R1 include the addition of numerous GUI extensions to existing Operations Navigator functions, the creation of numerous configuration and

administration wizards (many of which are in the new GUI areas listed in the previous list), and a new iSeries Information Center with online documentation available on the Web or CD.

Management Central-Pervasive

Management Central-Pervasive (MC-Pervasive) allows iSeries network administrators to keep an eye on their iSeries or AS/400 servers while they are away from their workstation or office. Using an Internet capable cellular phone, PDA with a wireless modem, or a Web browser, the administrator can monitor and manage their iSeries servers.

V5R1 enhancements for MC-Pervasive include:

- Additional support for system performance monitoring
- Monitor specific jobs and servers on multiple systems
- Monitor message queues on multiple systems
- Hold, release, or end a job on any endpoint system
- Run commands on any system or group of systems
- Manage Integrated xSeries Servers
  - View status of Integrated xSeries servers
  - Startup and shutdown of Integrated xSeries servers
  - Run Windows commands
  - Monitor Integrated xSeries events (routed to an iSeries message queue)
- Read only mode for selected users

These additional V5R1 enhancements are available via an English-only PTF. Customers interested in using Pervasive need to refer to the following IBM Web site to obtain the PTF numbers to load the code and MRI for Pervasive:

`http://www.ibm.com/servers/eserver/iseries/sftsol/pervasive.htm`

EZ-Setup for V5R1

In V5R1, EZ-Setup is extended to include:

- Installing and configuring Domino for iSeries
- Configuring LDAP service
- Configuring HTTP (using the Internet Connection Setup wizard)
- Installing Information Center
- Configuring the Extreme Support Connection

EZ-Setup now provides a complete setup path for many users and allows one to go from out-of-the-box to serving a business in one quick and easy path. EZ-Setup is now a part of iSeries Client Access Express and is on the *Setup and Operations* CD-ROM (shipped with all orders).

Information Center for iSeries

The Information Center for iSeries provides the starting point for finding iSeries technical information and is available on a CD-ROM shipped with OS/400. It is also on the Internet at:
`http://www.ibm.com/eserver/iseries/infocenter`

In V5R1, the Supplemental Library on PDF is integrated with the Information Center to provide a one-stop place to obtain technical information. You can search the PDF and HTML files in one search at the Internet site. In V5R1, the Information Center installation provides a wizard to install the Information Center to an intranet server from the iSeries. The wizard can even configure your HTTP server and set up search on the intranet.

XML Enablers

eXtensible Markup Language (XML) is one of the key technologies fueling growth of e-business and mobile e-business solutions. XML is becoming the standard way to represent data in a portable, reusable format for use in a number of solutions ranging from business-to-business (B2B) solutions that link together trading partners to pervasive computing applications, which connect mobile devices such as cell phones to core business solutions.

IBM and iSeries are committed to supporting XML. This support is demonstrated by the suite of XML application enablers delivered with OS/400 in V5R1, providing a core of XML services for applications to build on.

The XML application enablers provided in V5R1 include:

- XML parsers for use with Java and C++ applications. XML parsers are a common building block that XML-based solutions use to work with data in XML format.
- XML parsing interfaces for procedural languages such as RPG, COBOL, and C. These interfaces open the realm of XML to existing solutions, providing an easy path to extend these solutions with XML support.
- An Extensible Stylesheet Language (XSL) processor used to apply XSL stylesheets to transform an XML document into another markup language format. XSL stylesheets are the standard way to convert data between two XML document types and are commonly used to convert XML data to HTML for presentation in a Web browser environment.

Security

The many levels of security available with OS/400 ease the job of system security management. The five levels of security range from minimal to an enhanced level that

enables the iSeries servers to operate at the C2 level of trust as defined by the United states government. Security at V5R1 has been enhanced with:

- Enhanced system integrity with digital signature and object signing
- Easier to use Digital Certificate Manager
- Enhanced password protection

See “Security” on page 441.

Summary

iSeries and AS/400e servers offer a brilliant architecture that is not found on simply any business computing system. There are many examples of where the system architecture has delivered on its promise of making the most advanced technology readily and continuously available to its customers. For example, the iSeries and AS/400e have enabled their customers to:

- Provide Internet access to existing iSeries and AS/400e applications. Through a product known as HTML Gateway (which resides within OS/400), Internet users can access and run iSeries and AS/400e applications.
- Integrate diverse environments (such as Microsoft Windows NT and Lotus Notes/Domino) onto the iSeries or AS/400e server. All customer solutions require a range of hardware and software products from a variety of vendors. The iSeries and AS/400e, through integrating these mixed environments, simplify the task of managing them.
- Change to the on-chip copper-wiring processor technology or to Silicon on Insulator technology for the medium and high end servers.
- Implement PCI hot-plugging technology for higher availability, and use other performance boosting innovations such as the High Speed Link and new high speed LAN adapters.

Workload and Performance

Workload and Performance

Workload and Performance

Workload and performance are critical considerations in selecting an iSeries server. This chapter discusses some of the tools and factors to take into account, including workload ratings and processor positioning. Detailed performance information is in *iSeries Performance Capabilities Reference*, SC41-0607, which is located on the Web at:

- http://www.iseries.ibm.com/developer/performance/index.html
- http://www.ibm.com/eserver/iseries/library

For sizing recommendations, consult with your IBM Marketing Representative and service provider.

Commercial Processing Workload

When the AS/400 system was announced in 1988, the Relative Performance Rating (RPR) or Relative System Performance (RSP) of different models was measured using a RAMP-C workload. This workload is representative of general commercial processing. RPR figures for AS/400 models have been expressed relative to the 9404 Model B10, which was the initial entry model for the AS/400 range in 1988. It had a RPR rating of 1.0.

The AS/400e product line continues to grow in power with the PowerPC RISC processors and 24- and 12-way processors. With the increased processing power and more applications using vital technologies, such as Web serving, client/server, and multimedia, the point was reached when RAMP-C was no longer a valid means for measuring relative performance. Therefore, RAMP-C was replaced by a workload measurement called Commercial Processing Workload (CPW) in the second half of 1996.

Relative performance measurements are derived from commercial processing workload on the AS/400e. CPW is representative of commercial applications, particularly those that do significant database processing in conjunction with journaling and commitment control.

CPW contains a number of advantages over RAMP-C for measuring the iSeries and AS/400e servers, such as:

- Inclusion of a batch component
- Increased numbers of transaction types
- Support for journaling and commitment control
- Increased path lengths
- More complex file and terminal I/O

These enhancements mean that CPW exercises hardware and software paths that more closely match the paths exercised by our customers' current installations.

CPW values have been calculated for all previous AS/400e models. The summary table for most of the models, shown in “Summary of Earlier AS/400, AS/400e, and iSeries Models” on page 731, includes the CPW figures as well as RAMP-C figures. For processors announced since August 1997, CPW values are issued. No further RAMP-C figures are provided.

Note: Throughout this document, both RAMP-C and CPW performance figures are described as Relative System Performance (RSP). This is done to ensure consistency and to identify what is being referred to. RAMP-C or CPW is used to identify to which RSP the figures apply.

CPW figures are not based relative to a single model, as was the case with RAMP-C. CPW values give a relative performance rating of all iSeries and AS/400e processors.

CPW can be used as a quick means of comparing performance. However, a more detailed analysis should always be done using BEST/1 for OS/400. The performance users see that their AS/400 depends on many factors. Some of these factors include: the type and number of disk devices, the number of workstation controllers, the amount of memory, the system model and processor, the application being run, and other factors.

More detailed performance information is found in the *AS/400 Performance Capabilities Reference - Version 4, Release 5*, SC41-0607. This document is available on the Web at:
`http://publib.boulder.ibm.com/pubs/html/as400/online/chgfrm.htm`

IBM Workload Estimator for AS/400

The IBM Workload Estimator for AS/400 is a Web-based estimation tool that automates the manual calculations previously required from paper sizers. The Estimator tool allows the user the option to enter data for multiple workloads, from which a machine recommendation is made that best fits overall system needs.

IBM Workload Estimator is found on the Web at:
`http://as400service.ibm.com/servlet/EstimatorServlet`

Disk Arm Requirements

The disk configuration can be a major contributor of performance bottlenecks. It is important to size an iSeries and AS/400e server with an appropriate number of disk arms, to provide for the best obtainable disk subsystem performance, and, therefore, improve overall system performance.

A physical disk drive (and the processing through the disk controller) performs a specific number of disk accesses each second. Newer disk arms and controllers provide better performance than previous drives. Therefore, fewer disk drives (disk arms/actuators) can typically be used, yet provide comparable performance.

To help size the minimum number of disk arms required for a given AS/400e processor, refer to the AS/400 Disk Arm Requirements based on the *Processor Model Performance* document at: `http://www.iseries.ibm.com/developer/performance/dasdmenu.html`

ISV and other application solution providers also have recommendations for a minimum configuration.

iSeries Model 270 and 8xx Performance

The iSeries Model 270 and 8xx servers are significant steps in the evolution of the AS/400e server product line. iSeries Models 270, 820, 830, and 840 are configured to meet a wide range of performance requirements. Whether the system is running mostly back-office applications, newer e-business applications, or a mixture of both, the performance can be customized on the new servers to match business needs. Each model includes a base processor and interactive performance feature. Optional processor and interactive performance features can be selected to balance the server's performance for a given workload. Increasing performance on installed servers is done simply and with little disruption.

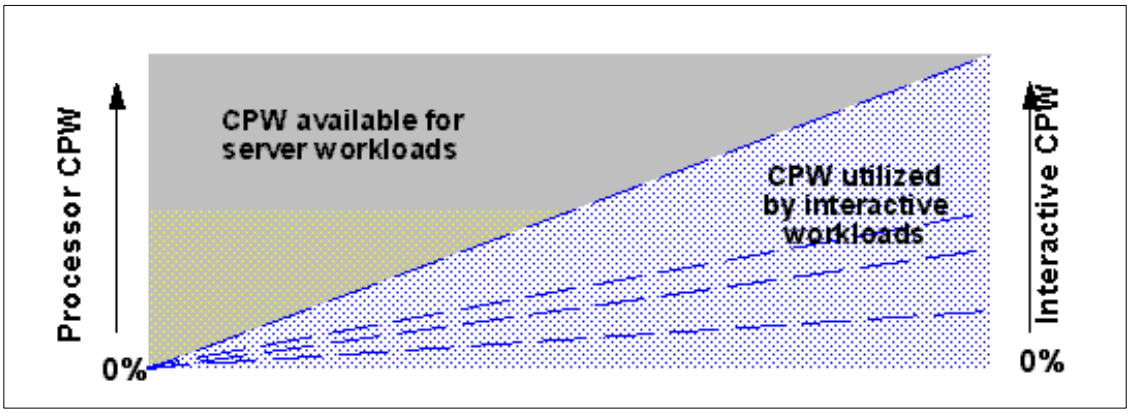
Note: Please note the following terms:

- **Processor Feature**: Used to indicate the feature code by which the processor is ordered.
- **Interactive Feature**: The feature code by which interactive performance is ordered.
- **Processor Feature Code**: Used by OS/400.
- **System Processor Feature**: Used by SLIC to indicate the same function.

iSeries Models 270, 820, 830, and 840 offer two CPW ratings to allow customizing of performance for a given workload:

- **Processor CPW**: Represents maximum relative performance running commercial processing workloads for a processor feature. Use this value to compare relative performance between various processor features. Processor CPW is known as Client/Server CPW in prior releases.
- **Interactive CPW**: Represents the relative performance available to perform interactive workloads. The amount of Interactive CPW consumed reduces the available Processor CPW by the same amount. Interactive CPW for a specific processor is changed through the installation of optional Interactive Features.

The interaction of the Processor CPW and Interactive CPW is illustrated in the following figure.



This chart shows the CPW that is available for server workloads as the interactive workload increases. On the left side of the chart, the scale runs from 0 to 100%, which represents the amount of Processor CPW available for server workloads (non 5250-type workload). On the right side of the chart, a similar scale reflects the amount of Interactive CPW used by Interactive workloads (5250 based). Each of the dotted lines dissecting the rectangle represents various levels of Interactive CPW that can be purchased when ordering an interactive feature for 270 and 8xx servers. Interactive features are not available on the Model 250.

At any point, the amount of CPW used to perform interactive workloads reduces the CPW available for server workloads by an equal and proportionate amount. For example, for a system with a processor CPW of 810 and an interactive feature CPW of 240, it is possible to use up to 240 CPW for an interactive workload and still have 570 CPW available for the non-interactive workload. On the other hand, if none of the AS/400e is used for interactive workloads, all of the Processor CPW is available to perform server workloads. No tuning or management is required.

For best performance, all critical system resources should be kept in balance with proper configuration. This includes processors (quantity and speed), number of disk arms, amount of memory, balanced HSL usage and more. For example, high I/O requirements on Optical HSL may be better handled by copper HSL.

Capacity Upgrade on Demand (CUoD)

iSeries Capacity Upgrade on Demand offers the ability to non-disruptively activate one or more additional central processors of specific models of iSeries Models 830 and 840. CUoD adds capacity in increments of one processor, up to the maximum number of On Demand processors built into the Model 840. CUoD has significant value for installations for customers who want to upgrade without disruption.

There are now six Capacity Upgrade on Demand processor features (#2416, #2417, #2419, #2352, #2353, and #2354) for the Model 840 and one CUoD processor feature (#2351) for the Model 830. Each offers a number of *Base processors* (only one for the Model 830) that are in “active” status and a set of *On Demand processors* that are in “standby” status.

On Demand processors (one or more) can be permanently activated by ordering the desired quantity of feature code #1604 for Models 840 or #1605 for the Model 830 as an MES order. Ordering feature #1604 and #1605 generates a CUoD Activation Code, which is then posted on a Web site and mailed to the customer. This activation code must then be entered at the server console. For further details, refer to the *Planning Guide for Capacity Upgrade On Demand* at: `http://www.ibm.com/eserver/iseries/ondemand`

AS/400e Dedicated Server for Domino Positioning

AS/400e capabilities to support Lotus Domino are firmly established since the announcement of Lotus Domino for AS/400 in January 1998. In mid-1999, IBM and Lotus delivered a first in the industry—the AS/400e Dedicated Server for Domino. Two models and six processor features were added in 2000.

For entry Domino environments, the Dedicated Server adds scalability for disk and memory capacity. For larger Domino environments, enterprise-class scalability and capacity can be achieved. The iSeries and AS/400e server’s reliability, robust subsystem architecture, and ease of operations provide a sound base to develop and deploy rich Web development and serving functions of Domino solutions. Combined with the rock-solid reliability and scalability of iSeries or AS/400e servers, Domino customers can achieve highly effective Web sites with intranet, extranet, and Internet capabilities.

iSeries and AS/400e customers extend their traditional applications and data by adding Lotus Domino solutions to their existing servers, as part of upgrades, or as stand-alone servers for e-mail, groupware applications, and Web sites. Domino customers use Domino partitioning on iSeries or AS/400e servers to consolidate Domino workloads onto one server with a simple, single footprint to deliver e-mail and business applications. Server consolidation offers vertical growth within the processor. Growth is available within the model.

With the availability of Dedicated Servers for Domino, customers choose to deploy Domino solutions on separate servers from other business applications for several reasons:

- Messaging and e-business servers are mission-critical assets. Reliability, maintenance, and availability requirements differ from other production systems.
- Many organizations employ specialized staff and servers to deliver messaging and groupware to their businesses, separate from those that support their line-of-business applications.

- Some organizations have remote environments, which require onsite groupware servers to provide key applications and e-mail to their users.

The price/performance and the increased scalability of the Dedicated Servers enhance the cost advantage for customers who need a mixed workload Domino server. The Dedicated Server for Domino is positioned to compete strongly for Domino placements compared to multiple Intel-based servers.

Consider Dedicated Server for Domino for:

- New Lotus Domino solutions on a manageable, reliable, and scalable server.
- Reliability and manageability to support mission-critical Domino applications.
- Consolidation of several servers to a single iSeries or AS/400e servers by employing the partitioning function of the Lotus Domino Enterprise Server license, multiple Domino servers for e-mail, Domino applications, Web serving, or a combination on segregated Intel servers.
- Groupware applications and messaging with existing system operations and skills.
- Standalone intranet, extranet, or Internet servers using Lotus Domino.
- Reliable servers to support Domino in remote locations where administration staff is not available.

Model 270 Dedicated Server for Domino Processor Features

Processor features for the Model 270 Dedicated Server for Domino are:

- **#2422 Dedicated Domino Processor**: An entry solution scalable mail server or mail or application server.
- **#2423 Dedicated Domino Processor**: More scalability for mail and robust applications.
- **#2424 Dedicated Domino Processor (2-way)**: The highest level of scalability within the AS/400e server 270.

iSeries Model 820 Dedicated Server for Domino Processor Features

Processor features for the Model 820 Dedicated Server for Domino are:

- **#2425 Dedicated Domino Processor**: An enterprise solution appropriate for mail and robust application. Ideal for customers who require more growth and capacity than the Model 270 provides.
- **#2426 Dedicated Domino Processor (2-way)**: More performance for mail and robust applications.

- **#2427 Dedicated Domino Processor (4-way)**: The highest level of scalability and performance within the iSeries Model 820.

The iSeries Dedicated Server for Domino Model 820 is the ideal model server for customers who require scalability or capacity beyond what the Model 270 Dedicated Domino #2424 processor provides.

Customers who require scalability or capacity beyond what the Dedicated Server for Domino 820 provides should pursue iSeries Models 830 or 840 servers, or to deploy multiple servers for their Domino applications.

- **Upgradability**: Processor feature conversions are supported within each Dedicated Server for Domino model. Upgrades are not available from a Model 270 to a Model 820, nor from the previous Dedicated Server for Domino Model 170.
- **Releases supported**: Support is offered for Lotus Domino Release 5.01 or later. The AS/400e Dedicated Server for Domino does not support Domino 4.6 or earlier.

The iSeries Dedicated Server for Domino is priced to be most competitive in these situations:

- Versus multiple single-function Intel Domino servers
- When reliability, manageability, and availability are a critical requirement in new or current Domino implementations

The Dedicated Domino processors are tuned specifically for Lotus Domino workloads. They provide sufficient capacity for non-Domino workloads, such as remote DB2 access, file serving, Integrated xSeries Server for iSeries, and TCP/IP, which support a Domino environment.

- **Lotus Domino workloads**: Defined as out-of-the-box functions such as:
  - E-mail
  - Calendars and scheduling
  - Web serving
  - Standard Lotus Domino template applications (for example, discussion database, workflow, and so on) and custom developed applications written with Domino Designer that perform no external program calls, relational database access, or Java integration.
- **Non-Domino workloads**: For customers planning significant use of non-Domino workloads, Dedicated Server for Domino should not be proposed. Instead, consider iSeries Model 270 or 8xx with standard processor features.

  Considerations for non-Domino workloads include:

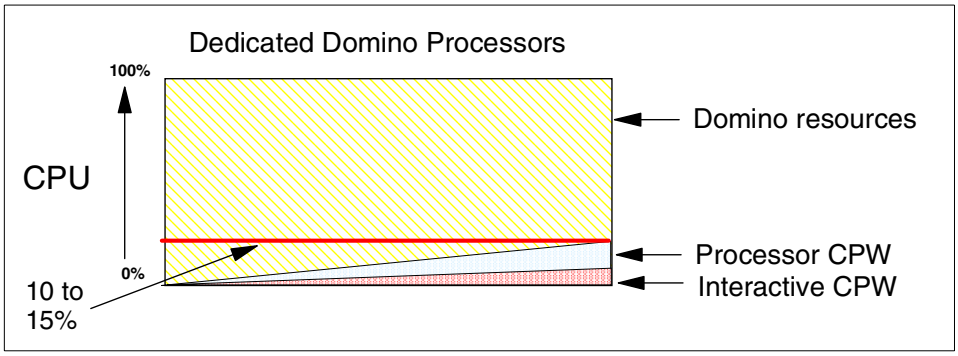
  - Any and all workloads not designated as Domino workloads are considered to be non-Domino workloads. They should be managed to a maximum of 10 to 15% of the CPU.
  - Stand-alone Java, RPG, COBOL, or C applications are non-Domino workloads.
  - Applications can work alongside Domino on the same AS/400e. An example is a Domino server that uses the *MSF SMTF Services option along with the QMSF task to process Internet mail through the OS/400 SMTP server. The OS/400 SMTP server and QMSF task are non-Domino work.
  - Domino applications using application integration functions, such as DB2 Universal Database access or external program calls, are considered non-Domino workloads.

- **System administration**: iSeries Dedicated Server for Domino can be effectively managed when there is no Interactive CPW (Interactive CPW = 0) available for application workloads. Interactive CPW is an approximate value reflecting the portion of Processor CPW that can be used for workloads performing interactive-based tasks (5250). The zero interactive CPW is intended to support a single interactive job for system administrative functions, that is:
  - Any job started from a console (green screen) to perform system administration functions is not considered interactive work if it is the *only* interactive job running (single interactive job exception).
  - Any system administration job submitted to batch is not considered interactive work.
  - Any use of Operations Navigator (GUI administration functions) is not considered interactive work.
- **Interactive workloads**: Any task started through a 5250 session (5250 device or 5250 emulation) where the user waits for a response is considered to be interactive work.
  - Application processing that uses 5250 interfaces is not supported on the iSeries Dedicated Server for Domino.
  - 5250 print is not supported on the iSeries Dedicated Server for Domino.

Relative performance measurements are derived by performing various monitored and measured workloads on iSeries and AS/400e servers. The results can be used to compare relative performance characteristics of processor features offered for servers.

- **Simple Mail Users (SMU)**: This relative performance measurement is derived by performing high-volume Lotus Domino mail workloads on Dedicated Domino processors. SMUs are representative of mail applications, particularly those that do not perform any database related tasks. SMUs represent the estimated number of concurrent light mail users for the Dedicated Domino processors. Reported values reflect 70% processor utilization.

- **Mail and Calendaring Users (MCU)**: This relative performance measurement is derived by performing mail and calendaring functions. This workload is considerably more complex than Simple Mail Users. The MCU workload represents users on a Notes client who are reading, updating, or deleting documents in an e-mail database, as well as lookups in the Domino directory and scheduling appointments and invitations. Reported values reflect 70% processor utilization.
- **Commercial Processing Workloads (CPW)**: CPWs are representative of commercial applications, particularly those that do significant database processing in conjunction with journaling and commitment control. The reported values for CPW represent the capacity of a non-Domino workload available to support a Domino environment. The reported CPW may be used by System Resource activities and Domino resource extensions such as database accesses and external program calls. The amount of CPW consumed reduces the available capacity to perform Domino workloads reflected as SMU or MCU.
  - Processor CPW is an approximate value reflecting the maximum amount of non-Domino workload (10 to 15% of CPU) that can be supported.
  - Interactive CPW is an approximate value reflecting the portion of Processor CPW that can be used for application workloads performing interactive-based tasks.

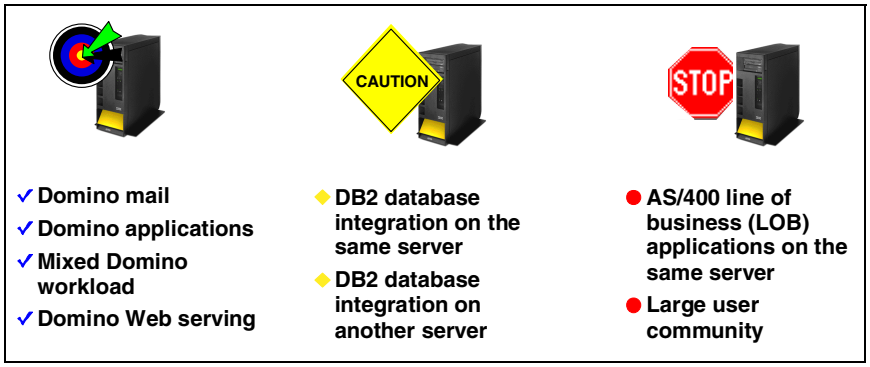


The above figure shows the relationships of the various workloads on the Dedicated Domino Processors. Domino can take any available CPU capacity (even below the line). The CPW workload can never rise above the line, and excessive attempts to use CPW resources do not significantly affect Domino performance. If CPW exceeds its limit, the system will not redirect Domino resources to non-Domino (CPW) work, and the non-Domino performance degradation can be dramatic.

For some Domino solution scenarios, you need to work closely with an IBM, Lotus, or IBM Business Partner representative to determine whether iSeries Model 270 with standard processor features, 8xx servers, or the new Dedicated Server for Domino is most appropriate for the proposed environment. In particular, Domino applications that require some degree of

integration with DB2 Universal Database for AS/400 data or use some external program calls (for example, RPG programs or Java) require careful evaluation.

The resources of Dedicated Server for Domino are focused primarily on the Domino workloads (see the following figure). Their ability to deliver superior Domino price/performance depends on running a workload very close to “pure Domino”. A small percentage of the overall processor capacity (10 to 15%) can be used for non-Domino work, such as routine system administration tasks and non-Domino programs invoked by the Domino application.



In evaluating Domino applications that access non-Domino functions, such as DB2/400 integration or program calls, ensure that the non-Domino functions represent a low percentage of the overall system utilization. Once non-Domino work reaches a maximum CPU capability on the Dedicated Server for Domino, no additional processing power will be available for non-Domino workloads. If the proposed Domino application employs any significant DB2 UDB or program integration, a standard iSeries or AS/400e server model is a better choice.

5250 Throughput

The iSeries and AS/400e servers support a family of displays and emulation adapters that are known as the 5250. The supported data stream is known as a 5250 data stream. Throughput considerations for these workstations regard the flow of the character stream, as discussed in the following section.

5250 Express Data Stream

The #2720, #2722, #2746, #4746, and #6180 twinax workstation adapter cards have three major features that can increase throughput:

- **2X Mode**: 2 Mbps versus 1 Mbps throughput of the #6050 workstation controller.
- **Optimized Mode**: The block transfer of data is improved to almost double the throughput to or from the attached device.
- **Dual Mode**: Means that two ports are polled simultaneously on the #2722, #2746, #4746, and #6180 workstation controllers. On older controllers (such as the #6050 workstation controller), only one port out of eight is active at any given time.

The enhancement produces nearly four times the throughput when all of the attached devices on a port support 5250 Express Data Stream. All of the IBM devices from the original 5251 up through the 3489 support the Express Data Stream.

Refer to Informational APAR II11804 for additional details regarding workstation considerations when attached devices or cabling do not support 5250 Express Data Stream. Additional information on 5250 Express Data Stream is available on the Web at:
`http://www.networking.ibm.com/525/`

The IBM 7299 twinax-to-fiber multiplexer fully supports all the new functions of the #2720, #2722, #2746, #4746, and #6180 workstation controllers.

iSeries Direction

iSeries Direction

iSeries Direction

This chapter outlines both future and present directions of the iSeries platform. It discusses product previews, statements of direction, and general planning information. Products, features, and software withdrawn are identified with announced dates when support is to be discontinued. By communicating these future plans, IBM intends to help our customers plan for better use of their system.

Product Previews

Product Previews identify specific functions IBM has committed to incorporate into future iSeries hardware or software releases. Understanding them can provide insight into IBM plans and directions for future iSeries hardware or software releases. The information released represents the current intent of IBM. It is subject to change or withdrawal. They represent goals and objectives only.

As part of the iSeries announcements made in April 2001 and May 2000, IBM announced an intention to provide an update of OS/400 that includes the following enhancements. The previews listed are separated into fulfilled and non-fulfilled categories at the time of the V5R1 initial and increment announcements (23 April and 28 August 2001 respectively).

Product Previews: Open

This product preview remained open at the time of V5R1 announcement (23 April 2001):

- **Business-to-business (B2B) integration - iSeries Licensed Program and operating system enhancements**: IBM intends to consider additional capabilities and integration of B2B for iSeries beyond the first release of Connect for iSeries, some of which have been released in the product update that became available on 23 April 2001 and 31 August 2001. Specific connectors may be made available for different e-marketplaces, as well as back-end core business applications that plug into the integration framework delivered in the first release of Connect for iSeries.

  IBM intends to integrate and provide interfaces to the Java servlets and JavaServer Pages (JSP) support for Apache, providing an integrated runtime environment for server applications written as Java servlets or JSPs. Also you will be able to upgrade from the base B2B, which can enable functions integrated into iSeries to the functionally rich IBM WebSphere framework of products. This upgrade will provide a smooth path for growth as you continue to enhance and integrate your processes with other businesses.

  For more information on Connect for iSeries, go to the Web site at:
  `http://www.ibm.com/servers/eserver/iseries/btob/connect`

Product Previews: Closed

These product previews were closed at the time of the 28 August 2001 announcement:

- **Dual Power LIne Cords on iSeries**: IBM intends to provide dual power line cords as another high availability option on iSeries Models 820, 830, and 840, as well as the #5074 and #5079 Towers.
- **Web Traffic Express**: IBM has changed its plan to provide a Web Traffic Express proxy server. Instead, a proxy server is included with the iSeries HTTP Server (Powered by Apache). It is an industry accepted proxy server and is delivered as a no charge feature of OS/400. The Apache-based HTTP proxy server provides high-performance caching, reverse proxy, and content filtering by domain and IP address.

These product previews were closed at the time of the V5R1 announcement (23 April 2001):

- **Logical Partitioning (LPAR) Enhancements**: IBM intends to significantly increase the flexibility of LPAR by supporting dynamic resource movement between partitions and providing support for multiple partitions assigned to a single processor.
- **iSeries Linux Support**: IBM plans to provide Linux for selected models of the iSeries platform by providing native support of the Linux kernel running in a secondary logical partition of the operating system. This will enable Linux applications to run on such iSeries servers with few or no changes required. The Linux kernel will enable a new stream of e-business applications for the iSeries platform that complements its strength as an integrated core business solution. Linux applications will benefit from the iSeries platform's ability to provide resource flexibility, reliability, and connectivity to other applications on a single server.
- **High-Speed Link (HSL) OptiConnect**: IBM intends to further leverage the significant bandwidth, flexibility, and speed of new High-Speed Link (HSL) for system-to-system connectivity by offering HSL OptiConnect.
- **Direct Attach Netfinity Server**: IBM intends to support direct AS/400 attachment of SMP Netfinity servers via the AS/400 High-Speed Link (HSL) bus, retaining the systems management and disk consolidation features of today's AS/400 Integrated Netfinity Server.
- **Electronic Customer Support (ECS) PM/400e and Service Agent**: IBM intends to support Electronic Customer Support (ECS) running over a TCP/IP connection, including electronic fix retrieval, problem reporting, and hardware and software inventory information. PM/400e and Service Agent (formerly known as Service Director) will also be modified to take advantage of the TCP/IP connection. These functions will use the V.90 integrated modem that is shipped with the 2xx and 8xx models. IBM also intends to add fax support for this integrated modem.
- **CPA Toolkit**: Support for Common Programming APIs (CPA) Toolkit will be discontinued in future OS/400 releases. OS/400 V4R4 is the last release to support

the CPA Toolkit development environment. CPA applications can be modified on V4R4 and earlier releases only. The CPA Toolkit runtime environment is supported for V4R5. Software developers and customers are encouraged to migrate CPA applications to kernel threads, the strategic OS/400 function. Information on migrating from CPA to kernel threads is available at:
`http://www.as400.ibm.com/developer/threads/cpa/roadmap.doc.html`

- **Altered Program Objects**: Some application providers and customers alter their program objects. Today you cannot recreate a program object without source code on an iSeries or AS/400 server if observable information, which includes program creation data, has been removed. A future enhancement to OS/400 will retain program creation data when observable information is removed, allowing the program to be recreated at the customer's option. Recreating a program helps ensure its integrity and allows you to take advantage of new hardware or enhancements in translator technology. However, when a program is recreated, alterations made to the program object are not retained. Programs that depend on alterations may fail or behave in an unexpected manner should the customer choose to recreate them. Customers should consult their application providers regarding potential impacts of program re-creation.

  Note: IBM recommends against altering program objects because altered programs may bypass checks made by OS/400 that help ensure system integrity and security.

Statement of Direction

Statements of direction identify the commitment of IBM to direct the iSeries servers toward a given design or technology. Understanding them can provide insight into IBM's design and technology plans.

As part of the iSeries announcements made in April 2001, IBM announced a commitment to the following direction:

Database File support in independent auxiliary storage pool/switchable disk

In a future release, IBM intends to enhance OS/400 support for switching the ownership of objects between Primary and Secondary Servers through the use of Independent Auxiliary Storage Pool (IASP) and switchable disk technologies by extending the list of possible switched objects beyond Integrated File System (IFS) files. Additions would include objects associated with the DB2 Universal Database for iSeries and other OS/400 library based objects.

Planning Information

Business grows, the information systems needs of a business change, and technology changes to allow more efficient and cost effective methods to solve business problems. As the iSeries and OS/400 are enhanced, new technology is introduced. Other technology

reaches a point where no further enhancements, functions, or maintenance is planned. This section helps our customers plan for these changes and to protect their investment as their business needs change.

- **AS/400 Models 4xx and 5xx**: OS/400 V5R1 is the final release to be supported on AS/400 Models 400, 436, 40S, 500, 510, 530, 50S, and 53S.
- **Client Access Family**: IBM intends to remove support of the Windows 95 operating system for the Client Access Express for Windows client. Client Access Express for Windows 95 will not be supported beyond V5R1.

  This removal of Windows 95 support applies to all of the functions shipped with Client Access Express, including EZ-Setup, Operations Navigator, Management Central, and Operations Console. Client Access Express for Windows will continue to be supported on the Windows 98, NT 4.0, ME, and 2000 Operating systems.
- **AS/400 support for Windows Network Neighborhood**: IBM intends to remove the support of the Windows 95 operating system from AS/400 NetServer. Windows 95 will continue to be supported from AS/400 NetServer in V5R1, but not in subsequent releases. AS/400 NetServer will continue to support the Windows 98, NT 4.0, ME, and 2000 Operating systems.
- **OfficeVision/400**: As previously announced, V4R5 is the final release to support OfficeVision/400. End of program services for OV/400 is 31 May 2001. OfficeVision/400 will be uninstalled upon upgrading to V5R1 or later releases.
- **BEST/1**: V5R1 is the final release to support the BEST/1 Capacity Planning tool. BEST/1 is included in Performance Tools (5722-PT1). The BEST/1 function will be discontinued after V5R1.
- **Wireless Connection for AS/400 (5798-TBW)**: V4R5 is the final release to support Wireless Connection for AS/400.
- **IPX**: V5R1 is the final release to support the IPX protocol. The Enhanced Integration for NetWare (Option 25) configurations can be changed from IPX to IP connectivity.
- **Lotus Domino Client subscription**: IBM intends to provide a new offering for customers to renew their software subscription entitlement for Lotus Domino clients, which was previously purchased under Lotus Domino Enterprise Server for AS/400 (5769-LNT).

  Under the new offering, customers can purchase client entitlement for one year of subscription at a price similar to Lotus' Passport Advantage. The terms of the current offering for Lotus Domino client software subscription are extended until the new offering is announced.
- **¼-Inch Cartridge Tape**: V5R1 is the final release to support the #6385/#6485 ¼-inch Cartridge Tape Unit. Customers using these tape units can order a conversion to a 16 GB ¼-inch Cartridge Tape Unit (#4483/#4583/#6383/#6483), a 25 Gb ¼-inch Cartridge Tape Unit (#4486/#4586/#6386/#6486), or a 50 GB ¼-inch Cartridge Tape

Unit (#4487/#4587). Customers who use their tape drive primarily for incremental fast backups and need smaller (2.5 GB) capacity tape drive units should consider the #4482/#6382 2 GB ¼-inch tape drive.

- **OS/2 Warp Server for iSeries and Novell 4.11 on the iSeries Integrated Netfinity Server**: Customers running this product are no longer supported as of 31 January 2001. These products will not be functionally enhanced. We recommend that customers with Domino on the OS/2 based iSeries Integrated Netfinity Server migrate to the native Domino for iSeries product, which provides enhanced scalability, reliability, and integration. V4R3 is the last release of OS/400 to support Lotus Domino running on the OS/2 based iSeries Integrated Netfinity Server.
- **NetVista Thin Client:** V5R1 is the final release to support NetVista Thin Client Manager V2R1. The current Program Service End Date for Thin Client Manager V2R1 is 31 December 2001.
- **Workstation Gateway**: V5R1 is the final release to support 5722-SS1 Workstation Gateway, which is part of the TCP/IP functions of OS/400. Migrate to IBM WebSphere Host Publisher XML Legacy Gateway, a customizable Web-based 5250 interface function, for equivalent.
- **Directory Services LDAP**: V5R1 is the final release to support Option 32 of 5722-SS1. On releases beyond V5R1, call the APIs from library *nnnn* instead of library QDIRSRV.

iSeries Planning Information Web Sites

For information on modeling tools, installation planning, and upgrade resources, see:
`http://www.ibm.com/servers/eserver/iseries/support/planning`

You can find such information as product previews, statements of direction, and products no longer supported on a release, with migration plans as available, on the Web at:
`http://www-1.ibm.com/servers/eserver/iseries/support/planning/nav.html`

Withdrawn Products

When products and features are withdrawn from marketing, they are removed from the *iSeries Handbook*. Information on all iSeries and AS/400e products and features can be found by referencing IBM online systems, such as a legacy edition of the *AS/400e System Handbook* found at: `http://publib.boulder.ibm.com/pubs/html/as400/online/chgfrm.htm` or the iSeries home site.

Refer to “Products and Features no Longer Marketed by IBM” on page 803 for a listing of many withdrawn features and products.

Features and Devices Not Supported on V5R1

These features are not supported with OS/400 V5R1:

- #2620 Cryptographic Processor
- #2628 Cryptographic Processor
- #2851 PCI Integrated PC Server
- #2854 PCI Integrated PC Server
- #6509 Additional 16MS FSIOP Memory
- #6516 16MB One-Port FSIOP
- #6517/9517 32MB One-Port FSIOP
- #6518 48MB One-Port FSIOP
- #6519 64MB One-Port FSIOP
- #6520 Upgrade 1 to 2 Port FSIOP
- #6526 16MB Two-Port FSIOP
- #6527 32MB Two-Port FSIOP
- #6528 48MB Two-Port FSIOP
- #6529 64MB Two-Port FSIOP
- #6616 Integrated PC Server
- #8716 Optional 16MB One-Port FSIOP
- #8717 Optional 32MB One-Port FSIOP
- #8718 Optional 48MB One-Port FSIOP
- #8719 Optional 64MB One-Port FSIOP
- #8726 Optional 16MB Two-Port FSIOP
- #8727 Optional 32MB Two-Port FSIOP
- #8728 Optional 48MB Two-Port FSIOP
- #8729 Optional 64MB Two-Port FSIOP

These devices are not supported with OS/400 V5R1:

- 2440
- 3422
- 3430
- 3995: Models 042, 043, 142, 143, A43
- 9347
- 9331: Models 001 and 002
- 3995: All models connected via a #2621 are no longer supported

Software End of Support Dates

With the high quality and reliability of the current OS/400 software releases, OS/400 users may not recognize the importance of periodic upgrading to stay on a supported release. Every release of OS/400 has a defined Program Services period, with the end date

announced with the initial announcement of the release. After the end of that Program Services period, IBM no longer accepts problems for defect analysis.

Version Release Modification	General Availability	End of Marketing	End of Program Support	Fee-based Support Extension
R7.5 SSP	8 March 1996	9 February 1999	31 May 2000	N/A
V3R0.5	3 June 1994	11 February 1997	31 May 1997	N/A
V3R1	30 June 1995	11 February 1997	31 October 1998	N/A
V3R2	21 June 1996	10 February 1998	31 May 2000	N/A
V3R6	29 September 1995	19 August 1997	31 October 1998	N/A
V3R7	8 November 1996	1 September 1998	30 June 1999	N/A
V4R1	29 August 1997	9 February 1999	31 May 2000	N/A
V4R2	27 February 1998	9 February 1999	31 May 2000	31 January 2001
V4R3	11 September 1998	15 February 2000	31 January 2001	N/A
V4R4	21 May 1999	31 May 2001	31 May 2000	30 November 2001
V4R5	28 July 2000		31 July 2002	N/A
V5R1	25 May 2001			N/A

Communications (WAN) Functions No Longer Supported

The following functions are no longer supported on current iSeries and AS/400e product line WAN hardware (such as the #2609 EIA 232/V.24 Two Line Adapter, the #2610 X.21 Two Line Adapter, and other, older adapters). They are not supported on the #2720 PCI WAN/Twinaxial IOA, the #2721 or #2745 PCI Two-Line WAN IOA, the #2699 Two-Line WAN IOA, or the #9771 Base PCI 2-Line WAN with Modem.

- X.21 switched interface (X.21 leased support)
- X.21 Shorthold mode
- V.25 2 port autocall. This is the protocol used to auto dial on switched connections using modems that require a second port dedicated to the dial function. Do not confuse this with V.25bis, which is the current day autocall protocol that sends dial commands over the same port used for data. V.25 bis itself is supported.
- Asynchronous communication speeds of less than 300 bps.
- Data Rate Select signal on the EIA 232/V.24 interface. This function is used by some, older 2400 bps modems to reduce the speed to 1200 bps.

- LPDA-1 (Link Problem Determination Aids). This is a diagnostic function supported by some (primarily older IBM) modems.
- V.54 local and remote loopback (diagnostic functions supported by some modems).

Server Summary

Server Summary

iSeries and AS/400e Servers

These tables summarize the resource capabilities and performance characteristics of all models in the current product line of iSeries and AS/400e servers.

Table 1: Summary of the AS/400e Server 250

Model	250	
Processor Feature	**#2295**	**#2296**
Relative System Performance - CPW (Notes 1 and 2)		
Processor Performance	50	75
Interactive Performance	15	20
Number of N-Way Multiprocessors	1	1
L2 Cache (MB)	0	0
Main Storage (MB) (min/max)	256-1024	256-1024
Main Storage or DIMMs (min/max)	2/8	2/8
Processor Group	PPS/P05	PPS/P05

	Base System for all processors	System Unit Expansion #7102	Total Maximum
Disk Storage (GB)			
Minimum Internal	8.58	0	8.58
Maximum Internal	70.16	105.24	175.40
System I/O Card Slots	6	9	15
Maximum Communication Lines (Note 4)	1-12	0-26	30
ATM Adapters (Note 3)	0	0-2	2
Maximum LAN/ATM Adapters (Note 6)	2	4	6
Non-Integrated Server LAN Low-Speed	1	4	5
Non-Integrated Server LAN 100/10 Ethernet	1	2	3
Integrated Server LAN Low-Speed	2	2	4
Integrated Server LAN 100/10 Ethernet	1	1	2
Maximum Workstation Controllers - Twinaxial	2	5	6
Maximum Workstations - Twinaxial	28-80	200	240
Cryptographic Processors	0	2	2
¼-inch Cartridge Tape (Internal)	0-1	0	1
8mm ½-inch Cartridge (External)	0	0-2	2
Tape Libraries (Note 5)	0	0-2	2
CD-ROM	1	0	1
Optical Libraries - Direct attach	0	0-2	2

Note 1:	Commercial Processing Workload (CPW) is used to measure the performance of all iSeries and AS/400e processors announced from September 1996 onward. The CPW value is measured on maximum configurations. The type and number of disk devices, the number of workstation controllers, the amount of memory, the system model, other factors, and the application running determine what performance is achievable. With the introduction of the Dedicated Servers for Domino, Simple Mail Users is added as a performance measurement.
Note 2:	Processor performance represents the relative performance (maximum capacity) of a processor feature running CPW in a client/server environment. Processor capacity is achievable when the commercial workload is not constrained by main storage and DASD. Interactive Performance represents the relative performance available to perform host-centric workloads. The amount of interactive capacity consumed reduces the available processor capacity by the same amount.
Note 3:	The Integrated Server is mutually exclusive with the high-speed slot for LAN in the Base System Unit.
Note 4:	One line is used by the Operations Console.
Note 5:	Total number of external tape drives does not increase.
Note 6:	Integrated Server refers to Integrated xSeries Server for iSeries.

Table 2: Summary of the iSeries Model 270

Model	**270**			
Processor Feature	**#2248**	**#2250**	**#2252**	**#2253**
Relative System Performance (Notes 1 and 2)				
Processor CPW	150	370	950	2000
Interactive CPW				
Base #1516 (Note 5)	-	0	0	0
#1517	25	-	-	-
#1518	-	30	-	-
#1519	-	-	50	-
#1520	-	-	-	70
Number / Type / Speed of Processors	1/Pulsar 400 Mhz	1/Pulsar 400 Mhz	1/Pulsar 450 Mhz	2/Pulsar 450 Mhz
L2 Cache (MB)/Processor	0	0	2	4
Main Storage (MB min/max)	256-4096	256-4096	256-8192	256-8192
Main Storage DIMMs (min/max)	2/8	2/8	2/16	2/16
Minimum Operating System Level	V4R5	V4R5	V4R5	V4R5
Processor Group (Note 7)	P05	P10/P10	P10/P10	P20/P20

Model	270		
Processor Feature	**#2431**	**#2432**	**#2434**
Relative System Performance (see Notes 1 and 2)			
Processor CPW	465	1070	2350
Interactive CPW			
None	-	-	-
Base #1516 (Note 5)	-	0	0
#1518	30	-	-
#1519	-	50	-
#1520	-	-	70
Number / Type / Speed of Processors	1/SStar 540 Mhz	1/SStar 540 Mhz	2/SStar 600 Mhz
L2 Cache (MB)	0	2	4
Main Storage (MB min-max)	256-8192	256-8192	256-16384
Main Storage DIMMs (min/max)	1/8	1/8	2/16
Minimum Operating System Level	V5R1	V5R1	V5R1
Processor Group (Note 7)	P10	P10/P10	P20/P20

Model	270 Dedicated Server for Domino		
Processor Feature	**#2422**	**#2423**	**#2424**
Relative System Performance (CPW - Notes 1 and 2)			
Processor CPW	50	100	200
Interactive Environment (Note 5)	0	0	0
Simple Mail Users	2400	3860	7580
Mail and Calendaring Users	1600	2570	5050
Number / Type / Speed of Processors	1/Pulsar 400 Mhz	1/Pulsar 450 Mhz	2/Pulsar 450 Mhz
L2 Cache (MB)	0	2	4
Main Storage (MB min/max)	256-4096	256-8192	256-8192
Main Storage DIMMs (min/max)	2/8	2/16	2/16
Minimum Operating System Level	V4R5	V4R5	V4R5
Processor Group (Note 7)	P05	P05	P10

Model	270 Dedicated Server for Domino	
Processor Feature	**#2452**	**#2454**
Relative System Performance		
Processor CPW	100	240
Interactive Environment	0	0
Mail and Calendaring Users	3070	6660
Number / Type / Speed of Processors	1/SStar 540 Mhz	2/SStar 600 Mhz
L2 Cache (MB)	2	4
Main Storage (MB min/max)	256-8192	256-16384
Main Storage DIMMs (min/max)	1/8	2/16
Minimum Operating System Level	V5R1	V5R1
Processor Group (Note 7)	P05	P10

Summary	Base System	System Unit Expansion #7104	PCI Expansion Tower #5075	Total Maximum	LPAR Maximum
Disk Storage (GB)					
Integrated Minimum	8.58	-	-	8.58	-
Integrated Maximum	105.2	210.5	105.2	421.1	421.1
External Maximum (Note 7)	403.6	-	403.6	403.6	403.6
Total Maximum	421.1	210.5	403.6	421.1	421.1
DASD Arms Maximum	23	12	23	24	24
Arms Internal	6	12	6	24	24
LUNs External	23	-	23	23	23
Physical Packaging					
External HSL Ports	2	-	-	2	2
External HSL Loops	1	-	-	1	1
#5075 Towers supported	1	-	-	1	1
#5074 Towers supported	-	-	-	-	-
External xSeries Servers supported	2	-	-	2	2
Embedded IOP	1	-	1	2	2
PCI Card Slots	7	-	8	15	15
Maximum PCI IOA Cards	6	-	7	13	13
Communication Lines (Note 4)	26	-	34	50	50
LAN Ports	4	-	5	8	8
Integrated Netfinity Servers	1	-	2	3	3
Twinaxial Workstation Controllers	4	-	6	6	6
Twinaxial Workstations	160	-	240	240	240
Interna/DIVD-ROM/DVD-RAM/Tape(6)	2	-	-	2	2
External Tape	3	-	3	3	6
External CD-ROM / DVD-RAM (Note 6)	3		3	3	6
Tape Libraries (Note 3)	3	-	3	3	6
Optical Libraries	4	-	4	4	8
Diskettes (5 ¼-inch or 8-inch)	-	-	-	-	-
Cryptographic Processor	3	-	3	3	3

Note 1:	Commercial Processing Workload (CPW) is used to measure the performance of all iSeries and AS/400e processors announced from September 1996 onward. The CPW value is measured on maximum configurations. The type and number of disk devices, the number of workstation controllers, the amount of memory, the system model, other factors, and the application running determine what performance is achievable. With the introduction of the Dedicated Servers for Domino, Simple Mail Users is added as a performance measurement.
Note 2:	Processor performance represents the relative performance (maximum capacity) of a processor feature running CPW in a client/server environment. Processor capacity is achievable when the commercial workload is not constrained by main storage and DASD. Interactive Performance represents the relative performance available to perform host-centric workloads. The amount of interactive capacity consumed reduces the available processor capacity by the same amount. On the Dedicated Servers for Domino, the Processor CPW is an approximate value reflecting the maximum amount of non-Domino workload (10 to 15% of CPU) that can be supported.
Note 3:	The total number of tape drives does not increase.
Note 4:	One line is used if the #5544 System Console on Operations Console is used. One line might be used if the #5546 or #5548 System Console on LAN is selected and the #0367 Operations Console Cable is connected.
Note 5:	This interactive CPW value of 0 represents the amount of 5250 processing capability available for customer applications. CPW=0 supports system administration functions performed by: • A single interactive job • Operations Navigator • Any job submitted to batch Multiple system administrators performing simultaneous tasks is not supported. There is no Interactive Feature Code card for the base interactive #1516. Interactive performance is included in the base. The #2248 comes with the #1517 only.
Note 6:	There must be one CD-ROM or DVD-RAM per system.
Note 7:	External DASD maximum assumes 17.54 GB LUNs. External DASD cannot exceed the maximum system capacity or the maximum number of disk arms.

Note 8: Processor Group is determined by a combination of the Processor and Interactive Feature. The following table provides a cross reference.

Processor	Interactive Feature	Processor Feature	Processor Group
#2248	#1517	#22A2	P05
#2250	#1516	#22A4	P10
	#1518	#22A5	P10
#2252	#1516	#22A7	P10
	#1519	#22A8	P10
#2253	#1516	#22AA	P20
	#1520	#22AB	P20
#2422	n/a	#2422	P05
#2423	n/a	#2423	P05
#2424	n/a	#2424	P10
#2431	#1518	#23E7	P10
#2432	#1516	#23F0	P10
	#1519	#23F1	P10
#2434	#1516	#23F0	P10
	#1519	#23F1	P10
#2452	n/a	#2452	P05
#2454	n/a	#2454	P10

General note: Capacities shown may require prerequisites. Some combinations of features may not be valid.

Table 3: Summary of the iSeries Model 820

Model	820			
Processor Feature	**#2395**	**#2396**	**#2397**	**#2398**
Relative System Performance (Note 1)				
Processor CPW	370	950	2000	3200
Interactive CPW				
#1521	35	35	35	35
#1522	70	70	70	70
#1523	120	120	120	120
#1524	240	240	240	240
#1525	-	560	560	560
#1526	-	-	1050	1050
#1527	-	-	-	2000
Number / Type / Speed of Processors	1/Pulsar 400 Mhz	1/Pulsar 450 Mhz	2/iStar 500 Mhz	4/iStar 500 Mhz
L2 Cache (MB)	0	2	4	4
Main Storage (MB min/max)	256-4096	256-8192	256-16384	256-16384
Main Storage DIMMs (min/max)	2/8	2/16	2/32	2/32
Minimum Operating System Level	V4R5	V4R5	V4R5	V4R5
Processor Group (Note 11)	P10-P20	P20-P30	P20-P30	P30-P40

Model	820 Dedicated Server for Domino		
Processor Feature	**#2425**	**#2426**	**#2427**
Relative System Performance (Note 1)			
Processor CPW	100	200	300
Interactive CPW (Note 8)	0	0	0
Simple Mail Users	4250	8000	14400
Mail and Calendaring Users	2620	4950	8910
Number / Type / Speed of Processors	1/Pulsar 450 Mhz	2/iStar 500 Mhz	4/iStar 500 Mhz
L2 Cache (MB)	2	4	4
Main Storage (MB min/max)	256-8192	256-16384	256-16384
Main Storage DIMMs (min/max)	2/16	2/32	2/32
Minimum Operating System Level	V4R5	V4R5	V4R5
Processor Group (Note 11)	P05	P10	P10

Model	820						
Processor Feature	**#2435**	**#2436**	**#2437**	**#2438**	**#0150**	**#0151**	**#0152**
Relative System Performance (Note 1)							
Processor CPW	600	1100	2350	3700	1100	2350	3700
Interactive CPW (Note 10)							
None	-	-	-	-	0	0	0
#1521	35	35	35	35	-	-	-
#1522	70	70	70	70	-	-	-
#1523	120	120	120	120	-	-	-
#1524	240	240	240	240	-	-	-
#1525	-	560	560	560	-	-	-
#1526	-	-	1050	1050	-	-	-
#1527	-	-	-	2000	-	-	-
Number / Type / Speed of Processors	1/SStar 600 Mhz	1/SStar 600 Mhz	2/SStar 600 Mhz	4/SStar 600 Mhz	1/SStar 600 Mhz	2/SStar 600 Mhz	4/SStar 600 Mhz
L2 Cache (MB)	2	2	4	4	2	4	4
Main Storage (MB min/max)	256 - 8192	256 - 16384	256 - 32768	256 - 32768	256 - 16384	256 - 32768	256 - 32768
Main Storage DIMMs	2/8	2/16	2/32	2/32	2/16	2/32	2/32
Minimum Operating System Level	V5R1	V5R1	V5R1	V5R1	V5R1	V5R1	V5R1
Processor Group (Note 10)	P10-P20	P20-P30	P20-P30	P30-P40	P20	P20	P30

Model	820 Dedicated Server for Domino		
Processor Feature	**#2456**	**#2457**	**#2458**
Relative System Performance (Note 1)			
Processor CPW	120	240	380
Interactive CPW (Note 8)	0	0	0
Mail and Calendaring Users	3110	6660	11800
Number / Type / Speed of Processors	1/SStar 600 Mhz	2/SStar 600 Mhz	4/SStar 600 Mhz
L2 Cache (MB)	2	4	4
Main Storage (MB min/max)	256-16384	256-32768	256-32768
Main Storage DIMMs (min/max)	2/16	2/32	2/32
Minimum Operating System Level	V5R1	V5R1	V5R1
Processor Group (Note 11)	P05	P10	P10

Summary	Base System	PCI Expansion Tower #5075	PCI Expansion Tower #5074	Migrated Total with #503x (Note 5,7)	New System Maximum (Note 6)	LPAR System Maximum
Disk Storage Minimum (GB)	8.58				8.58	
Maximum Internal (GB)	210.5	105.2	789.7	1625.9	4159.1	
Maximum External (GB) (Note 11)	2246.2	2246.2	3369.4	1595.3	4141.5	
Total Maximum (GB)	2456.8	2351.5	4141.5	1625.9	4159.1	
DASD arms maximum internal	12	6	45	210	237	
LUNs External	128	128	192	209	236	
Diskette (8 or 5 ¼-inch)	-	-	-	2	-	
Communication Lines (Note 3)	44	34	52	128	160	
Twinax Workstation Controllers	7	7	11	66	62	
Twinaxial Devices	280	280	440	2628	2480	
Internal CD-ROM/DVD-RAM/Tape (Note 4)	2	-	2	18 (Note 9)	12	
External CD-ROM/DVD-RAM (Note 4)	7	7	8	8	8	18
External Tape	7	7	8	8	8	18
Tape Libraries Maximum (Note 2)	7	7	8	8	8	18
Optical libraries	7	7	14	14	14	18
Physical Packaging						
External HSL Ports	2	-	-	-	2	
External HSL Loops	1	-	-	-	1	
#5074/#5075 Towers	5	-	-	-	5	
Integrated xSeries Adapter	4	-	-	-	4	
SPD Towers Supported	-	-	-	4	-	
Embedded IOPs	1	1	-	1	6	
PCI Adapter Card slots	12	8	14	86	82	
Maximum PCI IOA Cards	9	7	11	70	63	
LAN Ports Maximum	7	5	8	24	30	
Maximum Integrated xSeries Server	2	2	2	16	12	
Cryptographic Processor	7	7	8	3	8	

Note 1:	Commercial Processing Workload (CPW) is used to measure the performance of all iSeries and AS/400e processors announced from September 1996 onward. The CPW value is measured on maximum configurations. The type and number of disk devices, the number of workstation controllers, the amount of memory, the system model, other factors, and the application running determine what performance is achievable. With the introduction of the Dedicated Servers for Domino, Simple Mail Users is added as a performance measurement. Processor performance represents the relative performance (maximum capacity) of a processor feature running CPW in a client/server environment. Processor capacity is achievable when the commercial workload is not constrained by main storage and DASD. Interactive Performance represents the relative performance available to perform host-centric workloads. The amount of interactive capacity consumed reduces the available processor capacity by the same amount. On the Dedicated Servers for Domino, the Processor CPW is an approximate value reflecting the maximum amount of non-Domino workload (10 to 15% of CPU) that can be supported.
Note 2:	Total number of tape drives does not increase.
Note 3:	One line is used if #5544 System Console on Operations Console is used. One line might be used if #5546 or #5548 System Console on LAN is selected and the #0367 Operations Console Cable is connected.
Note 4:	There must be one CD-ROM or DVD-RAM per system.
Note 5:	Includes the #503x Migration Tower and all SPD bus towers attached to the #503x.
Note 6:	New systems only. Does not apply to migrated systems.
Note 7:	This column does not apply to Dedicated Domino Servers.
Note 8:	This interactive CPW value of 0 represents the amount of 5250 processing capability available for customer applications. CPW=0 supports system administration functions performed by: • A single interactive job • Operations Navigator • Any job submitted to batch Multiple system administrators performing simultaneous tasks is not supported.
Note 9:	Includes base CD-ROM in Migration tower (no feature code).

Note 10: Processor Group is determined by a combination of the Processor and Interactive Feature. The following table provides a cross reference.

Processor	Interactive Feature	Processor Feature	Processor Group
#2436	#1521	#24A8	P20
	#1522	#24A9	P30
	#1523	#24AA	P30
	#1524	#24AB	P30
	#1525	#24AC	P30
#0150	n/a	#0150	P20
#0151	n/a	#0151	P20
#2437	#1521	#24B0	P20
	#1522	#24B1	P30
	#1523	#24B2	P30
	#1524	#24B3	P30
	#1525	#24B4	P30
	#1526	#24B5	P30
#0152	n/a	#0152	P30
#2438	#1521	#24B8	P30
	#1522	#24B9	P40
	#1523	#24BA	P40
	#1524	#24BB	P40
	#1525	#24BC	P40
	#1526	#24BD	P40
	#1527	#24BE	P40
#2435	#1521	#24B8	P30
	#1522	#24B9	P40
	#1523	#24BA	P40
	#1521	#249B	P10
	#1522	#249C	P20
	#1523	#249D	P20
	#1524	#249E	P20

Note 10: Processor Group is determined by a combination of the Processor and Interactive Feature. The following table provides a cross reference.

Processor	Interactive Feature	Processor Feature	Processor Group
#2395	#1521	#23A1	P10
	#1522	#23A2	P20
	#1523	#23A3	P20
	#1524	#23A4	P20
#2396	#1521	#23A9	P20
	#1522	#23AA	P30
	#1523	#23AB	P30
	#1524	#23AC	P30
	#1525	#23AD	P30
#2397	#1521	#23B1	P20
	#1522	#23B2	P30
	#1523	#23B3	P30
	#1524	#23B4	P30
	#1525	#23B5	P30
	#1526	#23B6	P30
#2398	#1521	#23B8	P30
	#1522	#23B9	P40
	#1523	#23BA	P40
	#1524	#23BB	P40
	#1525	#23BC	P40
	#1526	#23BD	P40
	#1527	#23BE	P40

Note 11: External DASD maximum assumes 17.54 GB LUNs. External DASD cannot exceed the maximum system capacity or the maximum number of disk arms.

General note: Capacities shown may require prerequisites. Some combinations of features may not be valid.

Table 4: Summary of the iSeries Model 830

Model	830		
Processor Feature	**#2400**	**#2402**	**#2403**
Relative System Performance (Note 1)			
Processor CPW	1850	4200	7350
Interactive CPW (Note 9)			
#1531 (Base)	70	70	70
#1532	120	120	120
#1533	240	240	240
#1534	560	560	560
#1535	1050	1050	1050
#1536	-	2000	2000
#1537	-	-	4550
Number / Type / Speed of Processors	2/iStar 400 Mhz	4/iStar 540 Mhz	8/iStar 540 Mhz
L2 Cache (MB)	2	4	4
Main Storage (GB min/max)	1-64	1-64	1-64
Main Storage DIMMs (min/max)	8/64	8/64	8/64
Minimum Operating System Level	V4R5	V4R5	V4R5
Processor Group (Note 9)	P20-P30	P30-P40	P40-P50

Numbers are for All Processor Features	Base System #9074	PCI Expansion Tower #5074	Migrated Total with #5034 #5035 (Note 5)	Migrated Total with #5077 (Note 6)	New System Maximum (Note 7)	LPAR System Maximum
Disk Storage Minimum (GB)	8.58	-	-	-	8.58	
Maximum Internal (GB)	789.7	789.7	1625.9	4294.9	11055.8	
Maximum External (GB)	2807.8	3369.4	1595.3	4260.9	11038.3	
Total Maximum (GB)	3597.5	4141.5	1625.9	4294.9	11055.8	
DASD Arms Maximum Internal	45	45	210	596	630	
External LUNs	160	192	595	595	629	
Diskette (8 or 5 ¼-inch)	-	-	2	2	-	
Communication Lines (Note 4)	40	52	128	300	300	
Twinax Workstation Controllers	9	11	66	175	152	
Twinaxial Devices	360	440	2628	7000	6080	
Internal CD-ROM/DVD-RAM (Note 3)	2	2	18 (Note 8)	18 (Note 8)	18	28
Internal Tape	1	2	17	17	17	28
External CD-ROM/DVD-RAM (Note 3)	8	10	8	14	10	34
External Tape (Max/System)	8	10	8	14	10	34
Tape Libraries Maximum (Note 2)	8	10	8	14	10	34
Optical libraries	8	11	14	22	22	34
Physical Packaging				-		
External HSL Ports	8	-	-	-	8	
External HSL Loops	4	-	-	-	4	
#5074 Towers	13	-	-	18	13	
Integrated xSeries Adapter	8	-	-	-	8	
SPD Towers Supported	-	-	4	18	-	
Embedded IOPs	-	-	2		-	
PCI Adapter Card slots	14	14	86	270	196	
Maximum PCI IOA Cards	11	11	70	216	154	
LAN Ports Maximum	6	8	24	72	72	
Maximum Integrated xSeries Server	2	2	16	16	16	
Cryptographic Processors	3	3	3	3	3	

Note 1:	Commercial Processing Workload (CPW) is used to measure the performance of all iSeries and AS/400e processors announced from September 1996 onward. The CPW value is measured on maximum configurations. The type and number of disk devices, the number of workstation controllers, the amount of memory, the system model, other factors, and the application running determine what performance is achievable.
Note 2:	The total number of tape drives does not increase.
Note 3:	There must be one CD-ROM or DVD-RAM per system.
Note 4:	One line is used if #5544 System Console on Operations Console is used. One line might be used if the #5546 or #5548 System Console on LAN is selected and the #0367 Operations Console Cable is connected.
Note 5:	Includes the #5034 or #5035 tower and all the SPD bus towers attached to the #5034 or #5035.
Note 6:	Includes the #5077 tower and all the SPD bus towers attached to the #5077.
Note 7:	New systems only, does not apply to migrated towers.
Note 8:	Includes base CD-ROM in Migration tower (no feature code).
Note 9:	Processor Group is determined by a combination of the Processor and Interactive Feature. The following table provides a cross reference.

Processor	Interactive Feature	Processor Feature	Processor Group
#2400	#1531	#23C1	P20
	#1532	#23C2	P30
	#1533	#23C3	P30
	#1534	#23C4	P30
	#1535	#23C5	P30
#2402	#1531	#23D1	P30
	#1532	#23D2	P40
	#1533	#23D3	P40
	#1534	#23D4	P40
	#1535	#23D5	P40
	#1536	#23D6	P40
#2403	#1531	#23D8	P40
	#1532	#23D9	P50
	#1533	#23DA	P50
	#1534	#23DB	P50
	#1535	#23DC	P50
	#1536	#23DD	P50
	#1537	#23DE	P50

Note 10:	External DASD maximum assumes 17.54 GB LUNs. External DASD cannot exceed the maximum system capacity or the maximum number of disk arms.

General note: Capacities shown may require prerequisites. Some combinations of features may not be valid.

Table 5: Summary of the iSeries Model 840

Model	840				
Processor Feature	**#2416**	**#2417**	**#2418**	**#2419**	**#2420**
Relative System Performance (Notes 1 and 2)					
Processor CPW	10000	13200	10000	16500	16500
Interactive CPW					
#1540 (Base)	120	120	120	120	120
#1541	240	240	240	240	240
#1542	560	560	560	560	560
#1543	1050	1050	1050	1050	1050
#1544	2000	2000	2000	2000	2000
#1545	4550	4550	4550	4550	4550
#1546	10000	10000	10000	10000	10000
#1547	-	-	-	16500	16500
Number / Type / Speed of Processors	8 to 12/iStar 500 Mhz	12 to 18/iStar 500 Mhz	12/iStar 500 Mhz	18 to 24/iStar 500 Mhz	24/iStar 500 Mhz
L2 Cache (MB)	8	8	8	8	8
Main Storage (GB min/max)	4/128	4/128	4/128	4/128	4/128
Main Storage cards (min/max)	4/16	4/16	4/16	4/16	4/16
Minimum Operating System Level	V4R5	V4R5	V4R5	V4R5	V4R5
Processor Group (Note 8)	P40-P50	P40-P50	P40-P50	P40-P50	P40-P50

Model	840			
Processor Feature	**#2461**	**#2352**	**#2353**	**#2354**
Relative System Performance (Notes 1 and 2)				
Processor CPW	20200	8000-12000	11000-16500	15150-20200
Interactive CPW				
#1540 (Base)	120	120	120	120
#1541	240	240	240	240
#1542	560	560	560	560
#1543	1050	1050	1050	1050
#1544	2000	2000	2000	2000
#1545	4550	4550	4550	4550
#1546	10000	10000	10000	10000
#1547	16500	-	16500	16500
#1548	20200	-	-	20200
Number / Type / Speed of Processors	24/SStar/ 600 Mhz	8 to 12/SStar/ 600 Mhz	12 to 18/SStar/ 600 Mhz	18 to 24/Sstar/ 600 Mhz
L2 Cache (MB)	16	16	16	16
Main Storage (GB min/max)	4/128	4/128	4/128	4/128
Main Storage cards (min/max)	4/16	4/16	4/16	4/16
Minimum Operating System Level	V5R1	V5R1	V5R1	V5R1
Processor Group (Note 8)	P40-P50	P40-P50	P40-P50	P40-P50

Numbers are for All Processor Features	Base System #9079	PCI Expansion Tower #5074	Migrated Total with #5077 (Note 5)	New System Maximum (Note 6)	LPAR System Maximum
Disk Storage Minimum (GB)	8.58	-	-		
Maximum Internal (GB) (Note 9)	789.7	789.7	4294.9	18952.8	
Maximum External (GB)	2807.8	3369.4	4260.6	18935.3	
Total Maximum (GB)	3597.9	4141.5	4294.9	18952.8	
DASD Arms Maximum Internal	45	45	596	1080	
External LUNs	160	192	595	1079	
Diskette (8 or 5 ¼-inch)	-	-	2	-	
Communication Lines (Note 4)	40	52	300	400	
Twinax Workstation Controllers	9	11	175	175	
Twinaxial Devices	360	440	7000	7000	
Internal CD-ROM/DVD-RAM (Note 3)	2	2	18 (Note 7)	24	34
Internal Tape	1	2	17	26	34
External CD-ROM/DVD-RAM (Note 3)	8	11	14	26	34
External Tape (Max/System)	8	11	14	26	34
Tape Libraries Maximum (Note 2)	8	11	14	26	34
Optical libraries	8	11	22	26	34
Physical Packaging					
External HSL Ports	16	-	-	16	
External HSL Loops	8	-	-	8	
#5074 Towers	23	-	-	23	
Integrated xSeries Adapter	16	-	-	-	
SPD Towers Supported	-	-	18	-	
PCI Adapter Card slots	14	14	270	336	
Maximum PCI IOA Cards	11	11	216	264	
LAN Ports Maximum	6	8	72	96	
Maximum Integrated xSeries Server	2	2	16	16	
Cryptographic Processor	3	3	3	3	

Note 1:	Commercial Processing Workload (CPW) is used to measure the performance of all iSeries and AS/400e processors announced from September 1996 onward. The CPW value is measured on maximum configurations. The type and number of disk devices, the number of workstation controllers, the amount of memory, the system model, other factors, and the application running determine what performance is achievable. With the introduction of the Dedicated Servers for Domino, Simple Mail Users is added as a performance measurement.
Note 2:	The total number of tape drives does not increase.
Note 3:	There must be one CD-ROM or DVD-RAM per system.
Note 4:	One line is used if the #5544 System Console on Operations Console is used. One line might be used if the #5546 or #5548 System Console on LAN is selected and the #0367 Operations Console Cable is connected.
Note 5:	Includes the #5077 and all the SPD Bus towers attached to the #5077.
Note 6:	New systems only. Does not apply to migrated system.
Note 7:	Includes base CD-ROM in Migration tower (no feature code).
Note 9:	External DASD maximum assumes 17.54 GB LUNs. External DASD cannot exceed the maximum system capacity or the maximum number of disk arms.
Note 8:	Processor Group is determined by a combination of the Processor and Interactive Feature. The following table provides a cross reference.

Processor	Interactive Feature	Processor Feature	Processor Group
#2416	#1540	#24C0	P40
	#1541	#24C1	P50
	#1542	#24C2	P50
	#1543	#24C3	P50
	#1544	#24C4	P50
	#1545	#24C5	P50
	#1546	#24C6	P50
#2417	#1540	#24C8	P40
	#1541	#24C9	P50
	#1542	#24CA	P50
	#1543	#24CB	P50
	#1544	#24CC	P50
	#1545	#24CD	P50
	#1546	#24CE	P50

Note 8: Cont'd Processor Group is determined by a combination of the Processor and Interactive Feature. The following table provides a cross reference.

Processor	Interactive Feature	Processor Feature	Processor Group
#2418	#1540	#23E8	P40
	#1541	#23E9	P50
	#1542	#23EA	P50
	#1543	#23EB	P50
	#1544	#23EC	P50
	#1545	#23ED	P50
	#1546	#23EE	P50
#2419	#1540	#24D0	P40
	#1541	#24D1	P50
	#1542	#24D2	P50
	#1543	#24D3	P50
	#1544	#24D4	P50
	#1545	#24D5	P50
	#1546	#24D6	P50
	#1547	#24D7	P50
#2420	#1540	#23F8	P40
	#1541	#23F9	P50
	#1542	#23FA	P50
	#1543	#23FB	P50
	#1544	#23FC	P50
	#1545	#23FD	P50
	#1546	#23FE	P50
	#1547	#23FF	P50

Note 8: Cont'd Processor Group is determined by a combination of the Processor and Interactive Feature. The following table provides a cross reference.

Processor	Interactive Feature	Processor Feature	Processor Group
#2352	#1540	#26B0	P40
	#1541	#26B1	P50
	#1542	#26B2	P50
	#1543	#26B3	P50
	#1544	#26B4	P50
	#1545	#26B5	P50
	#1546	#26B6	P50
#2353	#1540	#26B8	P40
	#1541	#26B9	P50
	#1542	#26BA	P50
	#1543	#26BB	P50
	#1544	#26BC	P50
	#1545	#26BD	P50
	#1546	#26BE	P50
	#1547	#26BF	P50
#2354	#1540	#26C0	P40
	#1541	#26C1	P50
	#1542	#26C2	P50
	#1543	#26C3	P50
	#1544	#26C4	P50
	#1545	#26C5	P50
	#1546	#26C6	P50
	#1547	#26C7	P50
	#1548	#26C8	P50

Note 8: Cont'd Processor Group is determined by a combination of the Processor and Interactive Feature. The following table provides a cross reference.

Processor	Interactive Feature	Processor Feature	Processor Group
#2461	#1540	#26D0	P40
	#1541	#26D1	P50
	#1542	#26D2	P50
	#1543	#26D3	P50
	#1544	#26D4	P50
	#1545	#26D5	P50
	#1546	#26D6	P50
	#1547	#26D7	P50
	#1548	#26D8	P50

General note: Capacities shown may require prerequisites. Some combinations of features may not be valid.

Table 6: Summary of the iSeries Models SB2 and SB3

Model	SB2	SB3	
Processor Feature	**#2315**	**#2316**	**#2318**
Relative System Performance (Note 1)			
Processor CPW	7350	10000	16500
Interactive CPW	n/a	n/a	n/a
Number / Type / Speed of Processors	8/iStar 540 Mhz	12/iStar 500 Mhz	24/iStar 500 Mhz
L2 Cache (MB)	8	8	8
Main Storage (GB)	12	16	24
Main Storage cards/DIMMs (min/max)	48/48	8/8	12/12
Minimum Operating System Level	V4R5	V4R5	V4R5
Processor Group	P30	P40	P40
DASD Storage			
DASD Arms Maximum	4	6	8
Physical Minimum (GB)	34.3	34.3	34.3
Physical Maximum (GB)	70.1	105.2	140.3
Logical Maximum (Raid-5 Protection)	52.6	87.7	122.7

	SB2 Base #9074	SB3 Base #9079	Migration Tower II #5077	SB2 Total	SB3 Total
Diskette (8 or 5 ¼-inch)	-	-	-	-	-
Communication Lines (Note 3)	32	32	6	32	32
Twinax Workstation Controllers	1	1	1	1	1
Twinaxial Devices	28	28	28	28	28
Internal CD-ROM / DVD-RAM (Notes 4 and 6)	1	1	1	2	2
Internal Tape	1	1	2	2	2
External Tape	5	7	2	5	7
Tape Libraries Maximum (Note 2)	4	4	2	4	4
Optical libraries	2	2	1	2	2
Physical Packaging					
External HSL Ports (Note 5)	4	8	-	4	8
External HSL Loops (Note 5)	2	4	-	2	4
#5077 Migration Tower II	1	1	-	1	1
Integrated xSeries Adapter	-	-	-	-	-
Maximum SPD cards/PCI IOPs	3	3	2 (Note 7)	3	3
PCI Adapter Card slots (usable)	14	14	-	14	14
Maximum PCI IOA Cards (usable)	11	11	-	11	11
Maximum LAN Ports	4	4	3	4	4
Maximum Integrated xSeries Server	2	2	1	2	2
Cryptographic Processor	3	3	1	3	3

Note 1:	Commercial Processing Workload (CPW) is used to measure the performance of all iSeries and AS/400e processors announced from September 1996 onward. The CPW value is measured on maximum configurations. The type and number of disk devices, the number of workstation controllers, the amount of memory, the system model, other factors, and the application running determine what performance is achievable. With the introduction of the Dedicated Servers for Domino, Simple Mail Users is added as a performance measurement.
Note 2:	The total number of tape drives does not increase.
Note 3:	One line is used if the #5544 System Console on Operations Console is used. One line might be used if the #5546 or #5548 System Console on LAN is selected and the #0367 Operations Console Cable is connected.
Note 4:	There must be one CD-ROM or DVD-RAM per system.
Note 5	Because only three controllers and two towers are allowed on the SB3, a maximum of four HSL ports and two HSL loops are usable to attach towers. Other ports and loops are usable for clustering only.

Note 6	Includes base CD-ROM in Migration tower (no feature code).
Note 7	The Base MFIOP (CCIN 671A) is included in this total.

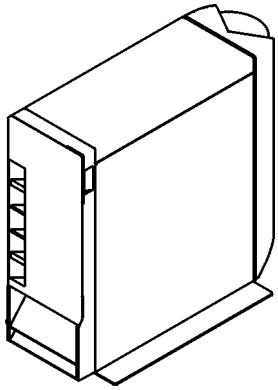
General note: Capacities shown may require prerequisites. Some combinations of features may not be valid.

AS/400e Server 250

AS/400e Server 250

AS/400e Server 250

The Model 250 System Unit is a PCI only based unit. It has a base configuration of:



AS/400e Server 250 System Unit

- Processor (one must be specified):

  V4R5 is required for the following processors. Processor performance CPW is provided.

  – #2295 processor (50/15 CPW) with 256M memory (2x CCIN 3022)
  – #2296 processor (75/20 CPW) with 256M memory (2x CCIN 3022)

  Performance figures shown are for the client/server and interactive in an unconstrained environment. Memory and disk I/O constraints may limit the performance of some applications.

- Multifunction I/O Processor (MFIOP CCIN 6757)

  Both the processor and MFIOP are combined onto one card. The base disk controller (CCIN 9728) is embedded. Feature #9728 is not required.

- Base DASD/Tape Cage with support for four internal disk units, one internal tape, and one internal CD-ROM
- One 8.58 GB Disk Unit
- #9771 Base PCI 2-Line WAN with Modem
- One CD-ROM unit
- One Console attachment (choose one of the following options):
  – #9720 Twinaxial/WAN IOA option for Twinaxial Console and ECS
  – LAN Adapter option: Select one of the following LAN features plus #0398 Operations Console package:
    - #9723 Base Ethernet IOA
    - #9724 Base PCI Token-Ring IOA
    - #9738 Base PCI 100/10 Ethernet IOA

    Note: The #0398 is not included in the base system. It is a required priced feature with the base LAN option. This special package is for the Model 250 only and includes CCIN 2745 and CCIN 0367.

    Note: When the #2746 is on the order, the #0398 is not required with the base LAN option.

- Six PCI card slots

- The following software products are always preloaded and included with the Model 250 base system:
  - 5769-SS1 OS/400
  - 5769-QU1 Query
  - 5769-ST1 DB2 Query manager and SQL development kit for AS/400
  - 5769-XW1 AS/400 Client Access Family for Windows

  A new processor group, PPS (processor-based packaged software), supports these four programs only when ordered as part of this package. The PPS group is less than the P05 group. Upgrades to the P05 or higher groups result in an upgrade charge. Processor-based programs, other than these four, are charged at the P05 group when ordered for a Model 250.

The AS/400e Model 250 servers are Customer Setup (CSU).

OS/400 V4R5 is required to support the 250 servers.

PCI Card Technology

The Model 250 is a Peripheral Component Interconnect (PCI) based technology system. SPD cards do not attach to the Model 250.

The fundamental bus architecture of the AS/400e server remains unchanged with the implementation of PCI adapters. The AS/400e IOP architecture continues to off load cycles from the main processor, isolate the host from adapter and network errors, and manage, configure, and service the adapters. PCI architecture continues to offer advantages over other system structures.

There are several types of PCI cards, each of which requires a specialized slot on the AS/400e Model 250 backplane:

- **Low-Speed PCI Adapter Cards**: Low-speed PCI cards require a PCI card slot and a PCI controller to drive them. This PCI controller can either be included on the backplane or as a separate PCI card that attaches to the backplane.
- **High-Speed PCI Adapter Cards**: High-speed PCI cards require a higher bandwidth connection to the PCI controllers than low-speed PCI cards require. The PCI controller can be included on the backplane or as a separate PCI card that attaches to the backplane.
- **Low-Speed/High-Speed PCI Adapter Cards**: The Low-speed/High-Speed PCI cards can be installed in either a low-speed slot or high-speed slot.

- **PCI Controller Cards**: PCI controller cards support a number of low-speed PCI card slots and a number of high-speed PCI card slots depending on how the backplane is wired. They require a controller position on the backplane.
- **Integrated xSeries Server for iSeries Controller Cards**: The latest manufacturing variance of the PCI controller cards, the Integrated xSeries Server for iSeries supports PCI card slots and requires a PCI controller to drive it. The Integrated xSeries Server occupies a reserved two-slot controller position on the backplane. One slot is for the Integrated xSeries Server processor card, and one is for the Integrated iSeries Server Bridge card.

Model 250 *non-CIF features* include:

- #2763 PCI Raid Disk Controller
- #2748 PCI Raid Disk Controller
- #7102 System Expansion Unit
- Processor Upgrades

Refer to “Customer Install Features (CIF)” on page 417 for a more complete list.

Main Storage

The Model 250 #2295 and #2296 processors ship with 256 MB of base main storage. There are no features to specify the base memory. The base memory positions contain two 128 MB DIMMs (CCIN 3022). There are six additional Dual Inline Memory Modules (DIMM) slots available. These additional slots are available for DIMMs of either 128 MB or 256 MB up to a maximum of 1024 MB. Memory on both processors of the Model 250 must be added in pairs.

The following table shows the main storage options for the Model 250.

Processor Options (min MB/max MB)	Main Storage Supported			
	Base	Feature #3022 (128 MB)	Feature #3024 (256 MB)	Maximum
#2295 (256/1024)	256M	6	2	6
#2296 (256/1024)	256M	6	2	6

Workstation Controllers

The Model 250 supports only 5250-type workstations and LAN attachments.

A 5250 twinaxial device or 5250 emulation adapter in a PC supports a single address, multiple addresses, or shared sessions on a single address. Whenever a device is powered on or when the 5250 emulation software is started on a PC, each defined address responds

to the workstation controller polls. Therefore, these addresses count as an active address even when no device description exists on the AS/400 system. This can occur when the QAUTOCFG system value is set to *NO. Further considerations include:

- When a device has multiple addresses defined for multiple sessions to support jump screen or to support an attached printer, each session counts towards the maximum active addresses supported by that workstation controller.
- When a device has a single address defined with shared sessions, that device counts as one of the maximum active addresses and up to four of the maximum shared sessions.

There is a maximum of 300 shared sessions per IOP. Refer to the count of active sessions table on page 122 for a reference of the types of sessions that count toward the maximum number of active sessions. You should also refer to “5250 Express Data Stream” on page 122 for workstation considerations.

When ordered, the Multifunction I/O Processor has a selection of features that determine whether a 5250-type device (#9720) or Operations Console (#0398) is to be used as a console.

The following workstation controllers can be attached to the Model 250:

- #2746 PCI Twinaxial Workstation IOA
- #9720 Base PCI WAN/Twinaxial IOA

#2746 PCI Twinaxial Workstation IOA

The #2746 is an 8-port twinaxial workstation IOA with a 20-foot attachment cable for attaching up to 40 5250-type displays and printers. Each port supports seven attached addresses allowing for up to 56 attached addresses, of which only 40 can be active. When the attached display supports address sharing, a maximum of 120 shared sessions are supported. The #2746 is specified when additional PCI twinaxial workstation controllers are required and can be installed in either high or low speed slots.

#9720 Base PCI WAN/Twinaxial IOA

The #9720 combined twinaxial and communications adapter is a base option on the Model 250. A cable with a 4-port expansion box comes with this adapter. Each port supports seven attached addresses, for a total of 28 attached addresses per #9720. When the attached display supports address sharing, a maximum of 112 shared sessions are supported. This adapter also supports a single communication line. See “#9720 Base PCI WAN/Twinaxial IOA” on page 97.

Note: The #2720 PCI WAN/Twinaxial IOA can be ordered manually to change the console from Operations Console. The administrative sales records should be RPOed to show a #9720 Base PCI WAN/Twinaxial IOA installed.

Multifunction I/O Processor (MFIOP)

A base MFIOP is standard on all Model 250s.

Note: Other IOP cards support several functions. Therefore, the term MFIOP is not limited to designate the base MFIOP as on earlier models.

PCI Base Multifunction IOP

This MFIOP provides support for two low-speed PCI card slots and one high-speed PCI card slot. It also drives one additional card, which is either an Integrated xSeries Server or an additional high-speed slot.

Low-speed PCI Slot (C09)	Supports the base #9771 Base PCI 2-Line WAN with Modem, #2745 PCI 2-Line WAN IOA, #2746 PCI Twinaxial Workstation IOA, or #9720 PCI WAN/Twinaxial IOA. C09 can also support a #2723/#9723 PCI Ethernet IOA or #2724/#9724 PCI Token-Ring IOA if C03 does not contain a #2838 100/10 Mbps Ethernet IOA.
Low-speed PCI slot (C08)	Supports #0398 Operations Console Package (CCIN 2745 and CCIN 0367) or #9720 PCI WAN/Twinaxial IOA or #9771 Base PCI 2-Line WAN with Modem
High-speed slot (C07)	Supports #2763 PCI RAID Disk Unit controller or #2748 PCI RAID Disk Unit Controller.
High-speed slot (C03)	If no #2866 Integrated Netfinity Server is installed in slots C02/C04, then C03 may be used for a #2723/#9723 PCI Ethernet IOA, #2724/#9724 PCI Token-Ring IOA, #2838/#9738 100/10 Mbps Ethernet IOA, #2750, #2751, or #2761 Integrated Analog Modem.
Reserved Slots (C02/C04)	The MFIOP supports #2866 Integrated NetfinityServer in slots C02/C04 only if no card is installed in high-speed slot C03.

Notes: The Base PCI Disk controller (CCIN 9728) is embedded on the backplane.

#2824 PCI LAN/WAN/Workstation IOP

The #2824 PCI IOP is a feature I/O processor with 32 MB of controller memory. The #2824 is installed in the #7102 System Expansion Unit. The #7102 has a base controller (CCIN 2824) in slot E10.

The number of PCI cards that can be supported in a Model 250 depends on the number of controllers in the system. Use care in the selection of the controllers. Follow the configuration rules.

Communications

The following adapters support communications on the Model 250:

- #2745 PCI Two-Line WAN IOA
- #2750 PCI ISDN BRI U IOA
- #2751 PCI ISDN BRI S/T IOA
- #2761 Integrated Analog Modem
- #9720 Base PCI WAN/Twinaxial IOA
- #9771 Base PCI 2-Line WAN with Modem

#2745 PCI Two-Line WAN IOA

Supports up to two multiple protocol communications ports when one of two (in any combination) of the following cables are attached:

- #0348 V.24/EIA232 20ft/6m PCI cable
- #0349 V.24/EIA232 50ft/15m PCI cable
- #0353 V.35 20ft/6m PCI cable
- #0354 V.35 50ft/15m PCI cable
- #0356 V.36 20ft/6m PCI cable
- #0359 X.21 20ft/6m PCI cable
- #0360 X.21 50ft/15m PCI cable
- #0365 V.24/EIA232 80ft/24m PCI cable
- #0367 Operations Console cable

Note: Only one #0367 Operations Console cable is allowed per system.

#2750 PCI ISDN BRI U IOA

#2750 is a 4-port (8-channel) ISDN BRI (basic rate interface) full-sized PCI card. Based on the latest DSP technology, #2750 allows connections to fax or data modems connected to the telephone network with analog phone lines as well as to other IDSN devices. Each port consists of 2B+D configuration. The #2750 is the “U”-bus (2 wire) version IOA.

- For data mode support, B-channel supports digital data at 64 Kbps.
- For modem mode support, B-channel supports V.90 and lesser modulations.

A wrap cable/plug and four 30-ft RJ-45 to RJ-45 network cables are shipped with each card.

The #2750 IOA supports full duplex mode. It supports the PPP, IDLC, and Fax protocols.

It is allowed both in the Base System Unit and the System Expansion Unit. There is a maximum of one #2750 per IOP. This feature requires country certification or homologation.

#2751 PCI ISDN BRI S/T IOA

The #2751 is a 4-port (8-channel) ISDN BRI (basic rate interface) full-size PCI card. Based on the latest DSP technology, the #2751 allows connections to fax or data modems connected to the telephone network with analog phone lines, as well as to other ISDN devices. Each port consists of 2B+D configuration. The #2751 is the “S/T”-bus (4 wire) version IOA.

- For data mode support, the B-channel supports digital data at 64 Kbps.
- For modem mode support, the B-channel supports V.90 and lesser modulations.

A wrap cable and plug and four 30-foot RJ-45 to RJ-45 network cables are shipped with each card.

The #2751 IOA supports full duplex mode. It supports the PPP, IDLC, and Fax protocols. It is allowed both in the Base System Unit and the System Expansion Unit. A maximum of one #2751 is allowed per IOP. This feature requires country certification or homologation.

#2761 Integrated Analog Modem

Based on the latest DSP technology, #2761 allows the modem function to be integrated into the IOA and supports multiple analog modem ports (8-phone lines). Each line supports V.90 and lesser modulations. The #2761 IOA supports full duplex mode.

A wrap cable/plug and eight 30-foot UTP phone cables are shipped with each card.

This feature supports the SLIP, PPP, SDLC, and Fax protocols. An asynchronous line description is required that can only be used for fax. The #2761 is configured as a single IOA with eight individual resources available.

There is a maximum of one #2761 per IOP. The #2761 requires country certification or homologation.

#9720 Base PCI WAN/Twinaxial IOA

The #9720 feature can be included as the base MFIOP to support ECS on the communications adapter. The cable required for ECS is the #0348 V.24/EIA232 20ft/6m PCI cable. The #9720 also supports Twinaxial Workstation Controllers (see “Workstation Controllers” on page 93). The #9720 is supported for migration only.

Note: The #2720 PCI WAN/Twinaxial IOA can be ordered manually to change the console from Operations Console. The administrative sales records should be RPOed to show a #9720 Base PCI WAN/Twinaxial IOA installed.

#0398 Operations Console Package

This feature attaches to the MFIOP and supports up to two multiple protocol communication ports for ECS and Operations Console on a PC. Because the package includes a CCIN 2745 and CCIN 0367, it is not necessary to specify the #0367 Operations Console PCI cable 20ft/6m. A #0348 V.24/EIA232 20ft/6m PCI must be specified for ECS.

The #0398 is mutually exclusive with #9720.

#9771 Base PCI 2-Line WAN with Modem

The #9771 is a 2-line WAN adapter, with one port supporting multiple protocol communications and the other port supporting V.90 56K Async Data on PPP using an internal modem.

Connection to the V.90 port is by way of a telephone cable.

Connection to the WAN port is through one of these cables:

- #0348 V.24/EIA232 20-ft PCI cable
- #0349 V.24/EIA232 50-ft PCI cable
- #0353 V.35 20 ft PCI cable
- #0354 V.35 50-ft PCI cable
- #0356 V.36 20 ft PCI cable
- #0359 X.21 20 ft PCI cable
- #0360 X.21 50-ft PCI cable
- #0365 V.24/EIA232 80-ft PCI cable

ECS and fax are not supported on the V.90 port at this time. IBM intends to support ECS on the V.90 port in the next release of OS/400 and with a Group PTF for V4R5.

ECS operates on the WAN port of the #9771 by changing the *RSRCNAME parameter of the QESLINE and QTILINE line descriptions to that of the WAN port on the #9771 card.

When the #9771 is selected to support ECS, one of the following cables must be specified and connected to the WAN port:

- #0348 V.24/EIA232 20 ft PCI cable (default)
- #0349 V.24/EIA232 50-ft PCI cable
- #0365 V.24/EIA232 80-ft PCI cable

The #9771 now supports the Operations Console as the system console.

Communication WAN Restrictions

Restrictions may apply when using any of the following communications functions on a PCI system:

- Frame Relay protocol
- IPX protocol
- X.25 with more than 16 virtual circuits per line
- SDLC protocol if used to connect to more than 64 remote sites
- Communications line speeds greater than 64 Kbps and up to 2.048 Mbps for the SDLC or Frame Relay protocols (Bisync is always limited to a maximum of 64 Kbps)
- Asynchronous communications or Asynchronous PPP line speeds greater than 115.2 Kbps
- Non-Asynchronous Communications line speeds greater than 64 Kbps and up to 640 Kbps for X.25
- No high speed communication line allowed when a feature code #2750, #2751, or #2761 is installed under the same IOP
- V.25 Autocall cable not supported
- Select standby mode not supported

In particular, this applies when using #2745 PCI Two-Line WAN IOA or the IPX protocol (IPX is used over LAN, ATM, or frame relay).

Rules for individual communication cards (adapters or processors) are found with an explanation of the applicable feature description in the *iSeries and AS400e System Builder*, SG24-2155.

For further considerations and sizing rules, refer to the feature descriptions of the specific adapters or IOPs in the Model 250 chapter of the *iSeries and AS400e System Builder*, SG24-2155, and the iSeries Information Center at `http://publib.boulder.ibm.com/pubs/html`

Select **Information Center->your language of choice->What's New**.

For general communications performance considerations, refer to the online-document *AS/400 Performance Capabilities*, SC41-0607. It is available in softcopy only by visiting the Web site at `http://publib.boulder.ibm.com/pubs/html/`

Select **Online Library->your language of choice->What's New**.

Encryption

#4801 PCI Crypto Coprocessor

The #4801 is a hardware cryptography solution. The #4801 is a half-length PC form-factor PCI card which offers rich cryptography function, secure storage of cryptographic keys, and

12 MB/s performance (at the card level) for bulk data encryption. The #4801 is available worldwide. The level of cryptographic function is determined by the Cryptographic Access Provider licensed program, which is downloaded to the adapter.

It can only be installed in a high speed slot in the System Expansion Unit (#7102). On new systems from the plant, the #4801 is shipped with the system, but not installed.

Local Area Networks and Asynchronous Transfer Mode

The following adapters and controllers support LAN attachment on the Model 250. One of the following base LAN adapters is included at no charge with the LAN option:

- #9723 PCI Ethernet IOA
- #9724 PCI 16/4 Mbps Token-Ring IOA
- #9738 PCI 100/10 Mbps Ethernet IOA

Other adapters supporting LAN attachments are:

- #2723 PCI Ethernet IOA
- #2724 PCI 16/4 Mbps Token-Ring IOA
- #2838 PCI 100/10 Mbps Ethernet IOA
- #2815 PCI 155 Mbps UTP OC3 ATM IOA
- #2816 PCI 155 Mbps MMF ATM IOA
- #2818 PCI 155 Mbps SMF OC3 ATM IOA
- #2866 PCI Integrated Netfinity Server

#2838/#9738 PCI 100/10 Mbps Ethernet IOA

The #9738 is a base LAN option on the Model 250.

The 100/10 Mbps Ethernet PCI adapter feature allows the AS/400 system to attach to standardized 100 Mbps high-speed Ethernet LANs and also allows attachment to existing 10 Mbps Ethernet LANs. This adapter comes with an RJ45 connector for attachment to UTP-5 media. It requires one high-speed PCI card slot. The Ethernet /IEEE 802.3 IOA is capable of operating in half or full duplex mode. Cabling for 10 Mbps must be CAT-3 or CAT-5, and cabling for 100 Mbps must be CAT 5 that meets or exceeds Industry Standard EIA/TIA T568A or T568B.

If the #2838/#9738 100/10 Mbps Ethernet is selected to be run on an Integrated xSeries Server, then one #0222 specify feature (100/10 Mbps Ethernet on Integrated Netfinity Server) is required for each #2838/#9738 ordered.

The #9738 is mutually exclusive with the #9723 and #9724 as a base LAN controller.

#2724/#9724 PCI 16/4 Mbps Token-Ring IOA

The #9724 is a base LAN option on the Model 250.

This feature provides a single attachment to either 16 Mbps or a 4 Mbps Token-Ring. The feature consists of an IOA card, internal code that supplies IEEE 802.5 Media Access Control (MAC) and IEEE 802.2 Logical Link Control (LCC) functions. The IOA is capable of operating in half or full duplex mode.

The #2724/#9724 comes with an 2.44m Token-Ring cable, or a separately purchased twisted-pair cable to the RJ45 connection on the IOA may be attached. It occupies one PCI card slot.

If the #2724/#9724 16/4 Mbps Token-Ring LAN IOA is installed on an #2866 Integrated Netfinity Server, then one Specify #0220 (Token-Ring on Integrated Netfinity Server) is required for each #2724/#9724 ordered.

The #9724 is mutually exclusive with #9723 and #9738 as a base LAN controller.

#2723/#9723 PCI Ethernet IOA (10 Mbps)

The #9723 is a base LAN option on the Model 250.

This feature provides a single attachment to one Carrier Sense Multiple Access/Collision Detect Local Area Network. It consists of an adapter card and internal code, which supplies Ethernet Version 2 and IEEE 802.3 Media Access Control (MAC) plus 802.2 Logical Link Control (LLC) functions. The Ethernet/IEEE 802.3 IOA is capable of operating in half or full duplex mode.

The #2723/#9723 has an RJ45 connector and a 15-pin D-shell connector for attachment of customer-supplied cabling. A vendor AUI Ethernet cable or RJ45 twisted-pair cable must be ordered separately. RJ45 cabling for 10 Mbps must be CAT-3 or CAT-5, if CAT 5 is used, because then it meets or exceeds Industry Standard EIA/TIA T568A or T568B. It occupies one PCI card slot.

If #2723/#9723 Ethernet IOA is selected to be run on an #2866 Integrated Netfinity Server, one Specify #0221 (Ethernet on Integrated Netfinity Server) is required for each #2723/#9723 ordered.

The #9723 is mutually exclusive with #9724 and #9738 as a base LAN controller.

#2815 PCI 155 Mbps Unshielded Twisted Pair ATM IOA

This feature allows the AS/400 system to be attached to an Asynchronous Transfer Mode (ATM) network using the Unshielded Twisted Pair (UTP-5) interface. This interface is intended for connection to both local area switches and direct connection to service provider equipment. The #2815 is typically used where 155 Mbps speeds are required over distances of less than 100 meters. It uses one high-speed slot, but cannot be placed in the Base System Unit. It attaches in slot E08 and slot E03 (where #2824 is a prerequisite) of the

System Expansion Unit (#7102). The maximum is two. Technical specifications and industry standards supported are available at the ATM Forum Web site: http://www.atmforum.com

#2816 PCI 155 Mbps Multi-Mode Fiber OC3 ATM IOA

This feature allows the AS/400 system to be attached to an Asynchronous Transfer Mode (ATM) network using the Multi-Mode Fiber (MMF) 62.5 micron interface. This interface is intended for connection to both local area switches and direct connection to service provider equipment. The #2816 is typically used where 155 Mbps speeds are required over distances of less than 2 km. It uses one high-speed slot but cannot be placed in the Base System Unit. It attaches in slot E08 and E03 (where #2824 is a prerequisite) of the System Expansion Unit (#7102). The maximum is two. Technical specifications and industry standards supported are available at the ATM Forum Web site: http://www.atmforum.com

#2818 PCI 155 Mbps Single-Mode Fiber OC3 ATM IOA

This feature allows the AS/400 system to be attached to an Asynchronous Transfer Mode (ATM) network using the Single-Mode Fiber (SMF) 9 micron interface. This interface is intended primarily for direct connection to service provider equipment but can be used for local area switches. The #2818 is typically used where 155 Mbps speeds are required over distances from 16 to 40 km. It uses one high-speed slot, but cannot be placed in the Base System Unit. It can attach in slots E08 and E03 (where #2824 is a prerequisite) of the System Expansion Unit (#7102). The maximum is two. Technical specifications and industry standards supported are available at the ATM Forum Web site: http://www.atmforum.com

#2866 PCI Integrated Netfinity Server

The Integrated Netfinity Server contains an Intel 333 MHz Pentium II Processor, four main storage slots, and two LAN IOA slots. The adapter requires two reserved PCI card positions: one for the processor card and the second for the bridge card to interface the processor card to the AS/400e server. A maximum of two #2866 Integrated Netfinity Servers are supported: one in the Base System Unit and one in the System Expansion Unit (#7102).

The Integrated Netfinity Server provides high-performance LAN serving to LAN-attached PCs. OS/2 Warp Server for AS/400, Novell IntraNetWare, Lotus Domino, Flowmark, Firewall for AS/400, or Microsoft Windows NT and Windows 2000 servers are supported on the Integrated Netfinity Server.

The Integrated Netfinity Server comes with no base main memory and supports up to four of the following features:

- #2861 32M IOP Memory Card
- #2862 128M IOP Memory Card
- #2867 256M IOP Memory Card

Each LAN slot can contain either a Token-Ring or an Ethernet IOA from the following list:

- #2723/#9723 PCI Ethernet IOA
- #2724/#9724 PCI 16/4 Mbps Token Ring IOA
- #2838/#9738 PCI 100/10 Mbps Ethernet IOA

There can only be one #2838/#9738 on each #2866 Integrated Netfinity Server. An external cable is included to enable connectivity to Integrated Netfinity Server hardware (keyboard, mouse), which also allows for optional use of parallel and serial ports.

If running Microsoft Windows NT on the Integrated Netfinity Server, these additional features are required:

- #0325 IPCS Extension Cable for Windows NT (orderable)
- #1700 IPCS Keyboard/Mouse for Windows NT (default in some countries and orderable in others)
- A display unit must be connected to the Integrated Netfinity Server to support Windows NT
- A minimum of 64M IOP memory on the Integrated Netfinity Server

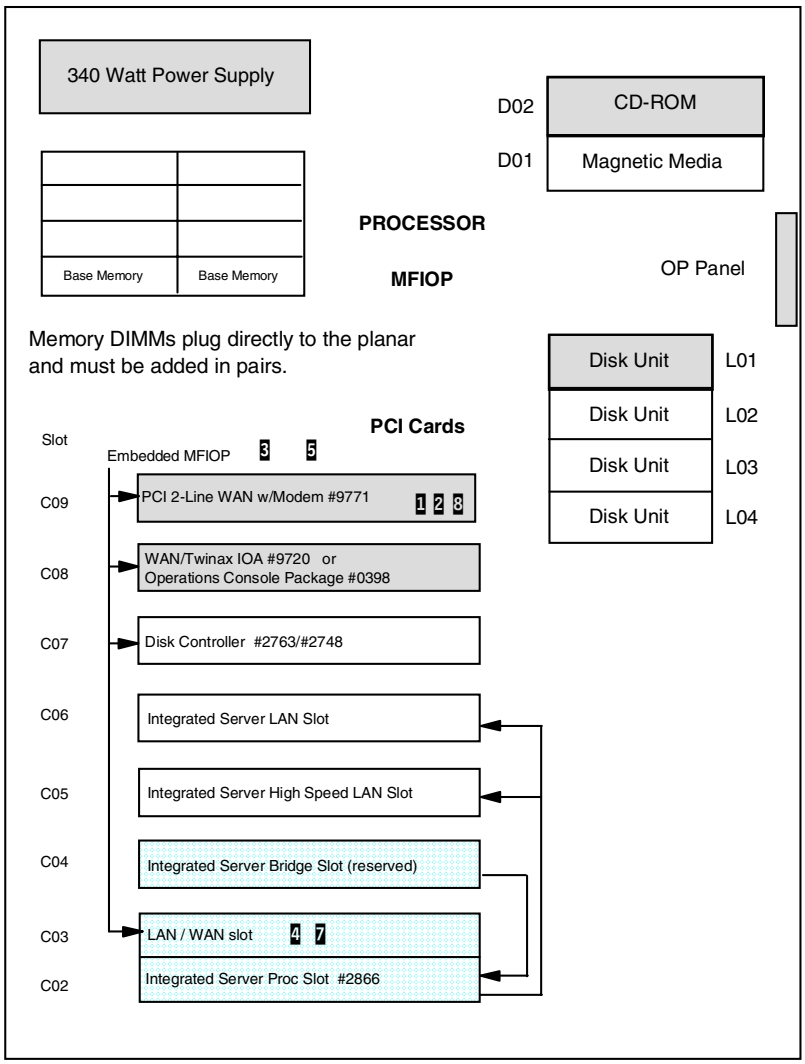
For keyboard/mouse and display support in countries outside the USA, consult the Internet at: `http://www.as400.ibm.com/windowsintegration/ntins.htm`

9406 Model 250 System Unit

Power and Packaging

The base system contains a planar, which combines both the processor and MFIOP in one card. The Base Disk Controller (CCIN 9728) is embedded on the backplane. The MFIOP provides support for two low speed PCI card slots and one high speed PCI card slot (used for the optional disk controller). It also drives one Integrated Netfinity Server (#2866) or one additional high speed slot.

9406 Model 250 System Unit and PCI Card Placement



Notes:

1. No high-speed LAN is allowed in Slot C09.
2. If any LAN is in Slot C03, no LAN card is allowed in Slot C09.
3. A maximum of three LAN cards are allowed on the MFIOP (including Integrated Server slots C05 and C06).
4. Communications cards #2750, #2751, and #2761 are *only* allowed in high-speed Slot C03.

5. The processors include an embedded base disk controller (CCIN 9728). A separate #9728 is not needed.
6. If any IPCS is in Slots C02/C04, C03 must remain empty.
7. In C03, #2723, #2724, #2745, #2746, #2750, #2751, #2761 and #2838 are supported.
8. C09 supports #2720, #2723/#9723, #2724/#9724, #2745/#9745, #2746. When the system is ordered with a base LAN, a #2746 and no #0398, the #2746 goes into C09 and the #9771 into C08.

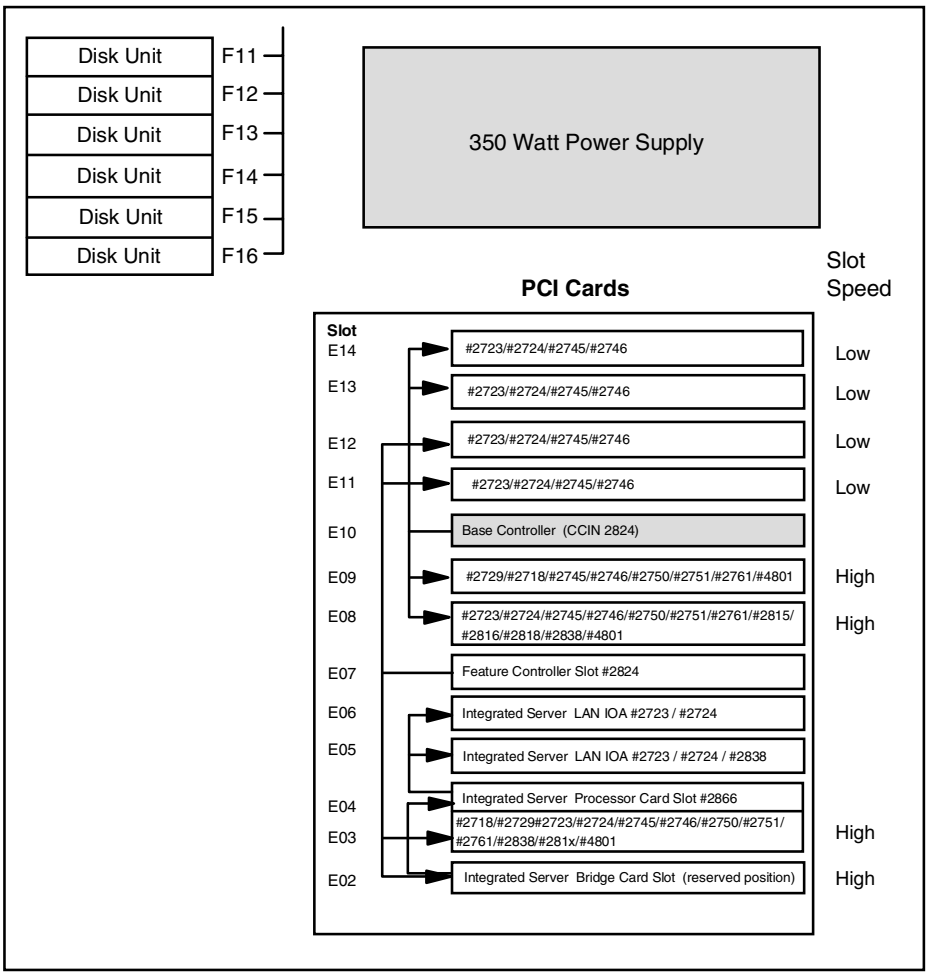
System Expansion Unit Schematics

#7102 System Expansion Unit

Power and Packaging

The System Expansion Unit supports six disk units and includes a Base controller (CCIN 2824) and further slots as illustrated in the following figure.

9406 Model 250 #7102 System Expansion Unit



Notes:

1. A maximum of one High Speed LAN/ATM or maximum of two low speed LANs per controller.
2. If an Integrated Server is in slots E02/E04, E03 must remain empty.
3. A maximum of one LAN in E11 or E12 with Integrated Server in E02/E04.
4. The disk units in the expansion unit are controlled by the #2763 or #2748 disk controller in the System Unit.
5. Communications cards #2750, #2751, and #2761 are allowed in slots E03, E08, and E09 (maximum one per IOP).

6. Cryptographic card #4801 is allowed in high-speed slots E03, E08, or E09 (maximum one per IOP).
7. Integrated Server refers to Integrated Netfinity Server, now available as the Integrated xSeries Server for iSeries.

Uninterruptable Power Supply (UPS)

An external UPS is recommended since the 9406 Model 250 does not have an internal battery backup unit (BBU). The configurator adds a country-specific UPS by default. The 9910 Models 080, 140, and 180 from the 9406 Model 170 may be used although the CPM function is not supported.

Disk Units

There is a maximum of ten disk units supported on the Model 250. There is no support for an external disk on the Model 250.

#6831 1.6 GB Read Cache Device

Read Cache Device feature #6831 (CCIN 6731) is a solid state disk device that provides the Large Read Cache function required by high-performance disk unit controllers. There is a maximum of one per #2748 PCI RAID Disk Unit Controller IOA. Extended Adaptive Cache cannot be used with compression on the same #2748 PCI RAID Disk Unit Controller IOA. The #2748 IOA is shipped with compression disabled. Compression is enabled by moving a jumper on the IOA. Refer to “PCI Disk Units” on page 315 for detailed information.

The following table contains the maximum number of supported disk units for the Model 250.

Feature	Size	RPM	Maximum
#6813	8.58 GB	7200	9
#6817	8.58 GB	10000	9
#6818	17.54 GB	10000	9
#6824	17.54 GB	7200	9
#8917	8,58 GB	10000	1
#8918	17.54 GB	10000	1

For disk unit descriptions, refer to “PCI Disk Units” on page 315.

Magnetic Media Controllers

#2729 PCI Magnetic Media Controller SCSI

The #2729 PCI Magnetic Media Controller SCSI provides for the attachment of tape and optical devices. See “I/O Adapters and Controllers” on page 283.

#2718 PCI Magnetic Media Controller

The #2718 is a SCSI Tape IOA that provides attachment capabilities for the IBM 7207 Model QIC External Tape Drive. The #2718 can attach one tape drive.

#2763 PCI RAID Disk Unit Controller

See “I/O Adapters and Controllers” on page 283.

#2748 PCI RAID Disk Unit Compression Controller

See “I/O Adapters and Controllers” on page 283.

Internal Tape, CD-ROM, and Diskette Units

Internal tapes cannot be installed in the #7102 System Expansion Unit. For more information, refer to “Internal Magnetic Media” on page 315.

Base CD-ROM Drive

Refer to “Internal CD-ROM and DVD-RAM Drives” on page 338.

Diskette Drive Support

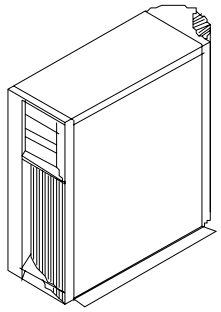
There is no diskette support on the Model 250.

iSeries Server 270

iSeries Server 270

iSeries Server 270

The iSeries Model 270 server delivers the performance, reliability, and security needed for applications that span from core business to e-business. With five processor options, the 270 server offers an *nnn* performance scalability from top to bottom. Processor upgrades are offered within the 270 server.



iSeries Server 270 System Unit

The iSeries server 270 offers up to 24 disk units, a high-performance PCI bus with Hot Plug PCI adapters (on selected processors), a High-Speed Link, and V.90 integrated modem. Options include a 1 Gbps high-speed Ethernet LAN adapter and 100 Mbps high-speed token-ring adapter. On selected processors, interactive performance features can be selected. The iSeries server 270 supports 700 MHz or 850 MHz Integrated xSeries Servers. Options to rack mount the iSeries server 270 are available.

Processor Feature	Number of Processors	Minimum OS/400 Release	Processor Technology	CSU	Concurrent Maintenance on Base DASD	Hot-plug Supported
#2431	1	V5R1	SStar	Yes	No	No
#2432	1	V5R1	SStar	Yes	Yes	No
#2434	2	V5R1	SStar	Yes	Yes	Yes

A minimum functional server consists of the base server unit and selected priced features.

The base server includes the physical package and power elements, a DASD controller, an I/O controller, and a #9771 Base PCI 2-Line WAN with Modem as follows:

- Operator panel without key stick
- Base DASD/tape cage (six Internal Disk slots, two Removable Media slots)

  The base DASD cage on #2431 processors do not support concurrent maintenance.
- Embedded Base PCI IOP

  Provides support for a maximum of up to four IOAs including:

  – Support for base #9767 Base PCI Disk Unit Controller
  – Support for up to six Disk Units, the required CD-ROM/DVD-RAM, and either a feature Internal Tape or feature CD-ROM/DVD-RAM.

  Provides support for base Console/Workstation IOA.

The configurator determines which feature combinations will be on the order based on the System Console #5540, #5544, #5546, or #5548 specify code.

- Hot plug PCI capability on the #2434 processor.

The following must be purchased:

- Processor (one must be specified). Processor performance CPW is in list
  - #2431 processor (465 CPW)
  - #2432 processor (1070 CPW)
  - #2434 2-way processor (2350 CPW)
- Interactive Feature. Use this processor/interactive feature table for the 270 server.

Processor Feature	#2431	#2432	#2434
Interactive Feature			
#1516	-	0	0
#1518	30	-	-
#1519	-	50	-
#1520	-	-	70
Note: An interactive value of zero supports system administrative functions.			

- Main Storage (see “Main Storage” on page 116 for minimum memory requirements)
  - Processors #2431, #2432, or #2452
    - #3032 - 256 MB Main Storage (DDR technology)
    - #3033 - 512 MB Main Storage (DDR technology)
    - #3034 - 1 GB Main Storage (DDR technology)
  - Processors #2434 and #2454
    - #3022 - 128 MB Main Storage (64 Mb technology)
    - #3024 - 256 MB Main Storage (128 Mb technology)
    - #3025 - 512 MB Main Storage (128 Mb technology)
    - #3026 - 512 MB Main Storage (256 Mb technology)
    - #3027 - 1 GB Main Storage (256 Mb technology)
    - #3029 - 128 MB Main Storage (128 Mb technology)

  Note that feature codes #3025 and #3026 or #3022 and #3029 cannot be mixed within pairs or quads.
- PCI Disk Unit Controller.

  The #9767 Base Disk Unit Controller may optionally be replaced with one of the following:
  - #2763 PCI RAID Disk Unit Controller

    Provides support for up to 12 Disk Units, the required CD-ROM/DVD-RAM, and either a feature Internal Tape, feature CD-ROM, or feature DVD-RAM.

  - #4778 PCI RAID Disk Unit Controller

    Provides support for up to 18 disk units, the required CD-ROM/DVD-RAM, and either a feature internal tape, feature CD-ROM, or feature DVD-RAM.

- Internal Disk Units and Read Cache
  - #4317 8.58 GB 10k RPM Disk Unit
  - #4318 17.54 GB 10k RPM Disk Unit
  - #4331 1.6 GB Read Cache Device
- Integrated Optical
  - #4525 — CD-ROM or
  - #4530 — DVD-RAM
- System Console/Communications Adapter
  - The console on LAN option requires a dedicated LAN adapter and a #0367 feature.
  - #5540 System Console on twinaxial workstation controller

    #4746 PCI Twinaxial IOA
  - #5544 System Console on #9771 WAN Adapter

    #0367 Operations Console PCI Cable
  - #5546 System Console on 100 Mbps Token Ring

    #2744 PCI 100 Mbps Token-Ring IOA (Console)
  - #5548 System Console on 100 Mbps Ethernet

    #4838 PCI 100/10 Mbps Ethernet IOA (Console)
- Uninterruptible Power Supply (UPS)

  An external UPS is recommended to protect the system unit and any external components against utility power outages.

Card Technology

PCI architecture offers advantages in flexibility over non-AS/400e server structures. Previous AS/400e models required input/output processors (IOPs) to be in specific slots in the system and expansion towers. If high performance in a particular area was required, a single input/output adapter (IOA) may have been assigned to a single IOP. This resulted in unassigned slots in the tower, leaving valuable slots empty.

With the implementation of new PCI technologies, the Model 270 provides more flexibility in the placement of IOPs and IOAs. This results in more efficient use of card slots, potentially resulting in a lower cost of implementation. Increased flexibility of configuration adds a

degree of complexity to the configuration process. A full understanding of configuration rules associated with the various I/O features of the 270 system is required.

The fundamental bus architecture of the iSeries server is unchanged when using PCI adapters. The AS/400e IOP continues to off load the main processor; isolate the host from adapter and network errors; and manage, configure, and service the adapters.

The following functions do not have equivalent function PCI cards for the Model 270:

- ASCII Adapter
- V.25 Autocall cable
- Select standby mode
- X.21 switched WAN dial-up or Shorthold Mode WAN
- Asynchronous communication speeds of less than 300 bps
- Data Rate Select signal on the EIA 232/V.24 interface. This function is used by some older 2400 bps modems to reduce the speed to 1200 bps.
- LPDA-1 (Link Problem Determination Aids). This is a diagnostic function supported by some (primarily older IBM) modems.
- V.54 local and remote loopback (diagnostics functions supported by some modems)

Processor Features

- #2431 Model 270 Processor (SStar Uni), includes:
  - Eight DIMM memory positions (plug directly onto the processor (direct attach)).
  - Embedded Base IOP (CCIN 286C)
  - Common Service Processor (CSP) (CCIN 25B9)
- #2432 Model 270 Processor (SStar Uni) includes:
  - 2 MB L2 Cache
  - Eight DIMM memory positions (plug directly onto the processor (direct attach)).
  - Embedded Base IOP (CCIN 286D)
  - Common Service Processor (CSP) (CCIN 25B9)
- #2434 Model 270 Processor (SStar 2-Way) includes:
  - Sixteen DIMM memory positions with the main storage expansion card (CCIN 2884).
  - Base I/O Backplane (CCIN 282F)
  - Embedded Base IOP (CCIN 284E)
  - Common Service Processor (CSP) (CCIN 282F)
  - Internal flex cable for HSL enablement (tower attachment)

Interactive Features

The Model 270 supports various levels of interactive performance through the installation of interactive features. See the Model 270 Processor/Interactive Feature Table on page 112.

Interactive CPW is an approximate value reflecting the portion of Processor CPW that can be used for workloads performing interactive-based tasks (5250). An iSeries server 270 can be effectively managed when there is no Interactive CPW (Interactive CPW = 0) available for application workloads. The zero interactive CPW is intended to support a single interactive job for system administrative functions.

- A job started from a console (green screen) to perform a system administration function is not considered interactive work if it is the only interactive job running (single interactive job exception).
- A system administration job submitted to batch is not considered interactive work.
- The use of Operations Navigator (GUI administration functions) is not considered interactive work.

For a discussion of how these features influence system performance, see “IBM Workload Estimator for AS/400” on page 42.

The available interactive options are shown in the Model 270 Processor/Interactive Feature Table on page 112.

A feature cross-reference table can be used to relate Processor Feature Code to the Processor and Interactive features visible in the AS/400e configurator. The Processor Feature Code is found by displaying the QPRCFEAT system value or in the rack configuration. The Processor Feature Code is used when ordering software license keys.

Processor Group is determined by a combination of the Processor and Interactive Feature. The following table provides a cross reference.

Processor	Interactive Feature	Processor Feature	Processor Group
#2431	#1518	#23E7	P10
#2432	#1516	#23F0	P10
	#1519	#23F1	P10
#2434	#1516	#23F4	P20
	#1520	#23F5	P20

Main Storage

All main storage on the Model 270 is feature main storage.

- Processors #2431 and #2432:
  - A single main storage DIMM is allowed on these processors.
  - Any additional DIMMs must be added in pairs of the same capacity and technology.
  - The DIMM memory features used on these processors are unique to this processor set and do not work on any other Model 270 processor.
  - There are eight slots available in the base system for main storage DIMMs, which plug directly onto the processor (direct attach)
- Processor #2434:
  - A pair of main storage DIMMs is allowed on these processors.
  - A minimum of four main storage DIMMs of the same capacity and technology must be selected.
  - This processor includes a base CCIN 2884 Memory Expansion Card. All main storage DIMM features plug into this card.
  - There are 16 slots available on this processor. Main storage DIMMs must be added in sets of four (quads). Each DIMM in the set of four must be of the same capacity and technology.
  - All DIMMs must be plugged in quads starting from the outer four corners going toward the center (A, B, C, D, then E, F, G, H, and so on). The exception is to allow a single set of two main storage DIMMs if these are the only two on the system.

    Using the same feature code number within a quad is required. Mixing quad “groups” on the same riser card is also allowed (including mixing stacked (#3025) and unstacked (#3024) memory technology).

Power and Packaging

The iSeries server 270 does not include an internal battery. An external UPS is recommended to protect the system unit and any external components against utility power outages. The AS/400e CPM/UPS Models 9910-080, 9910-140, and 9910-180, which were previously used with the 9406 Model 170, can also be used with the iSeries server 270. An external UPS, combined with abnormal IPL improvements in OS/400, can provide an equivalent level of power protection and fast recovery in the event of power failure. Continuously Powered Mainstore (CPM) is not supported on the iSeries server 270.

The supported power and packaging features for the iSeries server 270 are:

- #0551 iSeries Rack
  - Up to two iSeries server 270s may be installed in a #0551 rack.
  - Any iSeries server 270 being mounted in a #0551 must have the #7104 System Unit Expansion.
  - Certain upgrade paths are not supported when an iSeries server 270 is mounted in a rack. See “Model 270 Upgrades” on page 126 for valid upgrade paths.
  - Specify codes and features supported when used in conjunction with an iSeries server 270 are:
    - #0121 Lower Unit in Rack Specify
    - #0122 Upper Unit in Rack Specify
    - #0127 Field Install in Rack Specify
    - #1422 Power Distribution Unit (PDU) Line Cord
  - See “#0551 iSeries Rack” on page 260 for a complete description of the #0551 iSeries Rack and supported features and specify codes.
- #7002 HSL Enabler
  - The #7002 is a feature High Speed Link (HSL) internal flex cable, which enables connection to a #5075 PCI Expansion Tower.
  - Can be ordered on the Model 270 with processor #2431 only.
  - This cable connects the processor with a right angle bus connector to the back of the machine. Two HSL cables (#14XX) are required to connect the CEC to the expansion tower.

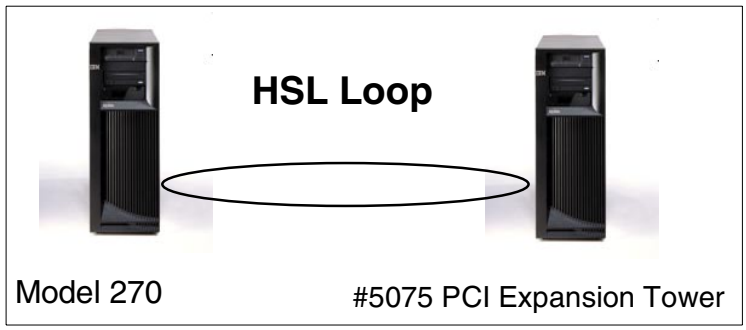
  Note: Certain processor upgrades are “roll-in/roll-out” system upgrades. On these upgrades, an RPO remove of the #7002 must be done because the new system unit comes standard with an internal flex cable. To identify “roll-in/roll-out” upgrades, see “Model 270 Upgrades” on page 126.
- #7104 System Unit Expansion
  - The #7104 is a feature system unit expansion that allows up to an additional 12 disk units to be added to the Model 270. The #7104 has no PCI card slots and no removable media slots.
  - The #7104 comes with support for six disk units standard and requires a #7123 when installing over six disk units.
  - The #7104 disk units are driven by a disk unit controller located in the CEC.
  - A #7133 DASD Concurrent Maintenance Cage is required for processors #2431 to support a #7104.
  - A separate power cord is required for the #7104.

  - If the #7104 is installed with a rack mounted iSeries server 270 in a #0551 iSeries Rack it may be powered by a PDU by ordering feature #1422 PDU Line Cord.
- #7123 DASD Expansion Unit
  - The #7123 is a concurrent maintenance DASD six-position expansion feature, which may be ordered to support an additional six disk units (for a total of 12) in the #7104 on the Model 270.
  - Prerequisite: #7104 on Model 270.
- #7133 DASD Concurrent Maintenance Cage
  - The #7133 is a DASD 6-Pack cage that may be ordered for the Model 270 with processors and #2431.
  - The #7133 enables disk unit concurrent maintenance and replaces the standard non-concurrent maintenance DASD 6-Pack cage.
- #5075 PCI Expansion Tower

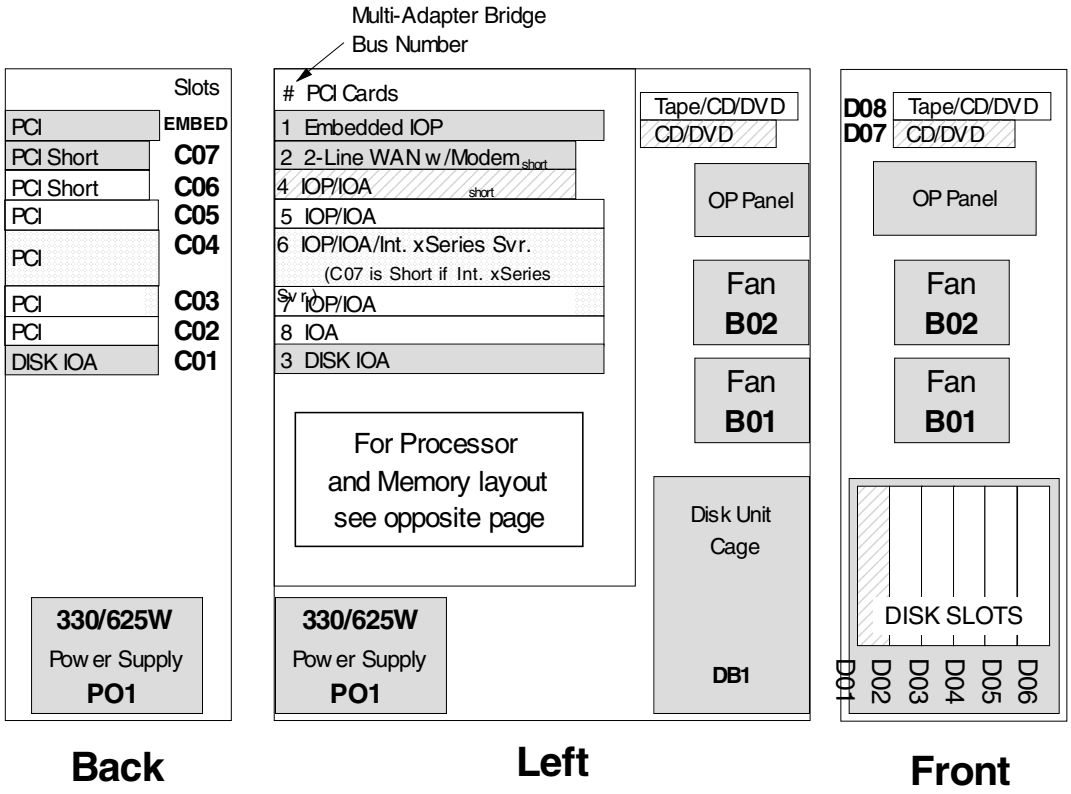
  See “Expansion Towers” on page 237 for detailed information.

High Speed Links (HSL) on Model 270

The Model 270 has been enhanced to provide an external connection to an expansion tower as shown in the figure on the right. The 270’s single HSL loop supports one #5075 PCI Expansion Tower. Combined with the system expansion unit #7104, it provides the Model 270 significant new growth capabilities. There are no migration towers supported on the Model 270 and no supported migration path exists to the Model 270.



Model 270 System Unit



Legend

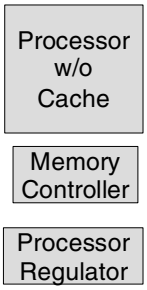
Base Feature

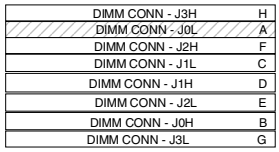
Required Feature

Unavailable if Integrated xSeries Server is installed

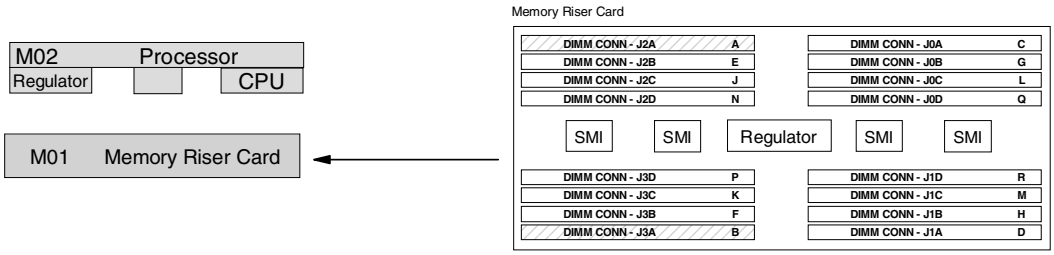
Model 270 Processor and Memory

#2431, #2432, #2452

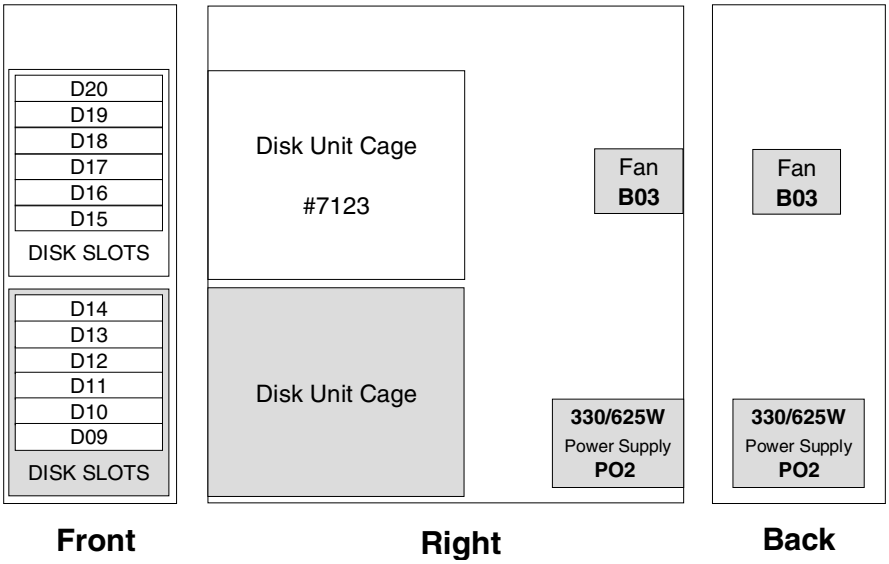




#2434, #2454



Model 270 #7104 System Unit Expansion
DASD Sidecar



For information on the #5075 PCI Expansion Tower, please refer to “#5075 PCI Expansion Tower” on page 241.

Workstation Controllers

A 5250 twinax device or 5250 emulation adapter in a PC can support a single address, multiple addresses, or shared sessions on a single address. Whenever a device is powered on or when the 5250 emulation software is started on a PC, any addresses defined respond to the workstation controller polls. These addresses count as an active address, even though no device description may exist on the iSeries server. This occurs when the system value QAUTOCFG is set to *NO.

- When a device has multiple addresses defined for multiple sessions to support jump screen or to support an attached printer, each session counts toward the maximum active addresses supported by that workstation controller.
- When a device has a single address defined with shared sessions, that device counts as one of the maximum active addresses and up to four of the maximum shared sessions.

There is a maximum of 300 shared sessions per IOP.

This table indicates the types of sessions that count toward the maximum number of active sessions.

Counted	Description
Yes	Local display sessions
Yes	Remote display sessions
Yes	Sessions over 5x94 Controllers (including PCs emulating 5250s)
Yes	Network Routing Facility (NRF) or SPLS displays
Yes	Distributed Host Command Facility (DHCF) displays
Yes	5250 emulation
Yes	Twinaxial shared session devices (separate display devices)
No	Client Access using 5x94 (Virtual displays)
No	Client Access (APPC devices and VRT displays)
No	Retail/Finance devices
No	SNA passthru
No	TDLC (5150 type devices)
No	Port sharing (ASCII) (5150 type device)
No	TCP/IP (Telnet session) (virtual display)
No	APPC (LU 6.2) sessions (APPC or host devices)
No	Display Station Passthru/5250 Passthru/ Workstation Function (virtual displays)
No	3270 Emulation over host CDs (Host devices)
No	Apple devices attached to a LocalTalk Workstation Controller
No	Wireless devices attached to a Wireless LAN Adapter
No	Twinaxial printers

The iSeries server supports a family of displays and emulation adapters that are known as the 5250. The supported data stream is, therefore, known as a 5250 data stream. Throughput considerations are discussed here.

5250 Express Data Stream

The #2720, #2722, #2746, #4746, and #6180 twinax workstation adapter cards have three major features that can increase throughput:

- **2X Mode**: 2 Mbps versus 1 Mbps throughput of the #6050 workstation controller.
- **Optimized Mode**: The block transfer of data is improved to almost double the throughput to or from the attached device.
- **Dual Mode**: Means that two ports are polled simultaneously on the #2722, #2746, #4746 and #6180 workstation controllers. On older controllers (such as the #6050 workstation controller), only one port out of eight is active at any given time.

The enhancement produces nearly four times the throughput when all of the attached devices on a port support 5250 Express Data Stream. All of the IBM devices from the original 5251 up through the 3489 support the Express Data Stream.

Refer to Informational APAR II11804 for additional details regarding workstation considerations when attached devices or cabling do not support 5250 Express Data Stream. Additional information on 5250 Express Data Stream is available on the Web at:
http://www.networking.ibm.com/525/

The IBM 7299 twinax-to-fiber multiplexer fully supports all the new functions of the #2720, #2722, #2746, #4746, and #6180 workstation controllers.

Remote Control Panel

#0382 Remote Control Panel Cable enables use of the Remote Control Panel function on a PC. The iSeries servers use a parallel interface (LPT) instead of a COM port for the Remote Control Panel. The parallel port must be configured to use the Enhanced Parallel Port (EPP) support. It must be EPP Version 1.9 compliant, which may require the PC's Basic Input/Output Services (BIOS) to change. Check with your PC manufacturer for any assistance, if needed. For cable connection details and PC requirements, see the *AS/400 Operations Console Setup Guide*, which is available at:
http://www.as400service.ibm.com/supporthome.nsf/Document/10000051

Notes:

- Due to the way EPP Version 1.9 support is implemented to support the remote control panel, there may be PCs that do not support the use of this function.
- Use of the Remote Control Panel function is independent of the System Console.
- The Remote Control Panel function can be used with any System Console Specify.
- The Remote Control Panel Cable is not required for a LAN attached console (#5546 or #5548).

Remote Control Panel is installed and used from PCs running the Windows NT 4.0 or Windows 2000 Professional PC operating systems.

I/O Processor and I/O Adapter Support

The following list shows the supported IOPs and IOAs. See “I/O Processor” on page 271 and “I/O Adapters and Controllers” on page 283 for full descriptions.

Note

PCI configuration rules are quite flexible. See the “PCI Card Placement Rules” chapter of the *iSeries and AS/400e System Builder*, SG24-2155, for rules on placing the PCI card in configurations.

LAN/WAN/Workstation IOAs

- #2743 PCI 1 Gbps Ethernet IOA
- #2744 PCI 100 Mbps Token Ring IOA
- #2760 PCI 1 Gbps Ethernet UTP IOA
- #2772 PCI Dual WAN/Modem IOA
- #2773 PCI Dual WAN/Modem IOA (ANSI)
- #2817 PCI 155 Mbps MMF ATM IOA
- #4723 PCI 10 Mbps Ethernet IOA
- #4745 PCI Two Line WAN IOA
- #4746 PCI Twinaxial IOA
- #4750 PCI ISDN BRI U IOA
- #4751 PCI ISDN BRI S/T IOA
- #4761 PCI Integrated Analog Modem
- #4801 PCI Cryptographic Coprocessor
- #4815 PCI 155 Mbps UTP OC3 ATM IOA
- #4816 PCI 155 Mbps MMF ATM IOA
- #4818 PCI 155 Mbps SMF ATM IOA
- #4838 PCI 100/10 Mbps Ethernet IOA
- #9771 Base PCI 2-Line WAN with Modem

Internal Disk Unit Controllers

- #2763 PCI RAID Disk Unit Controller
- #4748 PCI RAID Disk Unit Controller
- #4778 PCI RAID Disk Unit Controller
- #9767 Base PCI Disk Unit Controller

Note: Internal Disk Unit Controller configuration considerations:

- The system unit supports up to two disk unit controllers to control disks in the system unit and #7104 Expansion Unit (if installed).
- The system unit supports up to six disks. The #7104 supports up to twelve disks. The #5075 PCI Expansion Tower supports up to six disks and one disk controller.
- The default controller for a #5075 is the #2763 with #4748 optional.
- Disk protection levels:
  - None: No protection
  - 0040: Mirrored (device level)
  - 0041: Device parity protection (RAID)– all
  - 0042: Mirrored (IOP level)
- #4748 supports the #4331 1.6 GB Read Cache Device.

This table shows the defaults when the number of disk units and protection levels are selected.

Number of Disks	Protection	System Unit	#7104	#5075	Default Controller
1 - 6	none 0040	default	-	-	#9767
4 - 6	0041	default	-	-	#2763
7 - 12	none 0041, 0040	default	default	-	#2763
4 - 12	0042	default	default	-	1 - #9767 1 - #2763
13 - 18	none 0041, 0040	default	default	-	#4748
13 - 18	0042	default	default	default	1 - #9767 2 - #2763
19 - 24	none 0041, 0040	default	default	default	1 - #4748 1 - #2763
19 - 24	0042	default	default	default	1 - #9767 2 - #2763

Magnetic Media Controllers

- #2749 PCI Ultra Magnetic Media Controller
- #2765 Fibre Channel Tape Controller
- #2766 Fibre Channel Disk Controller
- #2768 PCI Magnetic Media Controller

I/O Processors

- Embedded Base 32 MB PCI IOP (CCIN 286F, CCIN 286C, CCIN 284E)
- #2842 32 MB PCI IOP
- #2890 PCI Integrated Netfinity Server
- #2891 Integrated xSeries Server

Internal Disk, Tape, and CD-ROM Support

The following list shows the supported internal disks, tape drives and CD-ROMs. Refer to “Internal Magnetic Media” on page 315 for full descriptions.

Internal Disk Units

- #4317 8.58 GB 10k RPM Disk Unit
- #4318 17.54 GB 10k RPM Disk Unit
- #4331 1.6 GB Read Cache Device

Internal Tape and CD-ROM

- #4525 CD-ROM
- #4530 DVD-RAM
- #4582 4 GB ¼-inch Cartridge Tape
- #4583 16 GB ¼-inch Cartridge Tape
- #4586 25 GB ¼-inch Cartridge Tape

CIF Features

Most features on the Model 270 are customer installable (CIF). Refer to “Customer Install Features (CIF)” on page 417 to determine the CIF status for each feature.

Model 270 Upgrades

Supported model upgrades within the 270 servers are identified here.

Model 270											
To		2250	2252		2253		2431	2432		2434	
From		1518	1516	1519	1516	1520	1518	1516	1519	1516	1520
270											
2248	1517	B		M		M	B		B		
2250	1516	B	M	M	M	M	B	B	B	M	M
	1518			M		M			B		M
2252	1516			B	B	B				B	B
	1519					B					B
2253	1516					B				B	B
2431	1518								B		M
2432	1516								B	M	M
	1519										M
2434	1516										B

Note: These upgrades are *not* supported when the Model 270 is mounted in a #0551 iSeries Rack.

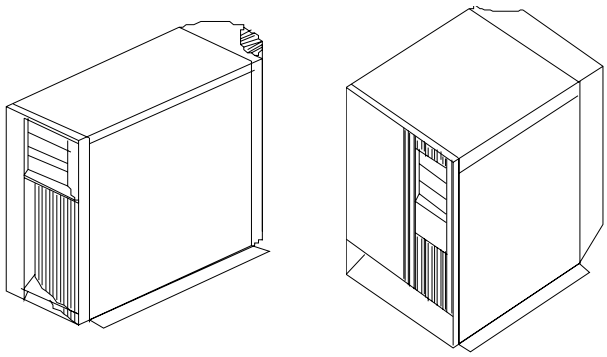
iSeries Dedicated Server for Domino

iSeries Dedicated Server for Domino

iSeries Dedicated Server for Domino

The iSeries Dedicated Server for Domino is specifically designed to deliver outstanding price performance and value when serving a variety of Lotus Domino workloads on a single server. Because the iSeries 270 and 820 models are used as the base models, the iSeries Dedicated Server for Domino is fully configured with all of the same expandability currently available on the iSeries servers 270 and 820.

This chapter describes the features unique to the Dedicated Server. Descriptions for features common to the remaining iSeries 270 and 820 Models are found in “iSeries Server 270” on page 111 and “iSeries Model 820” on page 139.



Model 270 Model 820

iSeries Dedicated Server for Domino System Units

The iSeries Models 270 and 820 families include new processor features for the iSeries Dedicated Server for Domino, supported by OS/400 V5R1. The Dedicated Domino processor capabilities are summarized in these tables.

Model	**270 Dedicated Server for Domino V5R1**	
Processor Feature	**#2452**	**#2454**
Relative System Performance		
Processor CPW	100	240
Interactive Environment	0	0
Mail and Calendaring Users	3070	6660
Number of Processors/Type of Processor	1/SStar (540 Mhz)	2/SStar (600 Mhz)
L2 Cache (MB)	2	4
Main Storage (MB Min/Max)	256-8192	256-16384
Main Storage DIMMs or Cards (Min/Max)	1/8	2/16
Processor Group	P05	P10

Model	270 Dedicated Server for Domino V4R5		
Processor Feature	**#2422**	**#2423**	**#2424**
Relative System Performance			
Processor CPW	50	100	200
Interactive Environment	0	0	0
Simple Mail Users	2400	3860	7580
Mail and Calendaring Users	1600	2570	5050
Number of Processors/Type of Processor	1/Pulsar	1/Pulsar	2 /Pulsar
L2 Cache (MB)	0	2	4
Main Storage (MB Min/Max)	256-4096	256-8192	256-8192
Main Storage DIMMs or Cards (Min/Max)	2/8	2/16	2/16
Processor Group	P05	P05	P10

Model	820 Dedicated Server for Domino V5R1		
Processor Feature	**#2456**	**#2457**	**#2458**
Relative System Performance			
Processor CPW	120	240	380
Interactive CPW	0	0	0
Mail and Calendaring Users	3110	6660	11800
Number of Processors/Type	1/SStar (600 Mhz)	2/SStar (600 Mhz)	4/SStar (600 Mhz)
L2 Cache (MB)	2	4	4
Main Storage (MB Min/Max)	256-16384	256-32768	256-32768
Main Storage DIMMs or Cards	2/16	2/32	2/32
Processor Group	P05	P10	P10

Model	820 Dedicated Server for Domino V4R5		
Processor Feature	**#2425**	**#2426**	**#2427**
Relative System Performance			
Processor CPW	100	200	300
Interactive CPW	0	0	0
Simple Mail Users	3860	8420	14840
Mail and Calendaring Users	2570	5610	9890
Number of Processors/Type	1/Pulsar	2/Istar	4/Istar
L2 Cache (MB)	2	4	4
Main Storage (MB Min/Max)	256-8192	256-16384	256-16384
Main Storage DIMMs or Cards	2/16	2/32	2/32
Processor Group	P05	P10	P10

Relative performance measurements are derived by performing various monitored and measured workloads on iSeries and AS/400e servers. The results (reported values) can be used to compare relative performance characteristics of processor features offered for iSeries and AS/400e servers.

The estimated performance and number of users in customer environments varies.

- **Commercial Processing Workload (CPW)**: This relative performance measurement is derived by performing Commercial Processing Workloads on Dedicated Domino processors. Commercial Processing Workloads are representative of commercial applications, particularly those that do significant database processing in conjunction with journaling and commitment control. The reported values for CPW do not represent a guaranteed level of capacity to perform non-Domino workloads.

  The reported CPW may be used by System Resource activities and Domino Resource extensions (for example, database accesses, external program calls, and so on). The amount of CPW consumed reduces the available capacity to perform Simple Mail Users (SMU).

  – Processor CPW is an approximate value reflecting the maximum amount of non-Domino workload (10 to 15% of CPU) that can be supported.

  – Interactive CPW is an approximate value reflecting the portion of Processor CPW that can be used for workloads performing interactive-based tasks (5250). AS/400e Dedicated Server for Domino can be effectively managed when there is no Interactive CPW (Interactive CPW = 0) available for application workloads. Multiple system operators performing simultaneous interactive tasks is not supported.

    - Any job started from a console (green screen) to perform system administration function is not considered interactive work if it is the *only* interactive job running.
    - Any system administration job submitted to batch is not considered interactive work.
    - Operations Navigator (GUI administration functions) is not considered interactive work for the purposes of CPW calculations.

- **Simple Mail Users (SMU)**: This relative performance measurement is derived by performing high-volume Lotus Domino mail workloads on Dedicated Domino processors. Simple Mail Users are representative of mail applications, particularly those that do not perform any database-related tasks. Simple Mail Users represent the number of concurrent light mail users for the Dedicated Domino processors. The reported values reflect 70% processor utilization to allow for peak loads in excess of customer workload estimates.

  Achieving the estimated Simple Mail User measurement requires a fully configured server, including additional memory and disk.

- **Mail and Calendaring Users (MCU)**: This relative performance measurement is derived by performing mail and calendaring functions. This workload is considerably more complex than Simple Mail Users. The MCU workload represents users on a Notes client who are reading, updating, or deleting documents in an e-mail database, as well as lookups in the Domino directory and scheduling appointments and invitations. Reported values reflect 70% processor utilization.

Note: Achieving estimated Simple Mail Users requires a fully configured server including additional memory and disk.

- **iSeries Model 270 Dedicated Server for Domino processors**
  - #2452 Dedicated Domino processor: SStar Uni Processor
    - Includes 2 MB L2 cache
    - Includes eight DIMM memory positions (which plug directly onto the backplane)

      A single main storage DIMM feature is allowed on systems with this processor. When the total number of main storage DIMMs is increased to greater than one, the single existing DIMM must be paired up (with a DIMM of the same capacity). Additional DIMMs must be added in pairs of the same capacity and technology. The DIMM memory features used on this processor are unique to this DSD processor.
    - Includes embedded base IOP (CCIN 286C)
    - Includes Common Service Processor (CCIN 25B9)
  - #2454 Dedicated Domino processor: SStar 2-way Processor
    - Includes 4 MB L2 cache
    - Includes 16 DIMM memory positions via the base main storage expansion card (CCIN 2884).

      All main storage DIMM features plug into this expansion card. There are 16 memory DIMM slots available on this processor. All main storage DIMM features must be added in sets of four (quads). Each DIMM in the set of four must be of the same capacity and technology.
    - Includes Base I/O backplane (CCIN 282F)
    - Includes embedded base IOP (CCIN 284E)
    - Includes Common Service Processor (CCIN 282F)
    - Includes internal flex cable for HSL enablement
- **iSeries Model 820 Dedicated Server for Domino processors**:
  - #2456 Dedicated Domino processor: SStar Uni Processor (CCIN 25BC)
    - Includes one 2 MB L2 w/600MHz Oscillator, Smart Chip VPD Card
    - Includes eight DIMM memory positions (which plug directly onto the processor - direct attach).

      The DIMMs can be plugged directly onto the processor. If more than eight DIMMs total are required, a #2884 Main Storage Expansion Card must be used and all DIMMs must then reside on the #2884. Without the #2884, the DIMMs must be paired. With the #2884, the DIMMs must be in sets of four (quads) of the same capacity and technology.

Note: A single pair of DIMMs is not supported on a feature #2884). In addition, the #2884 can be ordered/installed, at any time, even with eight or fewer DIMMs present. If a #2884 is installed, all DIMMs must be placed on it.

- Includes Base I/O backplane with CSP (CCIN 282D)

– #2457 Dedicated Domino processor: SStar 2-way (CCIN 25BD)

- Includes one 4MB L2 w/600MHz Oscillator, Smart Chip VPD Card
- Includes 16 DIMM memory positions via the base main storage expansion card (CCIN 2884).

Main storage DIMMs must be plugged onto a main storage expansion card (both base CCIN 2884 and feature #2884) and must be added in sets of four (quads) of the same capacity and technology. There is an exception to allow a single set of two main storage DIMMs if these are the only two on the system.

Note: A single pair of DIMMs is not allowed on these systems with a feature #2884 either ordered or present. If DIMMs are added in addition to the initial two, the initial two must be paired up to make a quad. Subsequent DIMMs must be added in quads.

A feature #2884 may be ordered or installed at any time, even if the base main storage expansion card is not full. For this processor, if a #2884 is ordered, a #5157 Feature Power Supply must be either present or ordered. When a feature #2884 is present (for a total of two memory expansion cards on the system), manufacturing spreads the DIMMS across both memory expansion cards.

- Includes Base I/O backplane with CSP (CCIN 282D)

– #2458 Dedicated Domino processor: SStar 4-way (CCIN 25BE)

- Includes one 4 MB L2 w/600MHz Oscillator, Smart Chip VPD Card
- Includes 16 DIMM memory positions via the base main storage expansion card (CCIN 2884).

Main storage DIMMs must be plugged onto a main storage expansion card (CCIN 2884 and #2884) and must be added in sets of four (quads) of the same capacity and technology. There is an exception to allow a single set of two main storage DIMMs if these are the only two on the system.

Note: A single pair of DIMMs is not allowed on these systems with a feature #2884 ordered/present). If DIMMs are added in additional to the initial two, the initial two must be paired up to make a quad. Subsequent DIMMs must be added in quads.

A feature #2884 may be ordered or installed at any time, even if the base main storage expansion card is not full. For this processor, if a #2884 is ordered, a #5157 Feature Power Supply must be present/ordered. When a feature #2884 is

present (for a total of two memory expansion cards on the system), manufacturing spreads the DIMMS across both memory expansion cards.

- Includes base I/O backplane (CCIN 282D)

CIF Features

Refer to “Customer Install Features (CIF)” on page 417 for information on CIF.

Main Storage

All Dedicated Servers for Domino have a required minimum of 256 MB main storage. There is no base main storage included with the servers. Therefore, all main storage, including the required minimum, must be ordered as separately priced features.

For processor and memory layout diagrams for the Model 270, refer to the diagrams on page 120. For processor and memory layout diagrams for the Model 820, refer to the diagrams on page 151.

Dedicated Server for Domino Upgrades

Supported model upgrades within the Dedicated Server for Domino 270 and 820 servers are identified here.

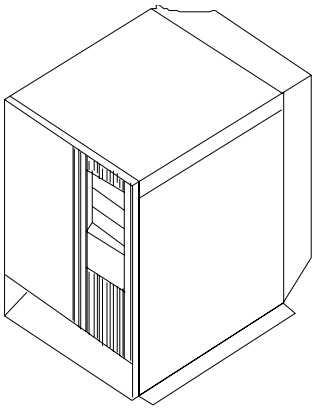
		Model 270				Model 820			
	To	2423	2424	2452	2454	2426	2427	2457	2458
From									
270									
2422		M	M	B	M				
2423			B		B				
2424					B				
2452					M				
820									
2425						B	B	B	B
2426							B	B	B
2427									B

		Model 270				Model 820			
	To	2423	2424	2452	2454	2426	2427	2457	2458
From									
2456								B	B
2457									B

iSeries Server 820

iSeries Server 820

iSeries Model 820



iSeries Model 820 System Unit

A minimum functional server consists of the base server unit and selected priced features. Included in the base server are the physical package and power elements, a DASD controller, an I/O controller, and a #9771 Base PCI 2-Line WAN with Modem as follows:

- Operator Panel without key stick
- Base DASD Cage (CCIN 283F)(six Internal Disk slots, concurrent maintenance allowed)
- Twelve PCI card slots (card hot-plugging allowed)
- One Removable Optical slot (CD-ROM/DVD-RAM)
- One Removable Media slot (CD-ROM/DVD-RAM/tape)
- Embedded Base PCI IOP (CCIN 284C)

Provides support for maximum of up to four IOAs including:

– Support for base #9767 Base PCI Disk Unit Controller

  Provides support for up to four Disk Units, the required CD-ROM/DVD-RAM, and either a feature Internal Tape or a feature CD-ROM/DVD-RAM. However, because RAID is default, the configurator will default the #4778 PCI RAID Disk Unit Controller, which supports the above, and in addition, provides RAID support for up to 12 Disk Units in the 820 system unit. The #4778 can support up to 18 disk units, but there is only space for 12 in the 820 system unit.

– Support for optional #2763 or #4778 PCI RAID Disk Unit Controllers.

  Provides support for up to 12 Disk Units, the required CD-ROM/DVD-RAM, and either a feature Internal Tape, feature CD-ROM, or feature DVD-RAM.

– Support for base Console/Workstation IOA

  - The configurator will determine which feature combinations will be on the order based on the System Console specify – #5540, #5544, #5546 or #5548.
  - The console on LAN options require a dedicated LAN adapter. A #0367 Operations Console PCI Cable will also be added to the order by the marketing configurator. One #0367 Operations Console PCI Cable is required for Console on LAN.
  - #5540 – System Console on Twinax WS

    #4746 PCI Twinaxial IOA
  - #5544 System Console on #9771 WAN Adapter

    #0367 Operations Console PCI Cable

- #5546 – System Console on 100Mbps Token Ring

  #2744 PCI 100Mbps Token Ring Adapter (Console)

- #5548 – System Console on Op Console (Default)

  #4838 PCI 100/10Mbps Ethernet IOA (Console)

These required features must be purchased:

- Processor (one must be specified)
  - #0150 processor (SStar 600 Mhz Uni) (1100 CPW)
  - #0151 2-wayprocessor (SStar 600 Mhz) (2350 CPW)
  - #0152 4-way processor (SStar 600 Mhz) (3700 CPW)
  - #2435 processor (SStar 600 Mhz Uni) (600 CPW)
  - #2436 processor (SStar 600 Mhz Uni) (1100 CPW)
  - #2437 2-way processor (SStar 600 Mhz) (2350 CPW)
  - #2438 4-way processor (SStar 600 Mhz) (3700 CPW)
- Interactive Card (one must be specified)

Processor Feature	#0150	#0151	#0152	#2435	#2436	#2437	#2438
Interactive Feature							
	None	None	None				
#1521				35	35	35	35
#1522				70	70	70	70
#1523				120	120	120	120
#1524				240	240	240	240
#1525					560	560	560
#1526						1050	1050
#1527	-	-	-				2000

- Main Storage (a minimum of two of the same features must be selected)
  - #3009 - 128 MB Main Storage (default - maximum of 8 DIMMs of this type per system)
  - #3004 - 256 MB Main Storage (128 Mb technology)
  - #3005 - 512 MB Main Storage (128 Mb technology)
  - #3006 - 512 MB Main Storage (256 Mb technology)
  - #3007 - 1 GB Main Storage (256 Mb technology)

  Note: Feature codes 3005 and 3006 can neither be mixed within pairs nor within quads.

- Integrated Disk Units

  Device Parity Protection: All (#0041) is the default for disk data protection. With RAID protection as the default, a minimum of four disk units of equal capacity must be ordered. If RAID protection is removed from the system order, order at least one of these disks:

  - #4317 - 8.58 GB 10k RPM Disk Unit
  - #4318 - 17.54 GB 10k RPM Disk Unit
- Integrated CD-ROM/DVD-RAM
  - #4525 CD-ROM
  - #4530 DVD-RAM
- System Console attachment Adapter or Cable
  - The console on LAN option requires a dedicated LAN adapter and a #0367 feature
  - #5540 System Console on twinaxial workstation controller

    #4746 PCI Twinaxial IOA
  - #5544 System Console on #9771 WAN Adapter

    #0367 Operations Console PCI Cable
  - #5546 System Console on 100 Mbps Token Ring

    #2744 PCI 100 Mbps Token-Ring IOA (Console)
  - #5548 System Console on 100 Mbps Ethernet

    #4838 PCI 100/10 Mbps Ethernet IOA (Console)
- Uninterruptible Power Supply

  The Model 820 does not include an internal battery. We recommend that you use an external UPS to protect the system unit and any external components against utility power outages. Continuously Powered Mainstore (CPM) is not supported on the Model 820. An external UPS, combined with abnormal IPL improvements in OS/400, can provide an equivalent level of power protection and recovery in the event of power failure.

The Model 820 server initial installation is Customer Setup (CSU). Model upgrades are performed by IBM service representatives.

Refer to “Customer Install Features (CIF)” on page 417 for CIF designations of individual features.

Card Technology

With the implementation of new PCI technologies, the Model 820 provides more flexibility in the placement of IOPs and IOAs. This results in more efficient use of card slots, which may potentially result in a lower cost of implementation.

Previous AS/400e models required input/output processors (IOPs) to be in specific slots in the system and expansion towers. If high performance in particular areas was required, a single input/output adapter (IOA) may have been assigned to a single IOP. This resulted in unassigned slots in the tower, and valuable slots were left vacant.

This PCI I/O structure enables customer setup of the Model 820 and selected features on all models. It also enables Hot Plug PCI for adding and replacing hardware without taking the server down. A full understanding of configuration rules associated with the various I/O features of the iSeries server is required.

These functions do not have equivalent function PCI cards for the Model 820:

- ASCII Adapter
- V.25 Autocall cable
- Select standby mode
- X.21 switched WAN dial-up or Shorthold Mode WAN
- Asynchronous communication speeds of less than 300 bps
- Data Rate Select signal on the EIA 232/V.24 interface. This function is used by some older 2400 bps modems to reduce the speed to 1200 bps.
- LPDA-1 (Link Problem Determination Aids). This is a diagnostic function supported by some (primarily older IBM) modems.
- V.54 local and remote loopback (diagnostics functions supported by some modems)

The fundamental bus architecture of the iSeries server is unchanged when using PCI adapters. The AS/400e IOP continues to off load the main processor; isolate the host from the adapter and network errors; and manage, configure, and service the adapters. PCI architecture offers advantages in flexibility over non-iSeries or non-AS/400e server structures.

Processor Features

- #0150 Model 820 Processor (SStar 600 MHz Uni) (CCIN 25BC)
  - Includes 600 MHz Oscillator, Smart Chip VPD Card
  - Includes one 2 MB L2 with 600 MHz Oscillator, Smart Chip VPD Card
  - Includes Base I/O Backplane with Common Service Processor (CSP) (CCIN 282D)

    Provides support for the Service Processor, nine 32-bit PCI slots and three 32 or 64-bit PCI slots.
- #0151 Model 820 Processor (SStar 600 MHz 2-way) (CCIN 25BD)
  - Includes one 4 MB L2 with 600 MHz Oscillator, Smart Chip VPD Card
  - Includes Base Main Storage Expansion Card with CSP (CCIN 2884)
  - Includes Base I/O Backplane with Common Service Processor (CSP) (CCIN 282D)

Provides support for the Service Processor, nine 32-bit PCI slots and three 32 or 64-bit PCI slots.

- #0152 Model 820 Processor (SStar 600 Mhz 4-way) (CCIN 25BE)
  - Includes one 4 MB L2 with 600 MHz Oscillator, Smart Chip VPD Card
  - Includes Base Main Storage Expansion Card with CSP (CCIN 2884)
  - Includes Base I/O Backplane with Common Service Processor (CSP) (CCIN 282D)

    Provides support for the Service Processor, nine 32-bit PCI slots and three 32 or 64-bit PCI slots.
- #2435 Model 820 Processor (SStar 600 MHz Uni) (CCIN 25BC)
  - Includes 600 MHz Oscillator, Smart Chip VPD Card
  - Includes one 2 MB L2 with 600 MHz Oscillator, Smart Chip VPD Card
  - Includes Base I/O Backplane with Common Service Processor (CSP) (CCIN 282D)

    Provides support for the Service Processor, nine 32-bit PCI slots and three 32 or 64-bit PCI slots.
  - Systems with this processor are limited to 8192 MB main storage. A #2884 memory expansion card is not supported with this processor.
- #2436 Model 820 Processor (SStar 600 Mhz Uni) (CCIN 25BC)
  - Includes one 2 MB L2 with 540 MHz Oscillator, Smart Chip VPD Card
  - Includes Base I/O Backplane with Common Service Processor (CSP) (CCIN 282D)

    Provides support for the Service Processor, nine 32-bit PCI slots and three 32 or 64-bit PCI slots.
- #2437 Model 820 Processor (SStar 600 MHz 2-way) (CCIN 25BD)
  - Includes one 4 MB L2 with 600 MHz Oscillator, Smart Chip VPD Card
  - Includes Base I/O Backplane with Common Service Processor (CSP) (CCIN 282D)

    Provides support for the Service Processor, nine 32-bit PCI slots and three 32 or 64-bit PCI slots.
  - Includes Base Main Storage Expansion Card with CSP (CCIN 2884)
- #2438 Model 820 Processor (SStar 600 MHz 4-way) (CCIN 25BE)
  - Includes 1 SSTAR 2-Way Daughter Card
  - Includes one 4 MB L2 with 600 MHz Oscillator, Smart Chip VPD Card

– Includes Base I/O Backplane with Common Service Processor (CSP) (CCIN 282D)

  Provides support for the Service Processor, nine 32-bit PCI slots and three 32 or 64-bit PCI slots.

– Includes Base Main Storage Expansion Card with CSP (CCIN 2884)

Interactive Features

The Model 820 supports various levels of interactive performance through the installation of interactive features. Interactive CPW is an approximate value reflecting the portion of Processor CPW that can be used for workloads performing interactive-based tasks (5250).

An iSeries server 820 can be effectively managed with an interactive CPW of 0 available for application workloads. The zero interactive CPW supports a single interactive job for system administrative functions. Considerations include:

- A job started from a console (green screen) to perform a system administration function is not considered interactive work if it is the only interactive job running (single interactive job exception).
- A system administration job submitted to batch is not considered interactive work.
- The use of Operations Navigator (GUI administration functions) is not considered interactive work.

The available interactive options are shown in the table on page 140.

For a discussion of how these features influence system performance, see “IBM Workload Estimator for AS/400” on page 42.

Use the feature cross-reference table to relate the Processor Feature Code to the Processor and Interactive features visible in the iSeries configurator. Display the QPRCFEAT system value or find within the rack configuration report to determine the Processor Feature Code. The Processor Feature Code is used when ordering software license keys.

Processor Group is determined by a combination of the Processor and Interactive Feature. The following table provides a cross reference.

Processor	Interactive Feature	Processor Feature	Processor Group
#0150	none	#0150	P20
#0151	none	#0151	P30
#0152	none	#0152	P40
#2435	#1521	#249B	P10
	#1522	#249C	P20
	#1523	#249D	P20
	#1524	#249E	P20
#2436	#1521	#24A8	P20
	#1522	#24A9	P30
	#1523	#24AA	P30
	#1524	#24AB	P30
	#1525	#24AC	P30
#2437	#1521	#24B0	P20
	#1522	#24B1	P30
	#1523	#24B2	P30
	#1524	#24B3	P30
	#1525	#24B4	P30
	#1526	#24B5	P30
#2438	#1521	#24B8	P30
	#1522	#24B9	P40
	#1523	#24BA	P40
	#1524	#24BB	P40
	#1525	#24BC	P40
	#1526	#24BD	P40
	#1527	#24BE	P40

Main Storage

All main storage on the Model 820 is feature main storage and a minimum of two of the same features must be selected.

These memory features are available on the Model 820:

- #3000 - Migrated 128 MB Main Storage (migrate base CCIN 3002s)
  - Supported only on model upgrades from 620, S20, and 720 into the 820.
  - Maximum quantity supported is two.
  - Supported in quads with #3002.

  Note: Each #3000 is to be considered as a #3002 for DIMM plugging.
- #3002 - 128 MB Main Storage
  - Supported only; only orderable up to the minimum number of dimms required to meet a pairing or quad system memory requirement.
  - #3002 cannot be mixed with #3009 for pairing or quadding.
- #3009 - 128 MB Main Storage (128 Mb technology)
  - #3009 cannot be mixed with #3002 for pairing or quadding.
  - Maximum of eight of these DIMMs per system.
- #3004 - 256 MB Main Storage (128 Mb technology)
- #3005 - 512 MB Main Storage (128 Mb technology)

  #3005 cannot be mixed with #3006 for pairing or quadding.
- #3006 - 512 MB Main Storage (256 Mb technology)

  #3006 cannot be mixed with #3005 for pairing or quadding.
- #3007 - 1 GB Main Storage (256 Mb technology)

For the #2435 processors:

- All main storage DIMMs must be added in pairs of the same capacity and technology.
- There are eight slots available in the base system for main storage DIMMs, which plug directly onto the processor (Direct Attach) and do not use a #2884 Main Storage Expansion Card.

For the #0150, #2436, and #2456 processors:

- There are eight slots available in the base system for main storage DIMMs, which plug directly onto the processor (Direct Attach).
- The DIMMs can be plugged directly into the processor, but if more than eight DIMMs total are required, a Main Storage Expansion Card #2884 must be used and *all* DIMMs

must then reside on the #2884. Without the #2884, the DIMMS must be paired. With the #2884, the DIMMs must be in sets of four (quads) of the same capacity

Note: A single pair of DIMMs is not supported on a feature #2884.

In addition, the #2884 can be ordered or installed, at any time, even with eight or fewer DIMMs present. If a #2884 is installed, all DIMMs must be placed on it.

For the #0151, #0152, #2437, #2438, #2457, and #2458 processors:

- A Base Main Storage Expansion Card (CCIN 2884) is included in the base system and does not need to be ordered.
- Main storage DIMMs must be plugged onto the Base Main Storage Expansion Card (CCIN 2884) and must be added in sets of four (quads) of the same capacity and technology. There is an exception that allows a single set of two main storage DIMMs if these are the only two on the system.

  Note: A single pair of DIMMs is not allowed on these systems with a feature #2884 ordered or present.

  If any additional DIMMs are added above the initial two, the initial two must be paired up to make a quad and then only DIMM quads can subsequently be added. A feature #2884 may be ordered or installed at any time, even if the base main storage expansion card is not full.
- The #2884 is required when the number of DIMMs exceeds 16.

For the #2884 Main Storage Expansion Card:

- This feature provides for mounting DIMM memory on the Model 820. It contains one riser card with 16 sockets for placement of 128 MB, 256 MB, or 512 MB DIMMs.
- Maximum: One (not supported on #2435 Processors).
- Using same feature code number within a quad is required. Mixing of quad “groups” on the same riser card is also allowed.
- For processors #0151, #0152, #2437, and #2438, a #5157 Feature Power Supply must be present or ordered when a feature #2884 Main Storage Expansion is added or ordered.

Power and Packaging

The Model 820 does not include an internal battery. An external UPS is recommended to protect the system unit and any external components against utility power outages. The Continuously Powered Mainstore (CPM) function is not supported on the 8xx servers. An external UPS, combined with abnormal IPL improvements in OS/400, provides an equivalent level of power protection and fast recovery in the event of power failure.

The supported power and packaging features are as follows:

- #7127 DASD Expansion Unit
  - The #7127 is a concurrent maintenance DASD 6 Position expansion feature, which may be ordered to support an additional six disk units (for a total of 12) in the Model 820 system unit/CEC.
  - Prerequisite: #5157 Feature Power Supply.
- #5102 Dual Line Cord - 820 CEC
  - The #5102 provides dual line cord capability for the model 820 system unit. Two #14XX line cords are required on the Model 820 when this feature is ordered initially or as an upgrade to a Model 820. When ordering #5102 alone as an MES, an additional #14XX line cord is required, for a total of two line cords on the system unit.
  - Prerequisites: #5155 Redundant Power and Cooling, #5157 Feature Power Supply, and #9002 Dual Line Cord Enabler.
  - OS/400 V5R1 and supporting PTFs are required. Refer to Informational APAR II12950 at: `http://as400service.rochester.ibm.com/supporthome.nsf/document/10000035`
  - e-configurator users can refer to this Web site for ordering information: `http://w3-1.ibm.com/sales/systems/ibmsm.nsf/MainFrameset?OpenForm&cdoc=idlcinstall`
- #5157 Feature Power Supply
  - The #5157 adds an additional 575 Watt power supply to the Model 820.
  - The #5157 is the default for all processors but may be removed from the order.

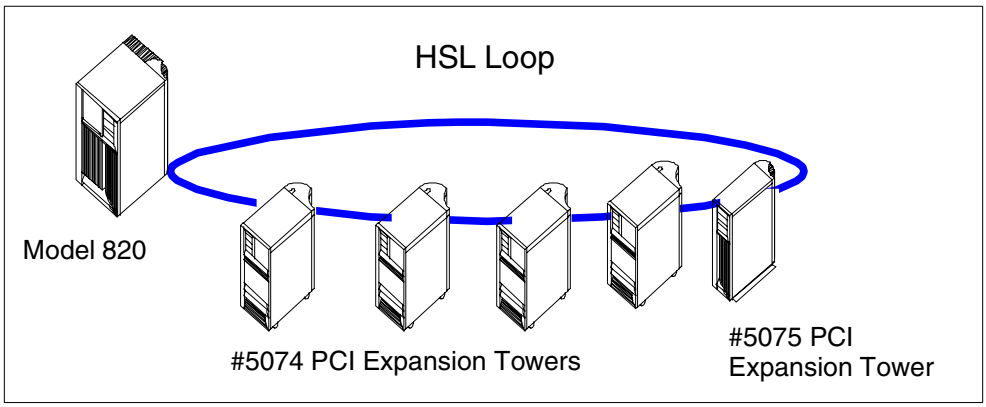
    Note: Redundant power on the model 820 CEC requires both the #5155 and #5157 features. If the #5155 is removed, the #5157 should be removed. The exception is to leave the #5157 due to the presence of a #7127 DASD Expansion Unit.
  - The #5157 is required when a #7127 Disk unit cage is added to a Model 820 and is required when a #5155 Redundant Power and Cooling feature is added to a Model 820.
- #5155 Redundant Power and Cooling
  - The #5155 adds an additional 575 Watt power supply for redundancy and additional cooling fans to the Model 820.
  - The #5155 is the default for all processors
  - Prerequisite: #5157 Feature Power Supply
- #9002 Dual Line Cord Enabler
  - The #9002 is a specify code that is added to all 820 systems ordered (initial orders or model upgrades into the 820) on or after the V5R1 announcement, regardless of operating system level ordered. This specify code is used to determine that the 820

power subsystem, which is being upgraded for V5R1, is enabled to support dual line cords.

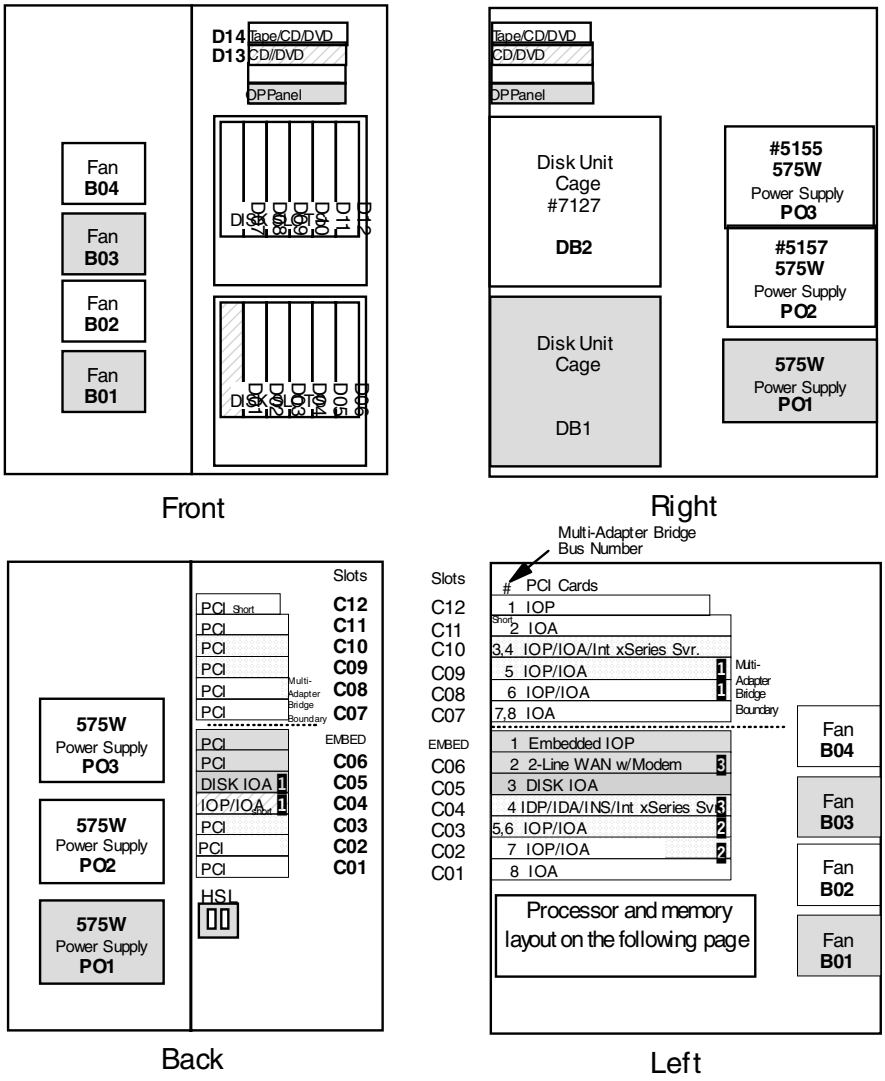
High Speed Link (HSL) on Model 820

The Model 820 supports a single HSL loop. These include the #5074/#5079 or #5075 PCI Expansion Towers (with the #5079 tower counting as two #5074s), #5078 PCI Expansion Unit and #0578 PCI Expansion Unit in Rack and certain external xSeries servers. The loop also supports one of: #5033, #5034, or #5035 Migration Tower I. These units provide for the migration of existing #5073 SPD I/O towers or #5065/#5066 PCI Expansion Towers. The following figure provides an example of the maximum supported tower configuration of a Model 820. For further details, see *AS/400e to iSeries 400 Migration*, SG24-6055.

Note: The attachment of a migration tower reduces the total number of new I/O towers by one.



Model 820 System Unit



Note 1: Position of cards may change depending on the console and other features selected.

Legend

Base Feature

Required Feature

Unavailable if Integrated xSeries Server is installed

Notes

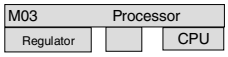
Note 1: If C10 has an Integrated xSeries Server, slot C09 is unavailable, and slot C08 is available only as a short slot.

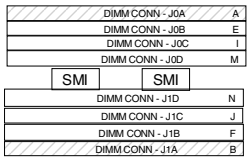
Note 2: If C04 has an Integrated xSeries Server, slot C03 is not available, and slot C02 is available only as a short slot.

Note 3: Position of the cards may change depending on the console and other features selected. A console is a required feature.

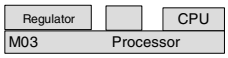
Model 820 Processor and Memory

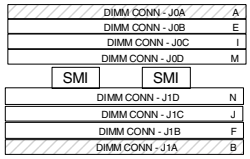
#2435



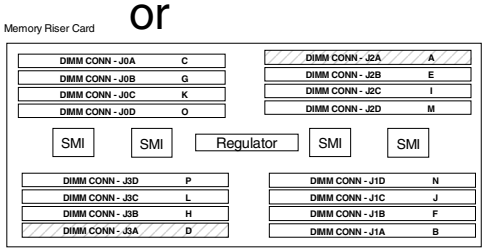


#0150, #2436, #2456



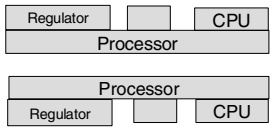


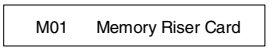
or

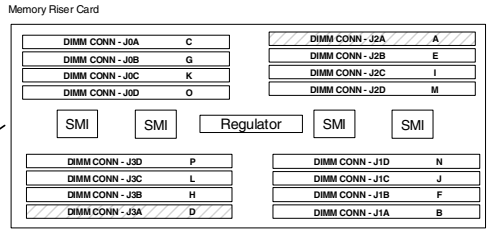


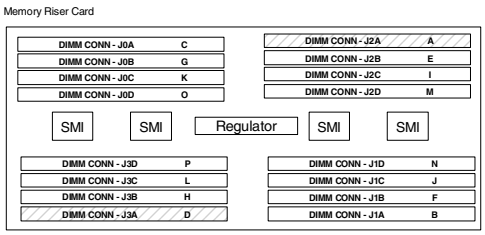
Note: All memory on the processor board, once a riser card is installed, is moved to the riser card.

#0151, #0152, #2437, #2438, #2457, #2458









Remote Control Panel

#0382 Remote Control Panel Cable enables use of the Remote Control Panel function on a PC. The iSeries servers use a parallel interface (LPT) instead of a COM port for the Remote Control Panel. The parallel port must be configured to use the Enhanced Parallel Port (EPP) support. It must be EPP Version 1.9 compliant, which may require the PC's Basic Input/Output Services (BIOS) to change. Check with your PC manufacturer for any assistance, if needed. For cable connection details and PC requirements, see the *AS/400 Operations Console Setup Guide*, which is available at:
`http://www.as400service.ibm.com/supporthome.nsf/Document/10000051`

Notes:

- Due to the way EPP Version 1.9 support is implemented to support the remote control panel, there may be PCs that do not support the use of this function.
- Use of the Remote Control Panel function is independent of the System Console.
- The Remote Control Panel function can be used with any System Console Specify.
- The Remote Control Panel Cable is not required for a LAN attached console (#5546 or #5548).

Remote Control Panel is installed and used from PCs running the Windows NT 4.0 or Windows 2000 Professional PC operating systems.

I/O Processor and I/O Adapter Support

This section lists the supported IOPs and IOAs. See “I/O Processor” on page 271 and “I/O Adapters and Controllers” on page 283 for full descriptions.

Note

PCI configuration rules for OS/400 V5R1 hardware are quite flexible. See the “PCI Card Placement Rules” chapter of the *iSeries and AS/400e System Builder*, SG24-2155, for rules for placing PCI card in configurations.

LAN/WAN/Workstation IOAs

- #2743 PCI 1 Gbps Ethernet IOA
- #2744 PCI 100 Mbps Token Ring IOA
- #2760 PCI 1Gbps Ethernet UTP IOA
- #2772 Dual WAN/Modem Adapter
- #2773 Dual WAN/Modem Adapter
- #2817 PCI 155Mbps MMF ATM

- #4723 PCI 10 Mbps Ethernet IOA
- #4745 PCI Two Line WAN IOA
- #4746 PCI Twinaxial IOA
- #4750 PCI ISDN BRI U IOA
- #4751 PCI ISDN BRI S/T IOA
- #4761 PCI Integrated Analog Modem
- #4801 PCI Cryptographic Coprocessor
- #4815 PCI 155 Mbps UTP OC3 ATM IOA
- #4816 PCI 155 Mbps MMF ATM IOA
- #4818 PCI 155 Mbps SMF ATM IOA
- #4838 PCI 100/10 Mbps Ethernet IOA
- #9771 Base PCI 2-Line WAN with Modem

Internal Disk Unit Controllers

- #4748 PCI RAID Disk Unit Controller
- #4778 PCI RAID Disk Unit Controller
- #2763 PCI RAID Disk Unit Controller
- #9767 Base PCI Disk Unit Controller

Magnetic Media Controllers

- #2749 PCI Ultra Magnetic Media Controller
- #2765 PCI Fibre Channel Tape Controller
- #2766 PCI Fibre Channel Disk Controller
- #2768 PCI Magnetic Media Controller

I/O Processors

- Embedded Base 32 MB PCI IOP (CCIN 282D)
- #2843 64 MB PCI IOP
- #2790 Integrated Netfinity Server
- #2791 Integrated xSeries Server

Internal Disk, Tape, CD-ROM, and DVD-RAM Support

This section lists the supported internal disks, tape drives, CD-ROMs and DVD-RAMs. See “PCI Disk Units” on page 315 and “Internal Tape, CD-ROM, and DVD-RAM” on page 327 for full descriptions.

Internal Disk Units and Read Cache

- #4317 8.58 GB 10k RPM Disk Unit
- #4318 17.54 GB 10k RPM Disk Unit

- #4331 1.6 GB Read Cache Device

Internal Tape and CD-ROM

- #4525 CD-ROM
- #4530 DVD-RAM
- #4582 4 GB ¼-inch Cartridge Tape
- #4583 16 GB ¼-inch Cartridge Tape
- #4586 25 GB ¼-inch Cartridge Tape
- #4587 50 GB ¼-inch Cartridge Tape

External Towers

These towers attach to the Model 820 using HSL (High Speed Link). See “Expansion Towers” on page 237 for full descriptions.

- #5033 Migration Tower I
- #5034 Migration Tower I
- #5035 Migration Tower I
- #5075 PCI Expansion Tower (small)
- #5074 PCI Expansion Tower (large)
- #0578 PCI Expansion Unit in Rack
- #5078 PCI Expansion Unit
- #5079 1.8m PCI I/O Expansion Tower

The Expansion Towers and Units in this table can attach to the Model 820 with the #5034 and #5035 Migration Towers.

Feature	Description	Prerequisites
#5043	Primary rack converted to secondary rack (migrated)	--
#5044	System Unit Expansion Rack (migrated)	Optical Link Processor (OLP) Card #2686
#5052	Storage Expansion Unit	#5143 and #5072 or #5082 and one of #6502, #6512, #6530, #6532, #6533
#5058	Storage Expansion Unit	#5073 or #5083 and one of #6502, #6512, #6530, #6532, #6533
#5065	Storage/PCI Expansion Tower	One port on OLP card #2688 in System Unit Expansion #9364/#5064
#5066	1.8 m I/O Tower	See #5065
#5072	1063M System Unit Expansion Tower	One port on OLP card #2688 in System Unit Expansion #9364/#5064

#5073	1063M System Unit Expansion Tower	One port on OLP card #2688 in System Unit Expansion #9364/#5064
#5082	1063M System Unit Expansion Tower	One of #6502, #6512, #6530, #6532, #6533 and one port on OLP card #2688 in System Unit Expansion #9364/#5064
#5083	1063M System Unit Expansion	See #5082

A full description of these racks and towers is found beginning with “Expansion Towers” on page 237.

Migration Tower Hardware

To connect migration towers, select one of these features:

- #2686 Optical Link Processor (266 Mbps)
- #2688 Optical Link Processor (1063 Mbps)

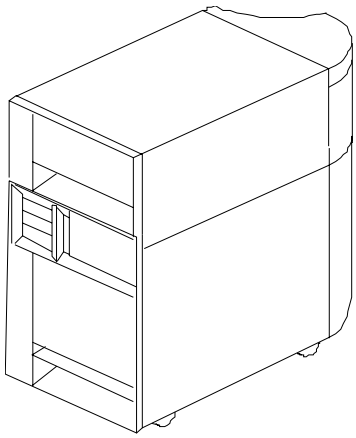
For hardware supported in the migration towers, refer to “Migration Tower PCI Hardware” on page 297 and “Migration Tower SPD Hardware” on page 305.

iSeries Server 830

iSeries Server 830

iSeries Model 830

A minimum functional server consists of the base server unit and selected priced features. Included in the base server are the physical package and power elements, a DASD controller, an I/O controller, and a #9771 Base PCI 2-Line WAN with Modem as follows:



iSeries Model 830 System Unit

- System Unit (CEC) and #9074 Base I/O Tower
- Linecord features
- Main Storage Expansion Card (slot M02) (CCIN 2881)
- Bus Expansion/Clock Card: Specify one of the these features:
  - #9777 Base HSL Ports - 8 Copper: Specify with processor #2400
  - #9774 Base HSL Ports - 2 Optical/6 Copper: Specify with processor #2400
  - #9752 Base HSL Ports - 8 Copper: Specify with processors #2402, #2403, and #2351
  - #9758 Base HSL Ports - 2 Optical/6 Copper: Specify with processors #2402, #2403, and #2351
- PCI and CSP Card (CCIN 28AA)
- Bus Adapter (CCIN 2681)
- Operator Panel with key stick (CCIN 247A)
- #9074 Base I/O Tower
- #9943 Base PCI IOP
  - Provides support for #9778 Base PCI RAID Disk Unit Controller

    Provides support for up to 15 Disk Units, the required CD-ROM/DVD-RAM, and a feature Internal Tape or a feature CD-ROM/DVD-RAM.
  - Provides support for base Console/Workstation IOA

    The configurator will determine which feature combinations will be on the order based on the System Console specify – #5540, #5544, #5546 or #5548.

These *required* features *must be* ordered:

- Processor (one must be specified)
  - #2400 2-way processor (iStar 400 Mhz) (1850 CPW)
  - #2402 4-way processor (iStar 540 Mhz) (4200 CPW)
  - #2403 8-way processor (iStar 540 Mhz) (7350 CPW

    Requires #2881 Main Storage Expansion (Slot M05)

– #2351 1/8 way POD (iStar 540 Mhz) (7350 CPW) requires V5R1

The #2351 is not generally available. Rochester lab approval for i-listed RPQ 847125 is required prior to placing an order for #2351 or #1605 POD Activation.

- Interactive Card (one must be specified)

Interactive CPW	Processor Feature			
	#2351	#2400	#2402	#2403
#1531	70	70	70	70
#1532	120	120	120	120
#1533	240	240	240	240
#1534	560	560	560	560
#1535	1050	1050	1050	1050
#1536	2000	-	2000	2000
#1537	4550	-	-	4550

- Main Storage
  - #2881 Main Storage Expansion (slot M05)
    - Required for #2403 and #2351 processors
    - Required for #2400 and #2402 processors if more than 32 main storage features are installed
    - Can be manually configured if 32 or less main storage features are included in the order.
  - A minimum of one set of eight of the same features must be selected:
    - #3062 - 128 MB Main Storage
    - #3064 - 256 MB Main Storage
    - #3065 - 512 MB Main Storage (128 Mb technology)
    - #3066 - 512 MB Main Storage (256 Mb technology)
    - #3067 - 1GB Main Storage DIMM (256 Mb technology)
- Internal Disk Units and Read Cache

Device Parity Protection: All (0041) is the default for disk data protection. With RAID protection as the default, a minimum of four disk units of equal capacity must be ordered. If RAID protection is removed from the system order, order at least one of these disks:

  – #4317 - 8.58 GB 10k RPM Disk Unit
  – #4318 - 17.54 GB 10k RPM Disk Unit
  – #4331 - 1.6 GB Read Cache Device

- Integrated CD-ROM/DVD-RAM
  - #4425 CD-ROM
  - #4430 DVD-RAM
- System Console/Communications Adapter

  The console on LAN options require a dedicated LAN adapter. A #0367 Operations Console PCI Cable will also be added to the order by the marketing configurator.
  - #5540 System Console on twinaxial workstation controller

    #4746 PCI Twinaxial IOA
  - #5544 System Console on #9771 WAN Adapter

    #0367 Operations Console PCI Cable
  - #5546 System Console on 100 Mbps Token-Ring
    - #2744 PCI 100Mbps Token-Ring IOA (Console)
    - #0367 Operations Console PCI Cable
  - #5548 System Console on 100 Mbps Ethernet
    - #4838 PCI 100/10Mbps Ethernet IOA (Console)
    - #0367 Operations Console PCI Cable

The 830 server initial installation and model upgrades are performed by IBM Service representatives.

Card Technology

With the implementation of new PCI technologies, the Model 830 provides more flexibility in the placement of IOPs and IOAs. This results in more efficient use of card slots, potentially resulting in a lower cost of implementation.

Prior AS/400 models required input/output processors (IOPs) to be in specific slots in the system and expansion towers. If high performance in a particular area was required, a single input/output adapter (IOA) may have been assigned to a single IOP. This resulted in unassigned slots in the tower, leaving valuable slots empty.

This PCI I/O structure enables customer setup of selected features of the Model 830. It also enables Hot Plug PCI for adding and replacing hardware without taking the server down. A full understanding of configuration rules associated with the various I/O features of the 830 system is required.

The 830 processors support four 32-bit and ten 32/64-bit PCI slots.

These functions do not have equivalent function PCI cards for the Model 830:

- ASCII Adapter
- V.25 Autocall cable
- Select standby mode
- X.21 switched WAN dial-up or Shorthold Mode WAN
- Asynchronous communication speeds of less than 300 bps
- Data Rate Select signal on the EIA 232/V.24 interface. This function is used by some older 2400 bps modems to reduce the speed to 1200 bps.
- LPDA-1 (Link Problem Determination Aids). This is a diagnostic function supported by some (primarily older IBM) modems.
- V.54 local and remote loopback (diagnostics functions supported by some modems)

PCI adapters also do not support X.21 switched WAN dial-up or Shorthold Mode WAN.

The fundamental bus architecture of the iSeries server is unchanged when using PCI adapters. The AS/400e IOP continues to off load the main processor; isolate the host from adapter and network errors; and manage, configure, and service the adapters. PCI architecture offers advantages in flexibility over non-iSeries or non-AS/400e server structures.

Processor Features

- #2351 1/8-way Processor on Demand (iStar 540 Mhz) (RPQ 847125)
  - Processor Capacity Card (CCIN 24xx)
  - Processor 1 (CCIN 245D)
  - Processor 0 (CCIN 245D)
- #2400 2-way Processor (iStar 400 Mhz)
  - Processor 1 (CCIN 2400)
  - Processor 0 (CCIN 245C)
- #2402 4-way Processor (iStar 540 Mhz)
  - Processor 1 (CCIN 2402)
  - Processor 0 (CCIN 245D)
- #2403 8-way Processor (iStar 540 Mhz)
  - Processor Capacity Card (CCIN 2403)
  - Processor 0 (CCIN 245D)
  - Processor 1 (CCIN 245D)

Note: Capacity Upgrade on Demand (CUoD) is described in “Workload and Performance” on page 41.

Interactive Features

The Model 830 supports various levels of interactive performance through the installation of interactive features.

Interactive CPW is an approximate value reflecting the portion of Processor CPW that can be used for workloads performing interactive-based tasks (5250).

- Any system administration job submitted to batch is not considered interactive work.
- Any use of Operations Navigator (GUI administration functions) is not considered interactive work.

For a discussion of how these features influence system performance, see “Workload and Performance” on page 41.

A feature cross-reference table provided on the AS/400 system can be used to relate the Processor Feature Code to the Processor and Interactive features visible in the AS/400 configurator. The Processor Feature Code is found by displaying the QPRCFEAT system value or in the rack configuration. The Processor Feature Code is used when ordering software license keys. Or refer to the Model 830 processor/interactive feature table on page 160.

Processor Group is determined by a combination of the Processor and Interactive Feature. This table provides a cross reference for the Model 830.

Processor	Interactive Feature	Processor Feature	Processor Group
#2400	#1531	#23C1	P20
	#1532	#23C2	P30
	#1533	#23C3	P30
	#1534	#23C4	P30
	#1535	#23C5	P30
#2402	#1531	#23D1	P30
	#1532	#23D2	P40
	#1533	#23D3	P40
	#1534	#23D4	P40
	#1535	#23D5	P40
	#1536	#23D6	P40

#2403	#1531	#23D8	P40
	#1532	#23D9	P50
	#1533	#23DA	P50
	#1534	#23DB	P50
	#1535	#23DC	P50
	#1536	#23DD	P50
	#1537	#23DE	P50

Main Storage

All main storage on the Model 830 is feature main storage. All main storage DIMMs on the Model 830 must be added in sets of eight (octals) of the same capacity and technology. Note that the #3065 and #3066 cannot be mixed in the same octal. There are a total of 64 DIMM slots available on the Model 830. Of the 64 slots, 32 are “base”, and an additional 32 are available with feature #2881 Main Storage Expansion installed.

These memory features are available on the Model 830:

- #3000: Migrated 128 MB Main Storage DIMM—*Support only*
  - Available only on upgrades from Models 620/S20/720 to the Model 830
  - Only a quantity of two is supported
  - Supported in octal(s) with #3062
- #3062: 128 MB Main Storage DIMM
- #3064: 256 MB Main Storage DIMM
- #3065: 512 MB Main Storage DIMM (128 Mb technology)
- #3066: 512 MB Main Storage DIMM (256 Mb technology)
- #3067: 1 GB Main Storage DIMM (256 Mb technology) requires V5R1

For processors #2400 and #2402:

- For new systems without #2881 Main Storage Expansion, DIMMs are added in octals on the base Main Storage card.
- For new systems with #2881 Main Storage Expansion, DIMMs are added in octals and “spread” across the Base Main Storage card (CCIN 2881) and the #2881 Main Storage Expansion.
- For MES orders without #2881 Main Storage Expansion, DIMMs are added in octals on the Base Main Storage card (CCIN 2881).
- For MES orders with #2881 Main Storage Expansion, DIMMs are added in octals and “spread” across the Base Main Storage card and the #2881 Main Storage Expansion.
- If a #2881 Main Storage Expansion is added on an MES order, it is not required that the DIMMs (in octals) are “spread” equally between the Base Main Storage card (CCIN 2881) and the #2881 Main Storage Expansion.

For the #2403 and #2351 processors, both the Base Main Storage card (CCIN 2881) and the #2881 Main storage Expansion are required. For both new builds and MES orders, the DIMMS (in octals) are “spread” across the base Main Storage card and the #2881 Main Storage Expansion.

Power and Packaging

The Model 830 includes an internal battery that is automatically activated in the event of a utility power loss. The battery provides full operating power for a short time to all components within the system unit, but not to any external components. This can allow the system to run uninterrupted for a short time (30 seconds or less). For longer power outages, the system uses the battery to attempt an orderly shutdown to avoid losing data in main storage that is not written to disk. An external UPS is recommended to protect the system unit and any external components against utility power outages. Continuously Powered Mainstore (CPM) is not supported on the Model 830. An external UPS can allow the system to run uninterrupted for longer than thirty seconds when utility power is lost. It can also maintain power long enough to ensure that the system successfully completes a shutdown to avoid losing data.

System Power

- Processor Enclosure
  - Bulks (1100 watt) (CCIN 515B) (Quantity two)
  - Regulator (CCIN 27AA with Processors #2400 and #2402, CCIN 27AB with Processor #2403)
- Base I/O Tower (#9074)
  - Bulks (765 Watt) (CCIN 515A) (Quantity two)
  - AC Input/Charger
  - Batteries (Quantity four)
- Dual Line Cord - 830 CEC (#5103)
  - Provides dual line cord capability for the Model 830 system unit and attached #9074 base I/O tower.
  - Two #14XX line cords are required on the Model 830 when this feature is ordered initially or as an upgrade to a Model 830. When ordering #5103 alone as an MES, an additional 14XX line cord is required, for a total of two line cords for the system unit.
  - This feature is supported on racked (#0550) Model 830 servers.
  - Prerequisite: If the #9074 has feature #5101 (30-Disk Expansion Feature) installed, the #5101 must be converted to a #5111.

- OS/400 V5R1 plus PTFs, or later is required. Refer to Informational APAR II12950 at:
  http://as400service.rochester.ibm.com/supporthome.nsf/document/10000035
- e-configurator users can refer to this Web site for ordering information:
  http://w3-1.ibm.com/sales/systems/ibmsm.nsf/MainFrameset?OpenForm&cdoc=idlcinstall

#0550 iSeries Rack

See “#0550 iSeries Rack” on page 259 for a description of the #0550 iSeries Rack.

#9074 Base I/O Enclosure

The #9074 is the base I/O tower shipped on Models 830 and SB2. The #9074 supports up to 45 disk units, up to 11 PCI IOAs, and up to two removable media units.

One internal HSL cable is included as base. Optionally, one of these HSL cables may be selected:

- #1460 - 3m Copper HSL cable
- #1461 - 6m Copper HSL cable
- #1462 - 15m Copper HSL cable

The #1462 15m Copper HSL cable can be used on any HSL port of the Model 830.

The #9074 has a #9943 Base PCI IOP and a #9778 PCI RAID Disk Unit Controller, has PCI slots for up to 11 PCI IOAs, space for up to 45 disk units (15 are “base”, 30 additional with #5101), space for two removable media devices, one battery backup and redundant/hot swap power supplies. The #9074 is capable of controlling Ultra2 SCSI disk units. The 11 PCI IOAs are supported (driven) by the base #9943 PCI IOP and by feature #2843 PCI IOPs or #2791 Integrated xSeries Servers.

The mounting for the first 15 disk units is included in the #9074 (base). The mounting for the next 30 disk units is optional by ordering feature code #5101 30 Disk Expansion Feature.

The #9074 also supports up to two removable media devices (internal tape or CD-ROM/DVD-RAM) that are supported by the #9778.

#5101 30-Disk Expansion Feature

The #5101 is a disk unit expansion enclosure feature for the #9074 Base I/O Tower. The #5101 includes two 15 disk unit enclosures, one 765-Watt power supply, backplanes, and cables. One #4778 PCI RAID Disk Unit Controller is required to support the 15 disk units in each of the two disk unit enclosures included with the #5101. Two #4778 PCI RAID Disk Unit Controllers are required to support 30 disk units.

#5111 30-Disk Expansion With Dual Line Cord Feature

The #5111 is a disk unit expansion enclosure for systems and towers that are dual line cord enabled. It includes two 15 disk unit enclosures, backplanes, and cables. Two #4748/#4778 PCI RAID Disk Unit Controllers are required to support 30 disk units.

Prerequisites:

- #5103 when ordered for a Model 830 system unit
- #5105 when ordered for a stand alone #5074 I/O Tower
- #5106 for the unit in a #5079 where this expansion enclosure is to be installed

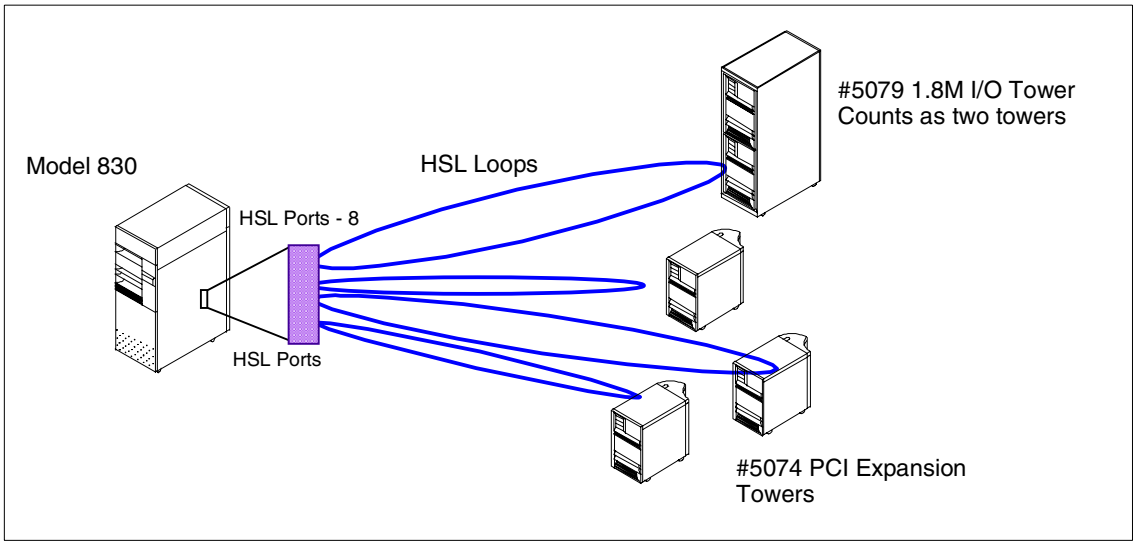
OS/400 V5R1 plus PTFs, or later is required. Refer to Informational APAR II12950 at:
`http://as400service.rochester.ibm.com/supporthome.nsf/document/10000035`

High Speed Link (HSL) on Model 830

The Model 830 supports up to four HSL loops, one of which can be an Optical HSL Loop. The Optical HSL Loop extends the distance between the 830 system unit and the I/O units from the current 15 meters to 250 meters, which can help to improve data reliability and protection. The Optical HSL cables are smaller and easier to work with. Optical and Copper HSL cables may not be intermixed within a loop. Each loop supports the attachment of the #5074 I/O towers (with the #5079 counting as two #5074s), the #5078 PCI Expansion Units, the #0578 PCI Expansion Unit in Rack, and certain external xSeries servers. Only #5074, #5079, #0578, and #5078 may be attached to the Optical HSL loop. The Model 830 supports #503x Migration Tower I or #5077 Migration Tower II, which provides for the migration of existing #5073 SPD I/O towers or #5065/#5066 PCI Expansion Towers to leverage the hardware investment in this older technology.

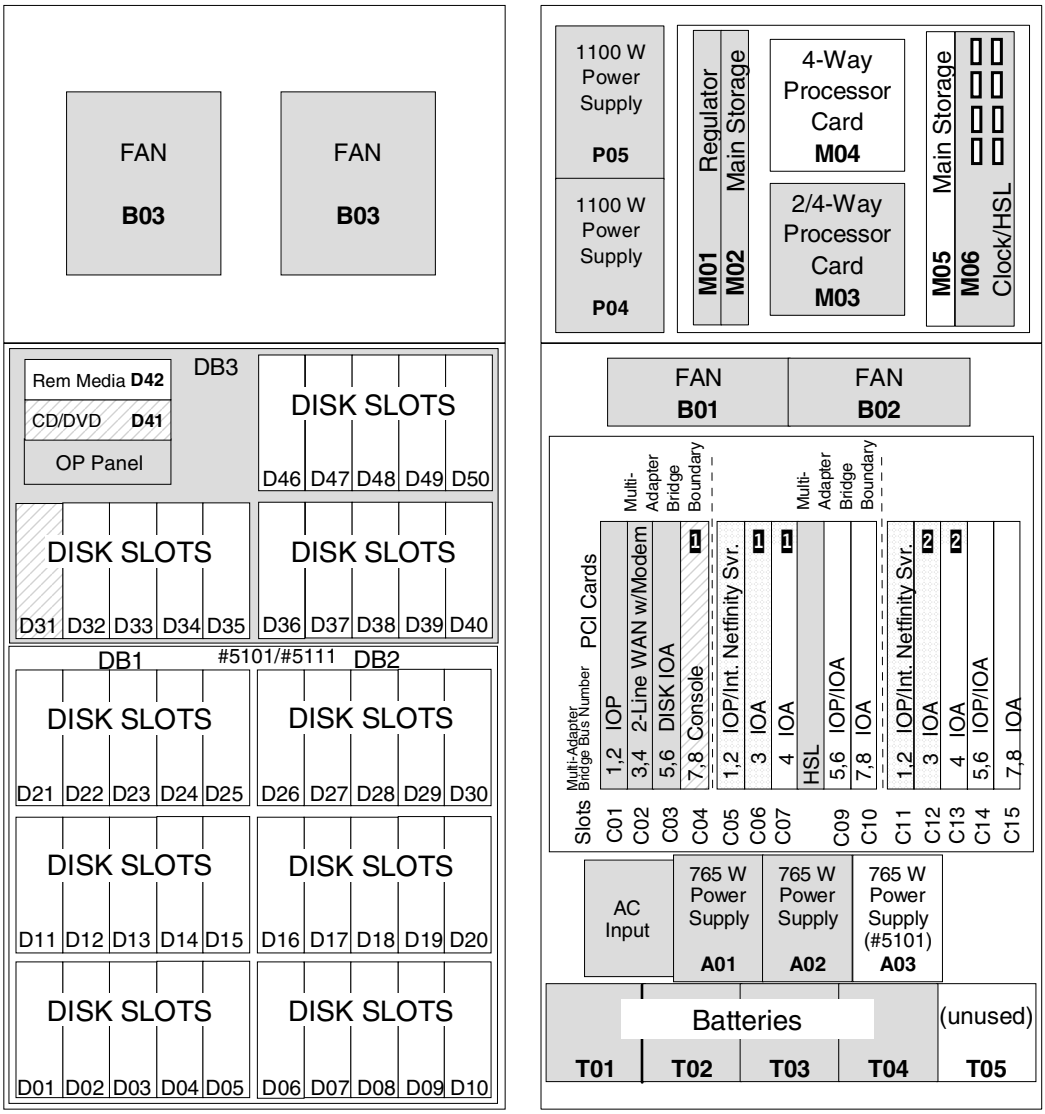
Due to the high bandwidth of HSL, you should see comparable performance, whether using copper or optical HSL, even though optical runs at a slower speed. However if you have intensive I/O bandwidth requirements (for example, large system data mining), you may experience some performance degradation with optical HSL. We recommend you avoid using a maximum number of I/O towers on an optical HSL loop.

The following figure shows the Model 830 and five connected towers. For further details, see *AS/400e to iSeries 400 Migration*, SG24-6055.


#5079 1.8M I/O Tower
Counts as two towers
Model 830
HSL Loops
HSL Ports - 8
HSL Ports
#5074 PCI Expansion
Towers

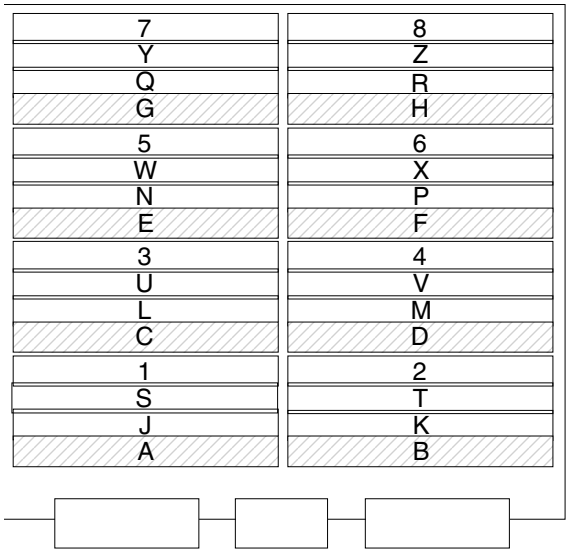
Model 830 System Unit (n - Way)

#2400, #2402, #2403, #2351 Processors



Model 830 Main Storage Card

(CCIN 2881)



Legend

Base Feature

Required Feature

Unavailable if Integrated xSeries Server is installed

Note 1: If C05 has an Integrated xSeries Server, slot C06 is unavailable, and slot C07 is available only as a short slot.

Note 2: If C11 has an Integrated xSeries Server, slot C12 is not available, and slot C13 is available only as a short slot.

Note 3: The position of the cards may change depending on the console and other features selected.

Remote Control Panel

The #0382 Remote Control Panel Cable enables use of the Remote Control Panel function on a PC. The iSeries servers use a parallel interface (LPT) instead of a COM port for the Remote Control Panel. The parallel port must be configured to use the Enhanced Parallel Port (EPP) support. It must be EPP Version 1.9 compliant, which may require the PC's Basic Input/Output Services (BIOS) to change. Check with your PC manufacturer for any assistance, if needed. For cable connection details and PC requirements, see the *AS/400 Operations Console Setup Guide*, which is available at:

`http://www.as400service.ibm.com/supporthome.nsf/Document/10000051`

Notes:

- Due to the way EPP Version 1.9 support is implemented to support the remote control panel, there may be PCs that do not support the use of this function.
- Use of the Remote Control Panel function is independent of the System Console.
- The Remote Control Panel function can be used with any System Console Specify.
- The Remote Control Panel Cable is not required for a LAN attached console (#5546 or #5548).

Remote Control Panel is installed and used from PCs running the Windows NT 4.0 or Windows 2000 Professional PC operating system.

I/O Processor and I/O Adapter Support

This section lists the supported IOPs and IOAs. See “I/O Processor” on page 271 and “I/O Adapters and Controllers” on page 283 for full descriptions.

Note

PCI configuration rules for OS/400 V5R1 hardware are quite flexible. See the PCI Card Placement Rules chapter of the *iSeries and AS/400e System Builder*, SG24-2155 for rules for placing PCI card in configurations.

LAN/WAN/Workstation IOAs

- #2743 PCI 1 Gbps Ethernet IOA
- #2744 PCI 100 Mbps Token Ring IOA
- #2760 PCI 1Gbps Ethernet UTP IOA
- #2772 Dual WAN/Modem Adapter
- #2773 Dual WAN/Modem Adapter
- #2817 PCI 155Mbps MMF ATM
- #4723 PCI 10 Mbps Ethernet IOA
- #4745 PCI Two Line WAN IOA
- #4746 PCI Twinaxial IOA
- #4750 PCI ISDN BRI U IOA
- #4751 PCI ISDN BRI S/T IOA
- #4761 PCI Integrated Analog Modem
- #4801 PCI Cryptographic Coprocessor
- #4815 PCI 155 Mbps UTP OC3 ATM IOA
- #4816 PCI 155 Mbps MMF ATM IOA
- #4818 PCI 155 Mbps SMF ATM IOA
- #4838 PCI 100/10 Mbps Ethernet IOA
- #9771 Base PCI 2-Line WAN with Modem

Internal Disk Unit Controllers

- #9778 Base PCI RAID Disk Unit Controller
- #4778 PCI RAID Disk Unit Controller

Magnetic Media Controllers

- #2749 PCI Ultra Magnetic Media Controller
- #2765 PCI Fibre Channel Tape Controller
- #2766 PCI Fibre Channel Disk Controller
- #2768 PCI Magnetic Media Controller

I/O Processors

- #9943 Base PCI IOP
- #2843 PCI IOP (64 MB)
- #2790 Integrated Netfinity Server
- #2791 Integrated xSeries Server

Internal Disk, Tape, CD-ROM, and DVD-RAM Support

This section lists the supported internal disks, tape drives and CD-ROMs. See “PCI Disk Units” on page 315 and “Internal Tape, CD-ROM, and DVD-RAM” on page 327 for full descriptions.

Internal Disk Units

- #4317 8.58 GB 10k RPM Disk Unit
- #4318 17.54 GB 10k RPM Disk Unit
- #4331 1.6 GB Read Cache Device

Internal Tape, CD-ROM, and DVD-RAM

- #4425 CD-ROM
- #4430 DVD-RAM
- #4482 4 GB ¼-inch Cartridge Tape
- #4483 16 GB ¼-inch Cartridge Tape
- #4486 25 GB ¼-inch Cartridge Tape
- #4487 50 GB ¼-inch Cartridge Tape

External Towers

These towers attach to the Model 830 via HSL (High Speed Link).

- #5034 Migration Tower I
- #5035 Migration Tower I
- #5074 PCI Expansion Tower
- #5077 Migration Tower II
- #0578 PCI Expansion Unit in Rack

- #5078 PCI Expansion Unit
- #5079 1.8m PCI I/O Expansion Tower

See “Expansion Towers” on page 237 and “Migration Towers” on page 248 for full descriptions.

The Expansion Towers and Units in this table can attach to the Model 830 via #5034, #5035, and #5077 Migration Towers.

Feature	Description	Prerequisites
#5043	Primary rack converted to secondary rack (migrated)	--
#5044	System Unit Expansion Rack (migrated)	#2686 Optical Link Processor (OLP) Card
#5052	Storage Expansion Unit	#5143 and #5072 or #5082 and one of #6502, #6512, #6530, #6532, #6533
#5058	Storage Expansion Unit	#5073 or #5083 and one of #6502, #6512, #6530, #6532, #6533
#5065	Storage/PCI Expansion Tower	One port on #2688 OLP card in #9364/#5064 System Unit Expansion or in #5077 Migration Tower
#5066	1.8m I/O Tower	See #5065
#5072	1063M System Unit Expansion Tower	One port on #2688 OLP card in #9364/#5064 System Unit Expansion or in #5077 Migration Tower
#5073	1063M System Unit Expansion Tower	One port on #2688 OLP card in #9364/#5064 System Unit Expansion or in #5077 Migration Tower
#5082	1063M System Unit Expansion Tower	One of #6502, #6512, #6530, #6532, #6533 and one port on #2688 OLP card in #9364/#5064 System Unit Expansion or in #5077 Migration Tower
#5083	1063M System Unit Expansion	See #5082

Full descriptions of these racks and towers are found beginning with “Expansion Towers” on page 237.

Migration Tower Hardware

To connect migration towers, select one of these features:

- #2686 Optical Link Processor (266 Mbps)

- #2688 Optical Link Processor (1063 Mbps)

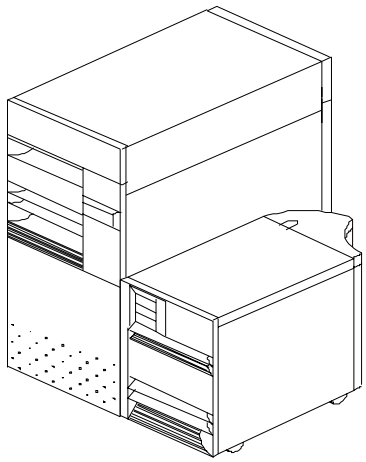
For hardware supported in the migration towers, refer to “Migration Tower PCI Hardware” on page 297 and “Migration Tower SPD Hardware” on page 305.

iSeries Server 840

iSeries Server 840

iSeries Model 840

A minimum functional server consists of the base server unit and selected priced features. Included in the base server are the physical package and power elements, a DASD controller, an I/O controller, and a #9771 Base PCI 2-Line WAN with Modem as follows:



iSeries Model 840 System Unit

- System Unit (CEC) and #9079 Base I/O Tower or #8079 Optional Base I/O Rack
- Linecord Features (one for the system unit and one for the #9079 or two for the #8079)
- Clock Card (CCIN 25AA)
- Clock Daughter Card (CCIN 25AC)
- Terminator/Filler Card (CCIN 246C) (Two on the #2352 and one on the #2353)
- PCI and CSP Card (CCIN 28AA)
- Operator Panel with key stick (CCIN 247C)
- #9079 Base I/O Tower or #8079 Optional Base I/O Rack
- Bus Expansion Card, specify one of these features:
  - #9755 Base HSL Ports - 16 Copper
  - #9759 Base HSL Ports - 4 Optical/12 Copper
- Bus Adapter (CCIN 2691)
- #9943 Base PCI IOP
  - Provides support for #9778 Base PCI RAID Disk Unit Controller

    Provides support for up to 15 Disk Units, the required CD-ROM, and a feature Internal Tape or a feature CD-ROM
  - Provides support for a base Console/Workstation IOA

    The configurator determines which feature combinations will be on the order based on the System Console specify #5540, #5544, #5546, or #5548

These features are required:

- Processor (one must be specified)
  - #2352 Model 840 8/12-Way POD (SStar 600 Mhz) (9000/12000 CPW)
  - #2353 Model 840 12/18-Way POD (SStar 600 Mhz) (12000/16500 CPW)

  - #2354 Model 840 18/24-Way POD (SStar 600 Mhz) (16500/20200 CPW)
  - #2461 Model 840 24-Way Processor (SStar 600 Mhz) (20200 CPW)
- Interactive Card (one must be specified)

Processor Feature	#2352	#2353	#2354	#2461
Interactive Feature				
#1540	120	120	120	120
#1541	240	240	240	240
#1542	560	560	560	560
#1543	1050	1050	1050	1050
#1544	2000	2000	2000	2000
#1545	4550	4550	4550	4550
#1546	10000	10000	10000	10000
#1547		16500	16500	16500
#1548			20200	20200

- Main Storage. Main storage cards are required to be installed in groups of four (quads) of the same capacity and technology. A minimum of one set of four is required.
  - #3196 - 8192 MB Main Storage Card (256 Mb technology)
    - Requires #2730 Programmable Regulator (2X)
    - May be selected only to achieve main storage increments greater than 65536MB
  - #3612 - 1024 MB Main Storage Card (256 Mb technology)
  - #3613 - 2048 MB Main Storage Card (256 Mb technology)
  - #3614 - 4096 MB Main Storage Card (256 Mb technology)

  The #3196 requires the #2730 Programmable Regulator (quantity two) and may be selected only to achieve main storage increments greater than 65536 MB.
- Integrated Disk Units

  Device Parity Protection: All (0041) is the default for disk data protection. With RAID protection as the default, order a minimum of four disk units of equal capacity. If RAID protection is removed from the system order, order at least one of these disks:
  - #4317 - 8.58 GB 10k RPM Disk Unit
  - #4318 - 17.54 GB 10k RPM Disk Unit
- Integrated CD-ROM/DVD-RAM
  - #4425 CD-ROM
  - #4430 DVD-RAM
- System Console/Communications Adapter

  The console on LAN options require a dedicated LAN adapter. A #0367 Operations Console PCI Cable will also be added to the order by the marketing configurator.

– #5540 System Console on twinaxial workstation controller

  #4746 PCI Twinaxial IOA

– #5544 System Console on #9771 WAN Adapter

  #0367 Operations Console PCI Cable

– #5546 System Console on 100 Mbps Token Ring

  • #2744 PCI 100Mbps Token-Ring IOA (Console)
  • #0367 Operations Console PCI Cable

– #5548 System Console on 100 Mbps Ethernet

  • #4838 PCI 100/10Mbps Ethernet IOA (Console)
  • #0367 Operations Console PCI Cable

The 840 server initial installation and model upgrades are performed by IBM Service Representatives.

Card Technology

With the implementation of new PCI technologies, the Model 840 provides more flexibility in the placement of IOPs and IOAs. This results in more efficient use of card slots, potentially resulting in a lower cost of implementation.

Earlier AS/400e models required input/output processors (IOPs) to be in specific slots in the system and expansion towers. If high performance in a particular area was required, a single input/output adapter (IOA) may have been assigned to a single IOP. This resulted in unassigned slots in the tower, leaving valuable slots empty.

This PCI I/O structure enables customer setup of selected features of the Model 840. It also enables Hot Plug PCI for adding and replacing hardware without taking the server down. A full understanding of configuration rules associated with the various I/O features of the 840 system is required.

The 840 processors support four 32-bit and ten 32/64-bit PCI slots.

These functions do not have equivalent function PCI cards for the Model 840:

- ASCII Adapter
- V.25 Autocall cable
- Select standby mode
- X.21 switched WAN dial-up or Shorthold Mode WAN
- Asynchronous communication speeds of less than 300 bps

- Data Rate Select signal on the EIA 232/V.24 interface. This function is used by some older 2400 bps modems to reduce the speed to 1200 bps.
- LPDA-1 (Link Problem Determination Aids). This is a diagnostic function supported by some (primarily older IBM) modems.
- V.54 local and remote loopback (diagnostics functions supported by some modems)

PCI adapters also do not support X.21 switched WAN dial-up or Shorthold Mode WAN.

The fundamental bus architecture of the iSeries is unchanged when using PCI adapters. The AS/400e IOP continues to off load the main processor; isolate the host from adapter and network errors; and manage, configure, and service the adapters. PCI architecture offers advantages in flexibility over non-iSeries or non-AS/400e server structures.

Processor Features

- #2352 8/12-way Processor on Demand (POD) (SStar 600 Mhz)
  - Processor Capacity Card (CCIN 2352)
  - Processor 0 (CCIN 246F)
  - Processor 1 (CCIN 246E)
- #2353 12/18-way Processor on Demand (POD) (SStar 600 Mhz)
  - Processor Capacity Card (CCIN 2353)
  - Processor 0 (CCIN 246F)
  - Processor 1 (CCIN 246E)
  - Processor 2 (CCIN 246E)
- #2354 18/24-way Processor on Demand (POD) (SStar 600 Mhz)
  - Processor Capacity Card (CCIN 2354)
  - Processor 0 (CCIN 246F)
  - Processor 1 (CCIN 246E)
  - Processor 2 (CCIN 246E)
  - Processor 3 (CCIN 246E)
- #2461 24-way Processor (SStar 600 Mhz)
  - Processor 0 (CCIN 246F)
  - Processor 1 (CCIN 246E)
  - Processor 2 (CCIN 246E)
  - Processor 3 (CCIN 246E)
  - Processor Capacity Card (CCIN 2461)

Note: Capacity Upgrade on Demand (CUoD) is described in “Workload and Performance” on page 41.

Interactive Features

The Model 840 supports various levels of interactive performance through the installation of interactive features.

Interactive CPW is an approximate value reflecting the portion of Processor CPW that can be used for workloads performing interactive-based tasks (5250).

- Any system administration job submitted to batch is not considered interactive work.
- Any use of Operations Navigator (GUI administration functions) is not considered interactive work.

For a discussion of how these features influence system performance, see “Workload and Performance” on page 41.

The available interactive options are shown in the table on page 178.

A feature cross-reference table can be used to relate the Processor Feature Code to the Processor and Interactive features visible in the AS/400 configurator. The Processor Feature Code is found by displaying the QPRCFEAT system value or in the rack configuration. The Processor Feature Code is used when ordering software license keys.

The Processor Group is determined by a combination of the Processor and Interactive Feature. The following table provides a cross reference for the Model 840.

Processor	Interactive Feature	Processor Feature	Processor Group
#2352	#1540	#26B0	P40
	#1541	#26B1	P50
	#1542	#26B2	P50
	#1543	#26B3	P50
	#1544	#26B4	P50
	#1545	#26B5	P50
	#1546	#26B6	P50
#2353	#1540	#26B8	P40
	#1541	#26B9	P50
	#1542	#26BA	P50
	#1543	#26BB	P50
	#1544	#26BC	P50
	#1545	#26BD	P50
	#1546	#26BE	P50
	#1547	#26BF	P50
#2354	#1540	#26C0	P40
	#1541	#26C1	P50
	#1542	#26C2	P50
	#1543	#26C3	P50
	#1544	#26C4	P50
	#1545	#26C5	P50
	#1546	#26C6	P50
	#1547	#26C7	P50
	#1548	#26C8	P50

#2461	#1540	#26D0	P40
	#1541	#26D1	P50
	#1542	#26D2	P50
	#1543	#26D3	P50
	#1544	#26D4	P50
	#1545	#26D5	P50
	#1546	#26D6	P50
	#1547	#26D7	P50
	#1548	#26D8	P50

Main Storage

All main storage cards on the Model 840 must be added in sets of four (quads) of the same capacity and technology. There are 16 slots available for main storage cards in the Model 840. The slots are arranged in groups of four: AAAA, BBBB, CCCC, and DDDD. The plugging order for the main storage cards is AAAA, BBBB, CCCC, and then DDDD.

There are no rules regarding the placement of a particular size of main storage card quad into a card slot group. A quad of any size main storage card may be placed in any of the four groups of four slots.

The available main storage features are as follows:

- #3196 - 8192 MB Main Storage Card (256 Mb technology)
- #3612 - 1024 MB Main Storage Card (256 Mb technology, replaces the #3197)
- #3613 - 2048 MB Main Storage Card (256 Mb technology, replaces the #3198)
- #3614 - 4096 MB Main Storage Card (256 Mb technology, replaces the #3195)

The #3196 requires the #2730 Programmable Regulator (quantity two) and may be selected only to achieve main storage increments greater than 65536 MB.

Power and Packaging

The Model 840 includes an internal battery that is automatically activated in the event of utility power loss. The battery provides full operating power for a short time to all components within the system unit, but not to any external components. This can allow the system to run uninterrupted for a short time (30 seconds or less). For longer power outages, the system uses the battery to attempt an orderly shutdown to avoid losing data in main storage that is not written to disk. An external UPS is recommended to protect the system unit and any external components against utility power outages. Continuously Powered Mainstore (CPM) is not supported on the Model 840. An external UPS can allow the system to run

uninterrupted for longer than thirty seconds when utility power is lost. It also maintains power long enough to ensure that the system successfully completes a shutdown to avoid losing data.

System Power

- Processor side, 8/12-Way, 12-Way, and 12/18-Way
  - Bulks (1000 watt) (CCIN 5154) (Quantity four)
  - Programmable Regulators (CCIN 2730) (Quantity eight)
  - #2730 Programmable Regulator (Quantity two) required if #3196 8 GB Main Storage cards are installed
  - Memory Control Regulator (CCIN 2716)
  - Processor Regulators (CCIN 2714) (Quantity two)
  - Charger
  - Battery Pack
  - SPCN Card (CCIN 285E)
  - AC Power Supply Country Specific Usage
- Processor side, 18/24 and 24-Way
  - Bulks (1000 watt) (CCIN 5154) (Quantity five)
  - Programmable Regulators (CCIN 2730) (Quantity nine)
  - #2730 Programmable Regulator (Quantity two) required if #3196 8 GB Main Storage cards are installed
  - Memory Control Regulator (CCIN 2716)
  - Processor Regulators (CCIN 2714) (Quantity two)
  - Charger
  - Battery Pack
  - SPCN Card (CCIN 285E)
  - AC Power Supply Country Specific Usage
- Base I/O Tower (#9079)
  - Bulks (765 Watt) (CCIN 515A) (Quantity two)
  - Batteries (Quantity four)
  - AC Input/Charger
- Dual Line Cord - 840 CEC (#5104)

  Provides dual line cord capability for the Model 840 system unit, #9079 base I/O tower, and lower unit of the #8079 Optional Base I/O Tower.
  - Two #14XX line cords are required on the Model 840 and two on the #9079 when the #5104 is ordered initially or for upgrades to a new Model 840. When ordered as an MES, an additional 14XX line cord for the system unit and one for the #9079 are required.

- Two #14XX line cords are required for the Model 840 system unit, and for the lower unit in the #8079 when this feature is ordered initially or as an upgrade to a Model 840. When ordering #5104 alone as an MES, an additional #14XX line cord is required for the system unit, and for the lower unit in the #8079, for a total of two line cords for both the system unit and the lower unit in the #8079.
- #5105 is required for dual line cord capability for the upper unit in the #8079.
- Prerequisite: If the #9079 or #8079 has feature #5101 (30-Disk Expansion Feature) installed, the #5101 must be converted to a #5111.
- OS/400 V5R1 and supporting PTFs are required. Refer to Informational APAR II12950 at: `http://as400service.rochester.ibm.com/supporthome.nsf/document/10000035`
- e-configurator users can refer to this Web site for ordering information: `http://w3-1.ibm.com/sales/systems/ibmsm.nsf/MainFrameset?OpenForm&cdoc=idlcinstall`

#8079 Optional Base I/O Rack

The #8079 is a optional base I/O rack shipped on the Model 840 instead of the #9079 Base I/O Tower. The #8079 supports up to 90 disk units, up to 22 PCI IOAs, and up to four removable media units. A #8079 is a #9079 Base I/O tower with a #5074 (#0574 Specify Code) tower package in a rack.

Select three or four (any combination) of these HSL cables:

- #1460 - 3m Copper HSL cable
- #1461 - 6m Copper HSL cable
- #1462 - 15m Copper HSL cable

The #1462 15m Copper HSL cable can be used on any HSL port of the Model 840. If a #5077 migration tower is included in the configuration, four HSL cables have to be ordered for the #8079 Optional Base I/O Rack.

Select two of these SPCN cables per tower:

- #1463 - 2m SPCN cable
- #1464 - 6m SPCN cable
- #1465 - 15m SPCN cable
- #1466 - 30m SPCN cable

Specify two line cords for the #8079 Optional Base I/O Rack.

The #8079 has a #9943 Base PCI IOP and a #9778 PCI RAID Disk Unit Controller. It has PCI slots for up 22 PCI IOAs, space for up to 90 disk units (the #5101 is installed in both the bottom and top unit), space for four removable media devices, two battery backups, and redundant/hot swap power supplies.

The #8079 is capable of controlling Ultra2 SCSI disk units.

The 22 PCI IOAs are supported (driven) by two base #9943 PCI IOPs and feature #2843 PCI IOPs, feature #2790 Integrated Netfinity Servers, or #2791 Integrated xSeries Servers.

The #8079 also supports up to four removable media devices (internal tape or CD-ROM). These removable media devices are supported by one 9748 and feature #4748.

If the top enclosure is to be attached to a different system than what was initially ordered, RPO remove the #0574 specify code from the initial ordered machine and add it to the target machine.

#9079 Base I/O Tower

The #9079 is the base I/O tower shipped on the Model 840. The #9079 supports up to 45 disk units, up to 11 PCI IOAs, and up to two removable media units.

Select two (any combination) of these HSL cables:

- #1460 - 3m Copper HSL cable
- #1461 - 6m Copper HSL cable
- #1462 - 15m Copper HSL cable

The #1462 15m Copper HSL cable can be used on any HSL port of the Model 840.

Select one of these SPCN cables per tower:

- #1463 - 2m SPCN cable
- #1464 - 6m SPCN cable
- #1465 - 15m SPCN cable
- #1466 - 30m SPCN cable

Specify one line cord for the #9079 Base I/O Tower.

The #9079 has a #9943 Base PCI IOP and a #9778 PCI RAID Disk Unit Controller. It has PCI slots for up 11 PCI IOAs, space for up to 45 disk units (15 are “base”, 30 additional with the #5101), space for two removable media devices, one battery backup, and redundant/hot swap power supplies.

The #9079 is capable of controlling Ultra2 SCSI disk units.

The 11 PCI IOAs are supported (driven) by the base #9943 PCI IOP and by feature #2843 PCI IOPs or #2791 Integrated xSeries Servers.

The mounting for the first 15 disk units is included in the #9079 (base). The mounting for the next 30 disk units is optional by ordering feature code #5101 30 Disk Expansion Feature.

The #9079 also supports up to two removable media devices (internal tape or CD-ROM). These removable media devices are supported by the #9778.

#5101 30-Disk Expansion Feature

The #5101 is a disk unit expansion enclosure feature for the #5074 Expansion Tower, the #9074 Base I/O Enclosure, and the #9079 Base I/O Tower. The #5101 includes two 15 disk unit enclosures, one 765-Watt power supply, backplanes and cables. One #4778 PCI RAID Disk Unit Controller is required to support the 15 disk units in each of the two disk unit enclosures included with #5101. Two #4778 PCI RAID Disk Unit Controllers are required to support 30 disk units.

#5111 30-Disk Expansion With Dual Line Cord Feature

The #5111 is a disk unit expansion enclosure for systems and towers that are dual line cord enabled. It includes two 15 disk unit enclosures, backplanes, and cables. Two #4748/#4778 PCI RAID Disk Unit Controllers are required to support 30 disk units.

Prerequisites:

- #5104 when ordered for a Model 840 system unit
- #5105 when ordered for a stand alone #5074 I/O Tower or the top unit in a #8079
- #5106 for the unit in a #5079 where the #5111 expansion enclosure is to be installed

OS/400 V5R1 and supporting PTFs are required. Refer to Informational APAR II12950 at:
`http://as400service.rochester.ibm.com/supporthome.nsf/document/10000035`

#2730 Programmable Regulator

The #2730 Programmable Regulator (quantity two) is required if the #3196 8 GB Main Storage Card is installed in the Model 840.

#5150 Battery Backup (external)

The #5150 is an external battery backup that, when used in conjunction with the internal battery backup, is capable of extending the battery backup time on Models 840 and SB3.

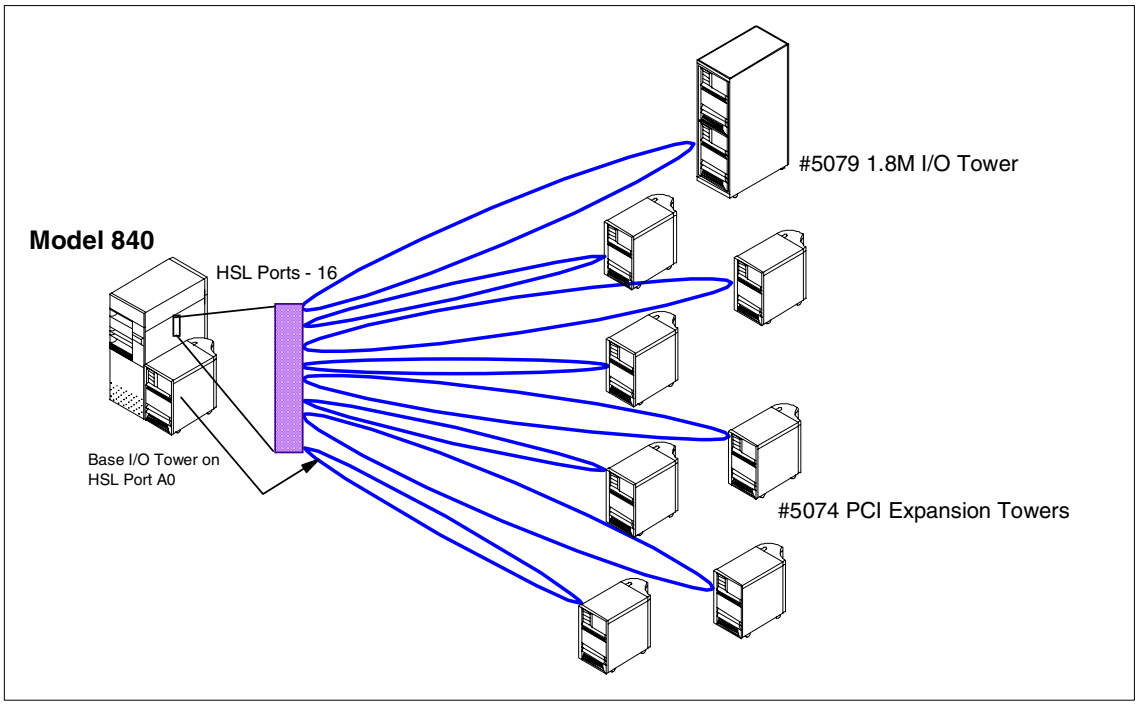
High Speed Links (HSL) on Model 840

The Model 840 supports up to eight HSL loops two of which can be Optical HSL loops. The Optical HSL Loop extends the distance between the 830 system unit and the I/O units from the current 15 meters to 250 meters which can help to improve data reliability and protection. The Optical HSL cables are smaller and easier to work with. Optical and Copper HSL cables may not be intermixed within a loop. These loops support the attachment of #5074 I/O Towers (with the #5079 counting as two #5074s) and certain external xSeries servers. Only #5074,

#5079, #0578, and #5078 may be attached to the Optical HSL loop. The Model 840 supports a #5077 Migration Tower II, which provides for the migration of existing #5073 SPD I/O towers or #5065/#5066 PCI Expansion Towers to leverage the hardware investment in this older technology. For further details, see *AS/400e to iSeries 400 Migration*, SG24-6055.

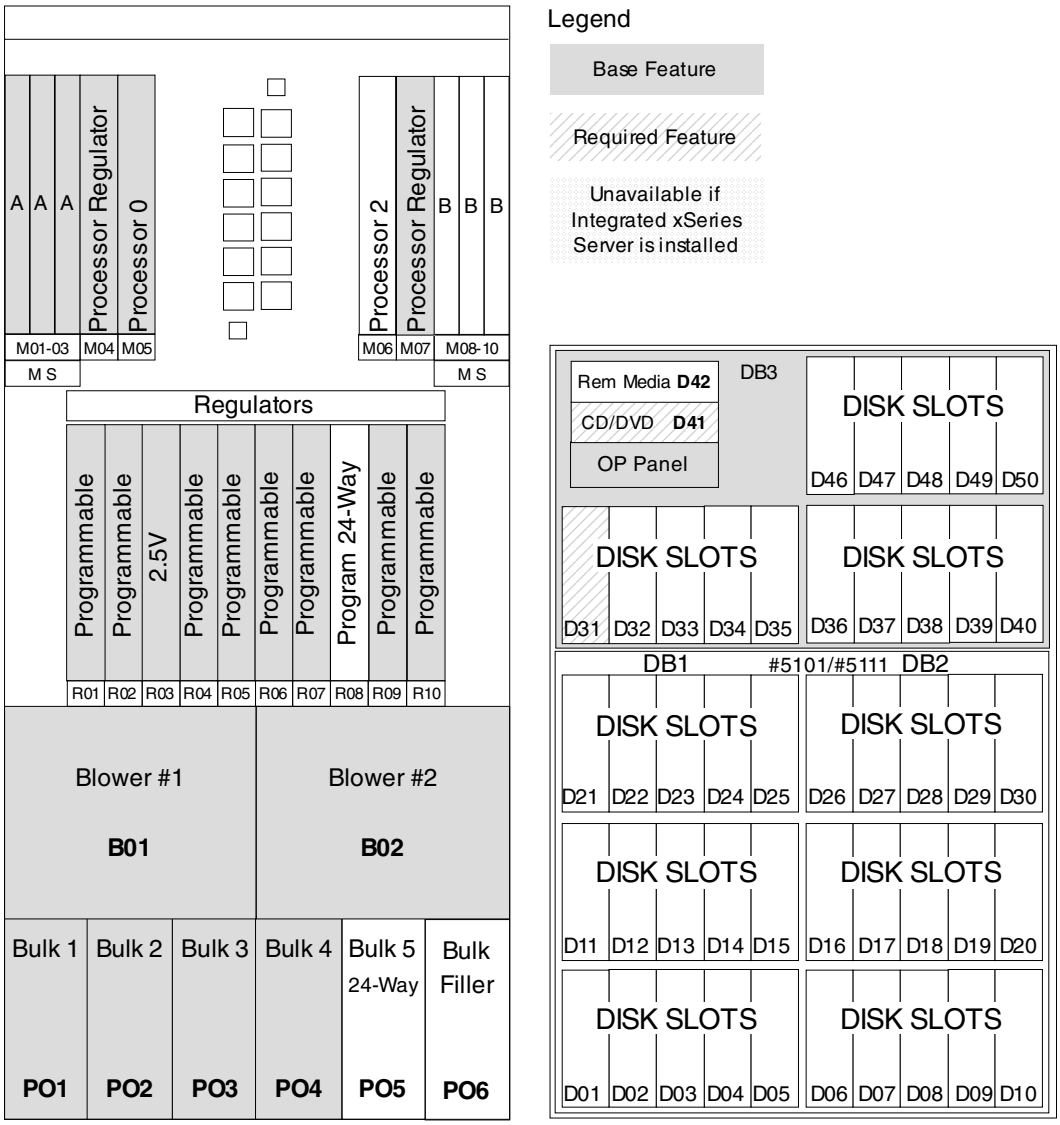
Due to the high bandwidth of HSL, you should see comparable performance, whether using copper or optical HSL, even though optical runs at a slower speed. However, if you have intensive I/O bandwidth requirements (for example, large system data mining) you may experience some performance degradation with optical HSL. Use less than the allowed maximum number of I/O towers on an optical HSL loop to optimize performance.

Note: The base I/O tower is on the first loop. The following figure shows the Model 840 and nine connected towers.



Model 840 System Unit (n - Way)

#2352, #2353, #2354, #2461 Processors



Front

Model 840 System Unit (n - Way)

#2352, #2353, #2354, #2461 Processors

Legend

Base Feature

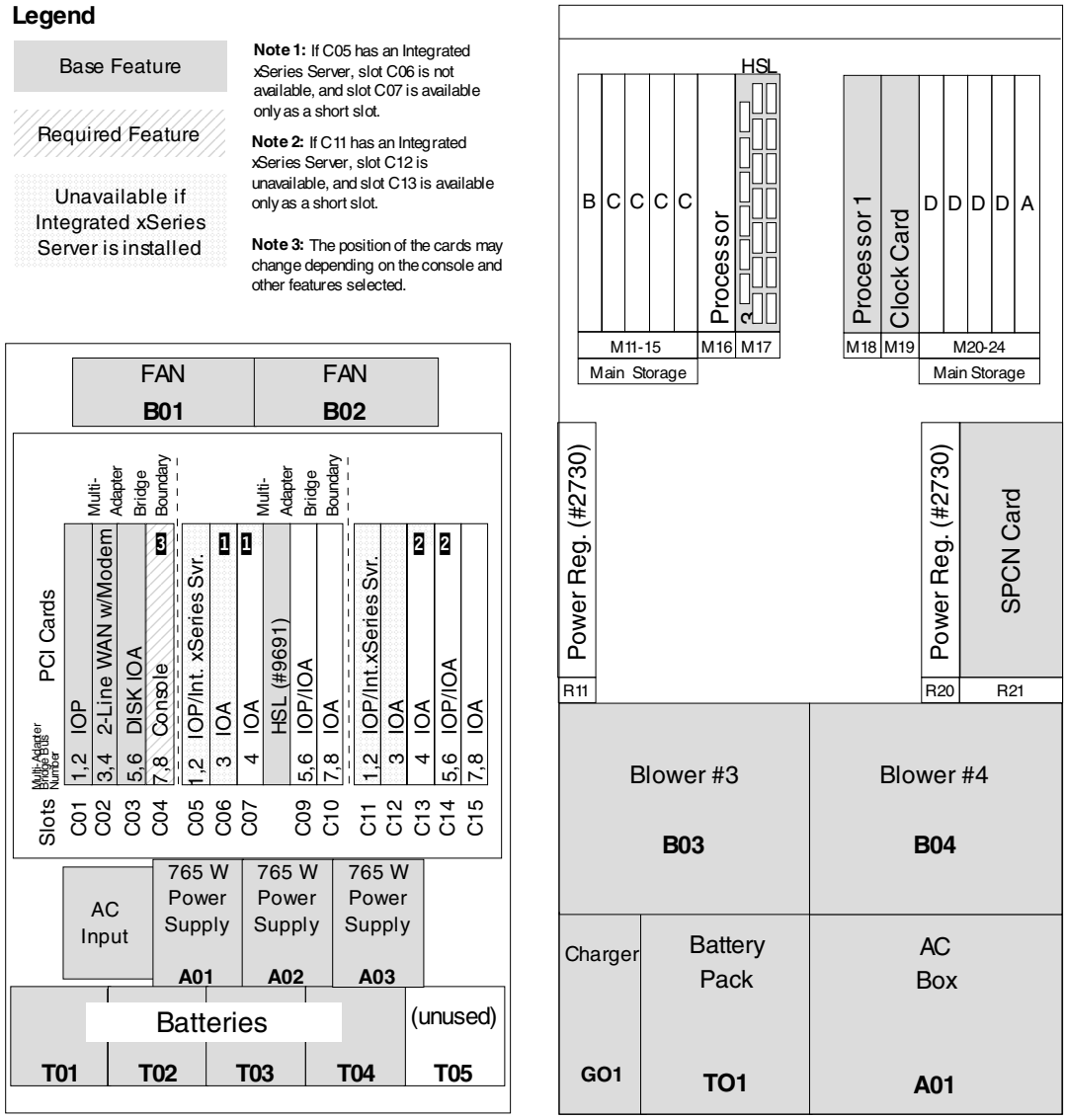
Required Feature

Unavailable if Integrated xSeries Server is installed

Note 1: If C05 has an Integrated xSeries Server, slot C06 is not available, and slot C07 is available only as a short slot.

Note 2: If C11 has an Integrated xSeries Server, slot C12 is unavailable, and slot C13 is available only as a short slot.

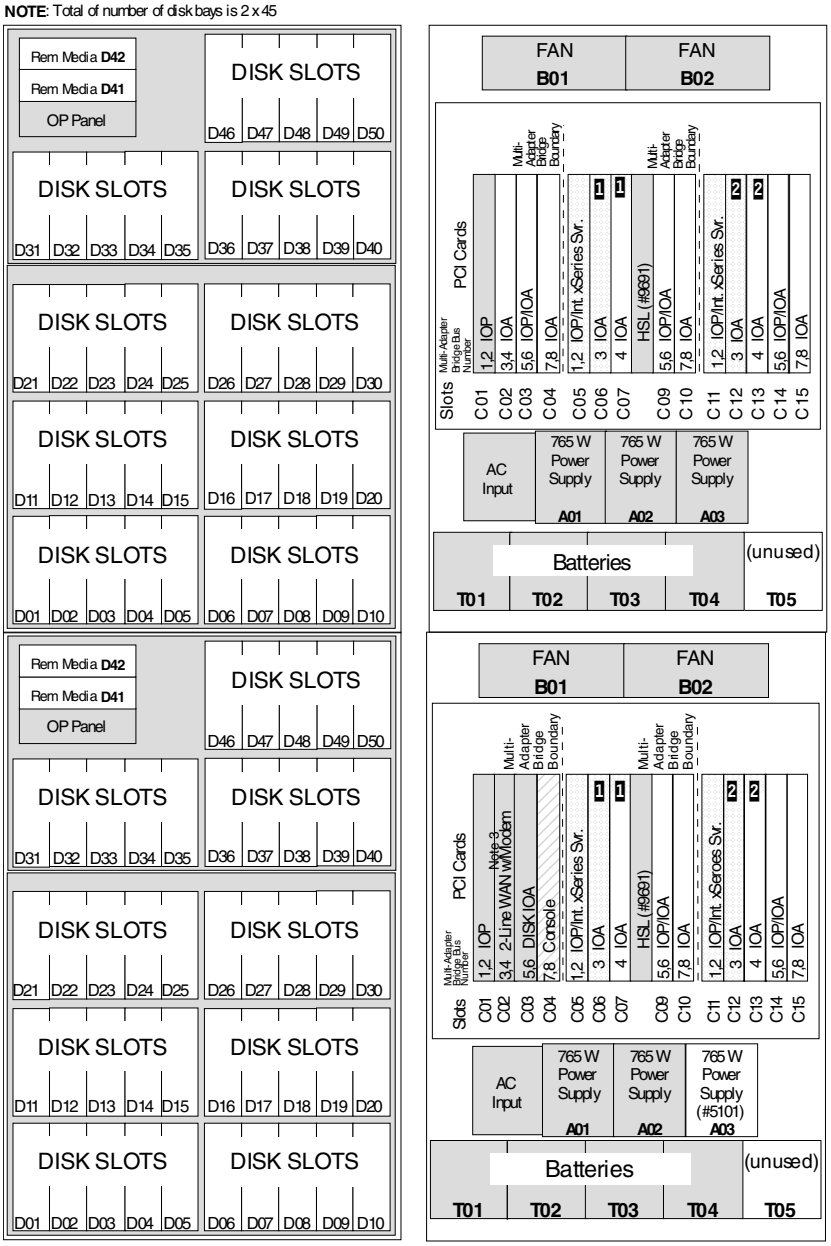
Note 3: The position of the cards may change depending on the console and other features selected.



Back

#8079 Optional Base Rack

NOTE: Total of number of disk bays is 2 x 45



Legend

Base Feature

Required Feature

Unavailable if Integrated Netfinity Server is installed

Note 1: If C05 has an Integrated Netfinity Server, slot C06 is unavailable, and slot C07 is available only as a short slot.

Note 2: If C11 has an Integrated Netfinity Server, slot C12 is not available, and slot C13 is available only as a short slot.

Note 3: The position of the cards may change depending on the console and other features selected.

Remote Control Panel

The #0382 Remote Control Panel Cable enables use of the Remote Control Panel function on a PC. The iSeries servers use a parallel interface (LPT) instead of a COM port for the Remote Control Panel. The parallel port must be configured to use the Enhanced Parallel Port (EPP) support. It must be EPP Version 1.9 compliant, which may require the PC's Basic Input/Output Services (BIOS) to change. Check with your PC manufacturer for any assistance, if needed. For cable connection details and PC requirements, see the *AS/400 Operations Console Setup Guide*, which is available at:
`http://www.as400service.ibm.com/supporthome.nsf/Document/10000051`

Notes:

- Due to the way EPP Version 1.9 support is implemented to support the remote control panel, there may be PCs that do not support the use of this function.
- Use of the Remote Control Panel function is independent of the System Console.
- The Remote Control Panel function can be used with any System Console Specify.
- The Remote Control Panel Cable is not required for a LAN attached console (#5546 or #5548).

Remote Control Panel is installed and used from PCs running the Windows NT 4.0 or Windows 2000 Professional PC operating systems.

I/O Processor and I/O Adapter Support

This section lists the supported IOPs and IOAs. See “I/O Processor” on page 271 and “I/O Adapters and Controllers” on page 283 for full descriptions.

Note

PCI configuration rules for V5R1 hardware are quite flexible. See the “PCI Card Placement Rules” chapter of the *iSeries and AS/400e System Builder*, SG24-2155, for rules for placing PCI card in configurations.

LAN/WAN/Workstation IOAs

- #2743 PCI 1 Gbps Ethernet IOA
- #2744 PCI 100 Mbps Token Ring IOA
- #2760 PCI 1Gbps Ethernet UTP IOA
- #2772 Dual WAN/Modem Adapter
- #2773 Dual WAN/Modem Adapter
- #2817 PCI 155Mbps MMF ATM

- #4723 PCI 10 Mbps Ethernet IOA
- #4745 PCI Two Line WAN IOA
- #4746 PCI Twinaxial IOA
- #4750 PCI ISDN BRI U IOA
- #4751 PCI ISDN BRI S/T IOA
- #4761 PCI Integrated Analog Modem
- #4801 PCI Cryptographic Coprocessor
- #4815 PCI 155 Mbps UTP OC3 ATM IOA
- #4816 PCI 155 Mbps MMF ATM IOA
- #4818 PCI 155 Mbps SMF ATM IOA
- #4838 PCI 100/10 Mbps Ethernet IOA
- #9771 Base PCI 2-Line WAN with Modem

Internal Disk Unit Controllers

- #4778 PCI RAID Disk Unit Controller
- #9778 Base PCI RAID Disk Unit Controller

Magnetic Media Controllers

- #2749 PCI Ultra Magnetic Media Controller
- #2765 PCI Fibre Channel Tape Controller
- #2766 PCI Fibre Channel Disk Controller
- #2768 PCI Magnetic Media Controller

I/O Processors

- #2843 PCI IOP (64 MB)
- #2790 Integrated Netfinity Server
- #2791 Integrated xSeries Server
- #9943 Base PCI IOP (64 MB)

Internal Disk, Tape, CD-ROM, and DVD-RAM Support

This section lists the supported internal disks, tape drives, CD-ROMs, and DVD-RAMs. See “PCI Disk Units” on page 315 and “Internal Tape, CD-ROM, and DVD-RAM” on page 327 for full descriptions.

Internal Disk Units

- #4317 8.58 GB 10k RPM Disk Unit
- #4318 17.54 GB 10k RPM Disk Unit
- #4331 1.6 GB Read Cache Device

Internal Tape, CD-ROM, and DVD-RAM

- #4425 CD-ROM
- #4430 DVD-RAM
- #4482 4 GB ¼-inch Cartridge Tape
- #4483 16 GB ¼-inch Cartridge Tape
- #4486 25 GB ¼-inch Cartridge Tape
- #4487 50 GB ¼-inch Cartridge Tape

External Towers

These towers attach to the Model 840 via High Speed Link (HSL). See “Expansion Towers” on page 237 for full descriptions.

- #5074 PCI Expansion Tower
- #5077 Migration Tower II
- #0578 PCI Expansion Unit in Rack
- #5078 PCI Expansion Unit
- #5079 1.8m PCI I/O Expansion Tower

The Expansion Towers and Units in this table can attach to the Model 840 using #5077 Migration Towers.

Feature	Description	Prerequisites
#5043	Primary rack converted to secondary rack (migrated)	--
#5044	System Unit Expansion Rack (migrated)	Optical Link Processor (OLP) Card #2686
#5052	Storage Expansion Unit	#5143 and #5072 or #5082 and one of #6502, #6512, #6530, #6532, #6533
#5058	Storage Expansion Unit	#5073 or #5083 and one of #6502, #6512, #6530, #6532, #6533
#5065	Storage/PCI Expansion Tower	One port on OLP card #2688 in the #5077 Migration Tower II
#5066	1.8m I/O Tower	See #5065
#5072	1063M System Unit Expansion Tower	One port on OLP card #2688 in the #5077 Migration Tower II
#5073	1063M System Unit Expansion Tower	One port on OLP card #2688 in the #5077 Migration Tower II

#5082	1063M System Unit Expansion Tower	One of #6502, #6512, #6530, #6532, #6533 and One port on OLP card #2688 in the #5077 Migration Tower II
#5083	1063M System Unit Expansion	See #5082

You can find the full descriptions of these racks and towers beginning with “Expansion Towers” on page 237.

Migration Tower Hardware

To connect migration towers, select one of these features:

- #2686 Optical Link Processor (266 Mbps)
- #2688 Optical Link Processor (1063 Mbps)

For hardware supported in the migration towers, refer to “Migration Tower PCI Hardware” on page 297 and “Migration Tower SPD Hardware” on page 305.

Upgrades to iSeries Server 8xx

Upgrades to iSeries Server 8xx

Upgrades to iSeries 8xx Servers

Upgrades to the 8xx servers can involve a housing change from a CEC to a tower. In some cases, an existing system CEC (on a 7xx system, for example) is converted into an 8xx I/O tower. All towers attached to the existing system CEC remain untouched.

Customers with AS/400e 7xx servers can upgrade to the iSeries 8xx models. This excludes the SB1 model. CISC models and RISC servers 6xx models and prior cannot be upgraded to the 8xx models.

The redbook *AS/400e to iSeries 400 Migration*, SG24-6055, provides guidance for upgrading to the iSeries server 8xx models.

No upgrades are offered into the Model 270 from any earlier models, nor can the Model 270 be upgraded into the 8xx models.

For software considerations, refer to “Supported Upgrade Paths” on page 503 and “Current Release to Previous Release Support” on page 504.

Interactive Performance Reduction Option for 8xx and 7xx Servers

In some cases, a supported upgrade path involves a reduction in Interactive CPW ratings. 7xx customers who do not want to keep their current interactive card may reduce their interactive capacity by one level when upgrading to a new 8xx server. This can lower the price paid for the upgrade.

For example, a customer with 1050 Interactive CPW (Interactive Feature #1510) upgrading to an 8xx server can choose a model with a lower Interactive CPW level (for example, 560). Customers choosing this reduction option will be required to repurchase (at full price) any additional Interactive CPW in the future.

Customers are encouraged to review current Interactive CPW utilization with PM/400, Management Central, or other AS/400 Performance Tools prior to using this interactive performance reduction option.

Upgrade Scenarios

To help you understand what is involved in upgrading to the 8xx servers, this section lists the overall steps involved for selected scenarios.

From 7xx servers

1. Perform a model upgrade.
2. Do a processor feature conversion.
3. Do an interactive card feature conversion.

From another 8xx server

1. Perform a model upgrade.
2. Do a processor feature conversion.
3. Depending on the “from” and “to” models, an interactive card feature conversion may also be required.

Once within an 8xx server, performance upgrades are simply made through processor or interactive feature conversions.

Migration considerations

- Most I/O supported on V4R1 or later are also supported on the 8xx models.
  - Features currently supported in 7xx servers remain valid on 8xx servers by using a migration tower. Some of these features cannot be ordered on new 8xx servers.
  - Features unique to 8xx servers are installed only in 8xx server system units and expansion units.
  - Features unique to “upgrade from” models are installed in migration and expansion towers attached to 8xx servers.
- No Model 730, or 740 main storage features migrate.
- Some Model 720 main storage features will migrate to 820 and 830 servers.

Example Model 720 to Model 820 Upgrade

When upgrading from a Model 720 to a Model 820, the following rules apply:

- Ship the new 820 system.
- Remove the existing processor from the 720 CEC.
- Convert the old system to the #5034 or #5035 Migration Tower I:
  - Convert to #5034 if the 720 has 10 DASD positions
  - Convert to #5035 if the 720 has 15 DASD positions
  - Existing power supply is used on #5034/#5035

  - Existing Line cord is used on #5034/#5035
  - Replace the existing planar with a new planar
  - Modify the operator panel
  - Add new microcode to the operator panel
  - Add internal HSL, J-TAG, and ISO cables/assemblies
- Memory
  - Main Storage DIMMs migrate (32 MB DIMMs do not migrate) from an old CEC to an 820 CEC.
  - Base CCIN 3001 (64 MB) does not migrate and is property of the customer.
  - Base CCIN 3002 (256 MB) migrates to 820 CEC. Marketing configurator will add a quantity of two #3000 specify codes to the model upgrade order for administrative purposes. Each #3000 represents one #3002 DIMM.
  - The #3001 features do not migrate and belong to the customer.
  - The #3002 and #3004 features migrate to the new 820 CEC.
- New power supply shipped with the 820 system.
- New line cord shipped with the 820 system.
- Ship HSL and SPCN cables (must be ordered since they are not included in migration tower conversion).
- Existing DASD remains with and in the #5034/#5035.
- Existing workstation adapters remain with and in the #5034/#5035.
- Existing LAN adapters remain with and in the #5034/#5035.
- Existing expansion towers remain attached (if desired) to the #5034/#5035.
- The modem is not changed.
- If any mirroring specify codes exist, they are migrated and apply to the entire 820 system (“old” side and new).
- If the #0044 exists, it is migrated but is treated as #0044 on the “old side” and is treated as #0041 on the new side.

RISC to RISC Data Migration (#0205)

This specify code is used when a customer orders a new (RISC) AS/400e server to replace an existing (RISC) AS/400e. The #0205 is orderable on any initial order iSeries 270 or 8xx model. Preloading Licensed Programs, by manufacturing, is not allowed with the #0205. Manufacturing only loads SLIC up through QSYS of OS/400 when #0205 is ordered.

The #0205 and #5000 are mutually exclusive.

Upgrades to iSeries Server 820

Supported upgrades to the 820 models from the 7xx servers are shown here. The chart represents upgrades announced as of 28 September 2001.

Upgrades to 820

Model 820																											
To		2395				2396					2397						2398							2435			
From		1521	1522	1523	1524	1521	1522	1523	1524	1525	1521	1522	1523	1524	1525	1526	1521	1522	1523	1524	1525	1526	1527	1521	1522	1523	1524
720																											
2061	1500	M	M	M	M	M	M	M	M		M	M	M	M			M	M	M	M				M	M	M	M
	1501	M	M	M	M	M	M	M	M	M	M	M	M	M	M		M	M	M	M	M			M	M	M	M
	1502		M	M	M		M	M	M	M		M	M	M	M	M		M	M	M	M	M			M	M	M
2062	1500					M	M	M	M		M	M	M	M			M	M	M	M				M	M	M	M
	1501					M	M	M	M	M	M	M	M	M	M		M	M	M	M	M			M	M	M	M
	1502						M	M	M	M		M	M	M	M	M		M	M	M	M	M			M	M	M
	1503							M	M	M			M	M	M	M			M	M	M	M	M			M	M
2063	1500										M	M	M	M			M	M	M	M							
	1502											M	M	M	M	M		M	M	M	M	M					
	1503												M	M	M	M			M	M	M	M	M				
	1504													M	M	M				M	M	M	M				
2064	1500																M	M	M	M							
	1502																	M	M	M	M	M					
	1503																		M	M	M	M	M				
	1504																			M	M	M	M				
	1505																				M	M	M				

Upgrades to 820

Model 820																			
To		2436					2437						2438						
From		1521	1522	1523	1524	1525	1521	1522	1523	1524	1525	1526	1521	1522	1523	1524	1525	1526	1527
720																			
2061	1500	M	M	M	M														
	1501	M	M	M	M	M													
	1502		M	M	M	M													
2062	1500	M	M	M	M		M	M	M	M									
	1501	M	M	M	M	M	M	M	M	M	M								
	1502		M	M	M	M		M	M	M	M	M							
	1503			M	M	M			M	M	M	M							
2063	1500						M	M	M	M			M	M	M	M			
	1502							M	M	M	M	M		M	M	M	M	M	
	1503								M	M	M	M			M	M	M	M	M
	1504									M	M	M				M	M	M	M
2064	1500						M	M	M	M			M	M	M	M			
	1502							M	M	M	M	M		M	M	M	M	M	
	1503								M	M	M	M			M	M	M	M	M
	1504									M	M	M				M	M	M	M
	1505											M					M	M	M

Model 820 Upgrades to 820

Supported model upgrades within the 820 server series are identified here.

Model 820 Upgrades

Model 820																													
To		0151	0152	2395			2396					2397						2398							2435				
From				1522	1523	1524	1521	1522	1523	1524	1525	1521	1522	1523	1524	1525	1526	1521	1522	1523	1524	1525	1526	1527	1521	1522	1523	1524
820																													
0150		B	B																										
0151			B																										
2395	1521			B	B	B	B	B	B	B		B	B	B	B			B	B	B	B				B	B	B	B
	1522				B	B		B	B	B	B		B	B	B	B			B	B	B	B				B	B	B	B
	1523					B			B	B	B			B	B	B	B			B	B	B	B				B	B
	1524									B	B				B	B	B				B	B	B	B				

Model 820 Upgrades

Model 820																													
To		0151	0152	2395			2396					2397						2398							2435			
From				1522	1523	1524	1521	1522	1523	1524	1525	1521	1522	1523	1524	1525	1526	1521	1522	1523	1524	1525	1526	1527	1521	1522	1523	1524
2396	1521							B	B	B		B	B	B	B			B	B	B	B							
	1522								B	B	B		B	B	B	B			B	B	B	B						
	1523									B	B			B	B	B	B			B	B	B	B					
	1524										B				B	B	B				B	B	B	B				
	1525															B	B					B	B	B				
2397	1521												B	B	B			B	B	B	B							
	1522													B	B	B			B	B	B	B						
	1523														B	B	B			B	B	B	B					
	1524															B	B				B	B	B	B				
	1525																B					B	B	B				
	1526																						B	B				
2398	1521																		B	B	B							
	1522																			B	B	B						
	1523																				B	B	B					
	1524																					B	B	B				
	1525																						B	B				
	1526																							B				
2435	1521																									B	B	B
	1522																										B	B
	1523																											B

Model 820 Upgrades

Model 820																								
To		2436					2437						2438							2457	2458			
From		1521	1522	1523	1524	1525	1521	1522	1523	1524	1525	1526	1521	1522	1523	1524	1525	1526	1527					
820																								
2395	1521	B	B	B	B		B	B	B	B														
	1522		B	B	B	B		B	B	B	B													
	1523			B	B	B			B	B	B	B												
	1524				B	B				B	B	B												
2396	1521						B	B	B	B			B	B	B	B								
	1522							B	B	B	B			B	B	B	B							
	1523								B	B	B	B			B	B	B	B						
	1524									B	B	B				B	B	B	B					
	1525										B	B					B	B	B					

Model 820 Upgrades

Model 820																						
To		2436					2437						2438							2457	2458
From		1521	1522	1523	1524	1525	1521	1522	1523	1524	1525	1526	1521	1522	1523	1524	1525	1526	1527		
2397	1521												B	B	B	B					
	1522													B	B	B	B				
	1523														B	B	B	B			
	1524															B	B	B	B		
	1525																B	B	B		
	1526																	B	B		
2425																				B	B
2426																				B	B
2427																					B
2435	1521	B	B	B	B		B	B	B	B			B	B	B	B					
	1522		B	B	B	B		B	B	B	B			B	B	B	B				
	1523			B	B	B			B	B	B	B			B	B	B	B			
	1524				B	B				B	B	B				B	B	B	B		
2436	1521		B	B	B	B	B	B	B	B			B	B	B	B					
	1522			B	B	B		B	B	B	B			B	B	B	B				
	1523				B	B			B	B	B	B			B	B	B	B			
	1524					B				B	B	B				B	B	B	B		
	1525										B	B					B	B	B		
2437	1521							B	B	B			B	B	B	B					
	1522								B	B	B			B	B	B	B				
	1523									B	B	B			B	B	B	B			
	1524										B	B				B	B	B	B		
	1525											B					B	B	B		
	1526																	B	B		
2438	1521													B	B	B					
	1522														B	B	B				
	1523															B	B	B			
	1524																B	B	B		
	1525																	B	B		
	1526																		B		
2456																				B	B
2457																					B

Upgrades to iSeries Model 830

Supported upgrades to the 830 servers from the 7xx servers are shown here. The chart represents upgrades announced as of 28 August 2001.

Upgrades to 830

Model 830																			
To		2400					2402						2403						
From		1531	1532	1533	1534	1535	1531	1532	1533	1534	1535	1536	1531	1532	1533	1534	1535	1536	1537
720																			
2061	1500	M	M	M			M	M	M				M	M	M				
	1501	M	M	M	M		M	M	M	M			M	M	M	M			
	1502	M	M	M	M	M	M	M	M	M	M		M	M	M	M	M		
2062	1500	M	M	M			M	M	M				M	M	M				
	1501	M	M	M	M		M	M	M	M			M	M	M	M			
	1502	M	M	M	M	M	M	M	M	M	M		M	M	M	M	M		
	1503		M	M	M	M		M	M	M	M	M		M	M	M	M	M	
2063	1500	M	M	M			M	M	M				M	M	M				
	1502	M	M	M	M	M	M	M	M	M	M		M	M	M	M	M		
	1503		M	M	M	M		M	M	M	M	M		M	M	M	M	M	
	1504			M	M	M			M	M	M	M			M	M	M	M	M
2064	1500						M	M	M				M	M	M				
	1502						M	M	M	M	M		M	M	M	M	M		
	1503							M	M	M	M	M		M	M	M	M	M	
	1504								M	M	M	M			M	M	M	M	M
	1505									M	M	M				M	M	M	M
730																			
2065	1506	M	M	M	M		M	M	M	M			M	M	M	M			
	1507	M	M	M	M	M	M	M	M	M	M		M	M	M	M	M		
	1508		M	M	M	M		M	M	M	M	M		M	M	M	M	M	
	1509			M	M	M			M	M	M	M			M	M	M	M	M
2066	1506	M	M	M	M		M	M	M	M			M	M	M	M			
	1507	M	M	M	M	M	M	M	M	M	M		M	M	M	M	M		
	1508		M	M	M	M		M	M	M	M	M		M	M	M	M	M	
	1509			M	M	M			M	M	M	M			M	M	M	M	M
	1510				M	M				M	M	M				M	M	M	M
2067	1506						M	M	M	M			M	M	M	M			
	1508							M	M	M	M	M		M	M	M	M	M	
	1509								M	M	M	M			M	M	M	M	M
	1510									M	M	M				M	M	M	M
	1511										M	M					M	M	M

Upgrades to 830

Model 830																			
To		2400					2402						2403						
From		1531	1532	1533	1534	1535	1531	1532	1533	1534	1535	1536	1531	1532	1533	1534	1535	1536	1537
2068	1506						M	M	M	M			M	M	M	M			
	1508							M	M	M	M	M		M	M	M	M	M	
	1509								M	M	M	M			M	M	M	M	M
	1510									M	M	M				M	M	M	M
	1511										M	M					M	M	M
740																			
2069	1510															M	M	M	M
	1511																M	M	M
	1512																	M	M
	1514												M	M	M	M	M		
2070	1510															M	M	M	M
	1511																M	M	M
	1512																	M	M
	1513																	M	M
	1514												M	M	M	M	M		

8xx Upgrades to 830

Supported model upgrades within the 8xx servers are identified here.

Model 830 Upgrades

Model 830																			
To		2400					2402						2403						
From		1531	1532	1533	1534	1535	1531	1532	1533	1534	1535	1536	1531	1532	1533	1534	1535	1536	1537
820																			
2395	1521	M	M	M			M	M	M										
	1522	M	M	M	M		M	M	M	M									
	1523		M	M	M	M		M	M	M	M								
	1524			M	M	M			M	M	M	M							
2396	1521	M	M	M			M	M	M				M	M	M				
	1522	M	M	M	M		M	M	M	M			M	M	M	M			
	1523		M	M	M	M		M	M	M	M			M	M	M	M		
	1524			M	M	M			M	M	M	M			M	M	M	M	
	1525				M	M				M	M	M				M	M	M	M

Model 830 Upgrades

Model 830																			
To		2400					2402						2403						
From		1531	1532	1533	1534	1535	1531	1532	1533	1534	1535	1536	1531	1532	1533	1534	1535	1536	1537
2397	1521						M	M	M				M	M	M				
	1522						M	M	M	M			M	M	M	M			
	1523							M	M	M	M			M	M	M	M		
	1524								M	M	M	M			M	M	M	M	
	1525									M	M	M				M	M	M	M
	1526										M	M					M	M	M
2398	1521												M	M	M				
	1522												M	M	M	M			
	1523													M	M	M	M		
	1524														M	M	M	M	
	1525															M	M	M	M
	1526																M	M	M
	1527																	M	M
2435	1521	M	M	M			M	M	M										
	1522	M	M	M	M		M	M	M	M									
	1523		M	M	M	M		M	M	M	M								
	1524			M	M	M			M	M	M	M							
2436	1521	M	M	M			M	M	M				M	M	M				
	1522	M	M	M	M		M	M	M	M			M	M	M	M			
	1523		M	M	M	M		M	M	M	M			M	M	M	M		
	1524			M	M	M			M	M	M	M			M	M	M	M	
	1525				M	M				M	M	M				M	M	M	M
2437	1521						M	M	M				M	M	M				
	1522						M	M	M	M			M	M	M	M			
	1523							M	M	M	M			M	M	M	M		
	1524								M	M	M	M			M	M	M	M	
	1525									M	M	M				M	M	M	M
	1526										M	M					M	M	M
2438	1521												M	M	M				
	1522												M	M	M	M			
	1523													M	M	M	M		
	1524														M	M	M	M	
	1525															M	M	M	M
	1526																M	M	M
	1527																	M	M

Model 830 Upgrades

Model 830																			
To		2400					2402						2403						
From		1531	1532	1533	1534	1535	1531	1532	1533	1534	1535	1536	1531	1532	1533	1534	1535	1536	1537
830																			
2400	1531		B	B	B		B	B	B	B			B	B	B	B			
	1532			B	B	B		B	B	B	B			B	B	B	B		
	1533				B	B			B	B	B	B			B	B	B	B	
	1534					B				B	B	B				B	B	B	B
	1535										B	B					B	B	B
2402	1531							B	B	B			B	B	B	B			
	1532								B	B	B			B	B	B	B		
	1533									B	B	B			B	B	B	B	
	1534										B	B				B	B	B	B
	1535											B					B	B	B
	1536																	B	B
2403	1531													B	B	B			
	1532														B	B	B		
	1533															B	B	B	
	1534																B	B	B
	1535																	B	B
	1536																		B

Upgrades to iSeries Model 840

Supported upgrades to the 840 servers from the 7xx servers are shown here. The chart represents upgrades announced as of 28 August 2001.

Model 840																													
To		2352							2353								2418							2420							
From		1540	1541	1542	1543	1544	1545	1546	1540	1541	1542	1543	1544	1545	1546	1547	1540	1541	1542	1543	1544	1545	1546	1540	1541	1542	1543	1544	1545	1546	1547
730																															
2065	1506																M	M	M					M	M	M					
	1507																M	M	M	M				M	M	M	M				
	1508																M	M	M	M	M			M	M	M	M	M			
	1509																	M	M	M	M	M			M	M	M	M	M		
2066	1506																M	M	M					M	M	M					
	1507																M	M	M	M				M	M	M	M				
	1508																M	M	M	M	M			M	M	M	M	M			
	1509																	M	M	M	M	M			M	M	M	M	M		
	1510																		M	M	M	M	M			M	M	M	M	M	M

Model 840																															
To		2352							2353								2418							2420							
From		1540	1541	1542	1543	1544	1545	1546	1540	1541	1542	1543	1544	1545	1546	1547	1540	1541	1542	1543	1544	1545	1546	1540	1541	1542	1543	1544	1545	1546	1547
2067	1506																M	M	M					M	M	M					
	1508																M	M	M	M	M			M	M	M	M	M			
	1509																	M	M	M	M	M			M	M	M	M	M			
	1510																		M	M	M	M	M			M	M	M	M	M	M	M
	1511																			M	M	M	M				M	M	M	M	M	M
2068	1506	M	M	M													M	M	M					M	M	M					
	1508	M	M	M	M	M											M	M	M	M	M			M	M	M	M	M			
	1509		M	M	M	M	M											M	M	M	M	M			M	M	M	M	M			
	1510			M	M	M	M	M											M	M	M	M	M			M	M	M	M	M	M	M
	1511				M	M	M	M												M	M	M	M				M	M	M	M	M	M
740																															
2069	1510			M	M	M	M	M											M	M	M	M	M			M	M	M	M	M	M
	1511				M	M	M	M												M	M	M	M				M	M	M	M	M	M
	1512					M	M	M													M	M	M					M	M	M	M	M
	1514	M	M	M	M												M	M	M	M				M	M	M	M				
2070	1510										M	M	M	M	M	M			M	M	M	M	M			M	M	M	M	M	M
	1511											M	M	M	M	M				M	M	M	M				M	M	M	M	M	M
	1512												M	M	M	M					M	M	M					M	M	M	M	M
	1513												M	M	M	M					M	M	M					M	M	M	M	M
	1514								M	M	M	M					M	M	M	M				M	M	M	M					

Model 840										
To		2461								
From		1540	1541	1542	1543	1544	1545	1546	1547	1548
730										
2068	1506	M	M	M						
	1508	M	M	M	M	M				
	1509		M	M	M	M	M			
	1510			M	M	M	M	M	M	
	1511				M	M	M	M	M	
740										
2069	1510			M	M	M	M	M	M	M
	1511				M	M	M	M	M	M
	1512					M	M	M	M	M
	1514	M	M	M	M					

Model 840										
To		2461								
From		1540	1541	1542	1543	1544	1545	1546	1547	1548
2070	1510			M	M	M	M	M	M	M
	1511				M	M	M	M	M	M
	1512					M	M	M	M	M
	1513					M	M	M	M	M
	1514	M	M	M	M					

Model 8xx Upgrades to 840

Supported model upgrades within the 8xx servers are identified here.

Model 840 Upgrades

Model 840																												
To		2352						2353								2354									2416					
From		1541	1542	1543	1544	1545	1546	1540	1541	1542	1543	1544	1545	1546	1547	1540	1541	1542	1543	1544	1545	1546	1547	1548	1541	1542	1543	1544	1545	1546
830																														
2403	1531							M	M	M						M	M	M												
	1532							M	M	M	M					M	M	M	M											
	1533								M	M	M	M					M	M	M	M										
	1534									M	M	M	M					M	M	M	M									
	1535										M	M	M	M					M	M	M	M								
	1536											M	M	M	M					M	M	M	M							
	1537												M	M	M						M	M	M	M						
840																														
2352	1540	B	B	B				B	B	B	B					B	B	B	B											
	1541		B	B	B				B	B	B	B					B	B	B	B										
	1542			B	B	B				B	B	B	B					B	B	B	B									
	1543				B	B	B				B	B	B	B	B				B	B	B	B	B	B						
	1544					B	B					B	B	B	B					B	B	B	B	B						
	1545						B						B	B	B						B	B	B	B						
	1546													B	B							B	B	B						
2353	1540								B	B	B					B	B	B	B											
	1541									B	B	B					B	B	B	B										
	1542										B	B	B					B	B	B	B									
	1543											B	B	B	B				B	B	B	B	B	B						
	1544												B	B	B					B	B	B	B	B						
	1545													B	B						B	B	B	B						
	1546														B							B	B	B						
	1547																						B	B						

Model 840 Upgrades

Model 840																													
To		2352						2353								2354									2416					
From		1541	1542	1543	1544	1545	1546	1540	1541	1542	1543	1544	1545	1546	1547	1540	1541	1542	1543	1544	1545	1546	1547	1548	1541	1542	1543	1544	1545	1546
2354	1540																B	B	B											
	1541																	B	B	B										
	1542																		B	B	B									
	1543																			B	B	B	B	B						
	1544																				B	B	B	B						
	1545																					B	B	B						
	1546																						B	B						
	1547																							B						
2416	1540							B	B	B	B					B	B	B	B						B	B	B			
	1541								B	B	B	B					B	B	B	B						B	B	B	B		
	1542									B	B	B	B					B	B	B	B						B	B	B	
	1543										B	B	B	B	B				B	B	B	B	B	B				B	B	B
	1544											B	B	B	B					B	B	B	B	B					B	B
	1545												B	B	B						B	B	B	B						B
	1546													B	B							B	B	B						
2417	1540															B	B	B	B											
	1541																B	B	B	B										
	1542																	B	B	B	B									
	1543																		B	B	B	B	B	B						
	1544																			B	B	B	B	B						
	1545																				B	B	B	B						
	1546																					B	B	B						
2418	1540							B	B	B	B					B	B	B	B											
	1541								B	B	B	B					B	B	B	B										
	1542									B	B	B	B					B	B	B	B									
	1543										B	B	B	B	B				B	B	B	B	B	B						
	1544											B	B	B	B					B	B	B	B	B						
	1545												B	B	B						B	B	B	B						
	1546													B	B							B	B	B						
2419	1540															B	B	B	B											
	1541																B	B	B	B										
	1542																	B	B	B	B									
	1543																		B	B	B	B	B	B						
	1544																			B	B	B	B	B						
	1545																				B	B	B	B						
	1546																					B	B	B						
	1547																						B	B						

Model 840 Upgrades

Model 840																														
To		2417							2418							2419								2420							
From		1540	1541	1542	1543	1544	1545	1546	1540	1541	1542	1543	1544	1545	1546	1540	1541	1542	1543	1544	1545	1546	1547	1540	1541	1542	1543	1544	1545	1546	1547
820																														
2397	1521								M	M														M	M					
	1522								M	M	M													M	M	M				
	1523								M	M	M	M												M	M	M	M				
	1524									M	M	M	M												M	M	M	M			
	1525										M	M	M	M												M	M	M	M		
	1526											M	M	M	M												M	M	M	M	M
2398	1521								M	M														M	M					
	1522								M	M	M													M	M	M				
	1523								M	M	M	M												M	M	M	M				
	1524									M	M	M	M												M	M	M	M			
	1525										M	M	M	M												M	M	M	M		
	1526											M	M	M	M												M	M	M	M	M
	1527												M	M	M													M	M	M	M
2436	1521								M	M																				
	1522								M	M	M																			
	1523								M	M	M	M																		
	1524									M	M	M	M																	
	1525										M	M	M	M																
2437	1521								M	M														M	M					
	1522								M	M	M													M	M	M				
	1523								M	M	M	M												M	M	M	M				
	1524									M	M	M	M												M	M	M	M			
	1525										M	M	M	M												M	M	M	M		
	1526											M	M	M	M												M	M	M	M	M
2438	1521								M	M														M	M					
	1522								M	M	M													M	M	M				
	1523								M	M	M	M												M	M	M	M				
	1524									M	M	M	M												M	M	M	M			
	1525										M	M	M	M												M	M	M	M		
	1526											M	M	M	M												M	M	M	M	M
	1527												M	M	M													M	M	M	M
830																														
2400	1531								M	M	M													M	M	M				
	1532								M	M	M	M												M	M	M	M				
	1533									M	M	M	M												M	M	M	M			
	1534										M	M	M	M												M	M	M	M		
	1535											M	M	M	M												M	M	M	M	M

Model 840 Upgrades

Model 840																													
To		2417							2418							2419								2420						
From		1540	1541	1542	1543	1544	1545	1546	1540	1541	1542	1543	1544	1545	1546	1540	1541	1542	1543	1544	1545	1546	1547	1540	1541	1542	1543	1544	1545	1546	1547
2402	1531								M	M	M													M	M	M					
	1532								M	M	M	M												M	M	M	M				
	1533									M	M	M	M												M	M	M	M			
	1534										M	M	M	M												M	M	M	M		
	1535											M	M	M	M												M	M	M	M	M
	1536												M	M	M													M	M	M	M
2403	1531								M	M	M													M	M	M					
	1532								M	M	M	M												M	M	M	M				
	1533									M	M	M	M												M	M	M	M			
	1534										M	M	M	M												M	M	M	M		
	1535											M	M	M	M												M	M	M	M	M
	1536												M	M	M													M	M	M	M
	1537													M	M														M	M	M
840																														
2416	1540	B	B	B	B											B	B	B	B					B	B	B	B				
	1541		B	B	B	B											B	B	B	B					B	B	B	B			
	1542			B	B	B	B											B	B	B	B					B	B	B	B		
	1543				B	B	B	B											B	B	B	B	B				B	B	B	B	B
	1544					B	B	B												B	B	B	B					B	B	B	B
	1545						B	B													B	B	B						B	B	B
	1546							B														B	B							B	B
2417	1540		B	B	B											B	B	B	B					B	B	B	B				
	1541			B	B	B											B	B	B	B					B	B	B	B			
	1542				B	B	B											B	B	B	B					B	B	B	B		
	1543					B	B	B											B	B	B	B	B				B	B	B	B	B
	1544						B	B												B	B	B	B					B	B	B	B
	1545							B													B	B	B						B	B	B
	1546																					B	B							B	B
2418	1540									B	B	B												B	B	B	B				
	1541										B	B	B												B	B	B	B			
	1542											B	B	B												B	B	B	B		
	1543												B	B	B												B	B	B	B	B
	1544													B	B													B	B	B	B
	1545														B														B	B	B
	1546																													B	B

Model 840 Upgrades

Model 840																															
To		2417							2418							2419								2420							
From		1540	1541	1542	1543	1544	1545	1546	1540	1541	1542	1543	1544	1545	1546	1540	1541	1542	1543	1544	1545	1546	1547	1540	1541	1542	1543	1544	1545	1546	1547
2419	1540																B	B	B												
	1541																	B	B	B											
	1542																		B	B	B										
	1543																			B	B	B	B								
	1544																				B	B	B								
	1545																					B	B								
	1546																						B								
2420	1540																								B	B	B				
	1541																									B	B	B			
	1542																										B	B	B		
	1543																											B	B	B	B
	1544																												B	B	B
	1545																													B	B
	1546																														B

Model 840 Upgrades

Model 840										
To		2461								
From		1540	1541	1542	1543	1544	1545	1546	1547	1548
820										
2398	1521	M	M							
	1522	M	M	M						
	1523	M	M	M	M					
	1524		M	M	M	M				
	1525			M	M	M	M			
	1526				M	M	M	M		
	1527					M	M	M	M	M
2438	1521	M	M							
	1522	M	M	M						
	1523	M	M	M	M					
	1524		M	M	M	M				
	1525			M	M	M	M			
	1526				M	M	M	M	M	
	1527					M	M	M	M	M

Model 840 Upgrades

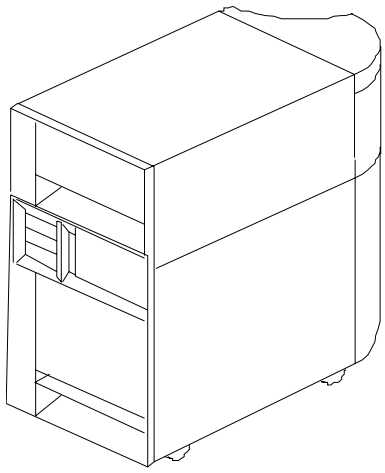
Model 840										
To		2461								
From		1540	1541	1542	1543	1544	1545	1546	1547	1548
830										
2402	1531	M	M	M						
	1532	M	M	M	M					
	1533		M	M	M	M				
	1534			M	M	M	M			
	1535				M	M	M	M	M	
	1536					M	M	M	M	M
2403	1531	M	M	M						
	1532	M	M	M	M					
	1533		M	M	M	M				
	1534			M	M	M	M			
	1535				M	M	M	M	M	
	1536					M	M	M	M	M
	1537						M	M	M	M
840										
2418	1540	B	B	B	B					
	1541		B	B	B	B				
	1542			B	B	B	B			
	1543				B	B	B	B	B	B
	1544					B	B	B	B	B
	1545						B	B	B	B
	1546							B	B	B
2420	1540	B	B	B	B					
	1541		B	B	B	B				
	1542			B	B	B	B			
	1543				B	B	B	B	B	B
	1544					B	B	B	B	B
	1545						B	B	B	B
	1546							B	B	B
	1547								B	B
2461	1540		B	B	B					
	1541			B	B	B				
	1542				B	B	B			
	1543					B	B	B	B	B
	1544						B	B	B	B
	1545							B	B	B
	1546								B	B
	1547									B

iSeries Server SB2

iSeries Server SB2

iSeries Model SB2

A minimum functional server consists of the base server unit and selected priced features. Included in the base server are the physical package and power elements, a DASD controller, an I/O controller, 12288 MB of Main Storage and a #9771 Base PCI 2-Line WAN with Modem as follows:



iSeries Model SB2 System Unit

- System Unit (CEC) and #9074 Base I/O Tower
- Line cord features
- Power
- Main Storage Expansion Card (Quantity two) (CCIN 2881)
- Main Storage

  48 Main Storage DIMMs, 256 MB DIMMs (128 Mb technology) (CCIN 300F) are shipped as “base” with each SB2
- #9752 Bus Expansion/Clock Card: Eight HSL Ports (CCIN 25AD)
- PCI and CSP Card (CCIN 28AA)
- Bus Adapter (CCIN 2681)
- Operator Panel (CCIN 247A)
- #9074 Base I/O Tower
- #9943 Base PCI IOP
  - Provides support for #9778 Base PCI RAID Disk Unit Controller

    Provides support for four Disk Units, the required CD-ROM/DVD-RAM, and a feature Internal Tape or a feature CD-ROM/DVD-RAM.
  - Provides support System Console/Communications Adapter
- #9771 Base PCI 2-Line WAN w/Modem

  Note: In countries where the #9771 is not homologated, the marketing configurator adds a #4745 PCI Two line WAN IOA, a #0032 modem feature, and a #0348 cable to the order. The #4745 is mandatory and cannot be removed from the system until the #9771 homologation is completed. The #0032 and #0348 features may be removed from the order/system at any time.

These features are required:

- Processor

  #2315 Model SB2 8-way Processor (iStar) (CCIN 2315)

- Integrated Disk Units

  Device Parity Protection: All (0041) is the default for disk data protection but may be removed from the order. Select four disk units. If four 17.54 GB disk units are selected, then RAID or mirroring must also be selected to meet the maximum logical DASD capacity limit.

  – #4317 - 8.58 GB 10k RPM Disk Unit
  – #4318 - 17.54 GB 10k RPM Disk Unit

- Integrated CD-ROM and DVD-RAM

  – #4425 - CD-ROM
  – #4430 - DVD-RAM

- System Console/Communications Adapter

  The console on LAN options require a dedicated LAN adapter. A #0367 Operations Console PCI Cable will also be added to the order by the marketing configurator.

  – #5540 System Console on twinaxial workstation controller

    #4746 PCI Twinaxial IOA

  – #5544 System Console on #9771 WAN Adapter

    #0367 Operations Console PCI Cable

  – #5546 System Console on 100 Mbps Token Ring

    - #2744 PCI 100 Mbps Token-Ring IOA (Console)
    - #0367 Operations Console PCI Cable

  – #5548 System Console on 100 Mbps Ethernet

    - #4838 PCI 100/10 Mbps Ethernet IOA (Console)
    - #0367 Operations Console PCI Cable

The server SB2 is a Customer Setup system. Refer to “Customer Install Features (CIF)” on page 417.

Card Technology

The new hardware completes the transition to PCI I/O architecture with the introduction of PCI architecture in all the 8xx systems. This I/O structure enables customer setup of selected features on the SB2. It also enables Hot Plug PCI for adding and replacing hardware without taking the server down.

With the implementation of new PCI technologies in the iSeries SB2 comes the requirement for a better understanding of the configuration rules associated with the various I/O features of the system. Previous AS/400e models required input/output processors (IOPs) to be in specific slots in the system and expansion towers. If high performance in particular areas was required, a single input/output adapter (IOA) may have been assigned to a single IOP. This resulted in unassigned slots in the tower, wasting valuable slots. The new PCI I/O architecture provides more flexibility in the placement of IOPs and IOAs. This results in more efficient use of card slots, potentially resulting in a lower cost of implementation. Increased flexibility of configuration also adds a degree of complexity to the configuration process.

These functions do not have equivalent function PCI cards for the Model SB2:

- ASCII Adapter
- V.25 Autocall cable
- Select standby mode

PCI adapters also do not support X.21 switched WAN dial-up or Shorthold Mode WAN.

The fundamental bus architecture of the iSeries and AS/400e servers is unchanged when using PCI adapters. The system IOP continues to off load the main processor; isolate the host from adapter and network errors; and manage, configure, and service the adapters. PCI architecture offers advantages in flexibility over non-AS/400e server structures.

Processor Feature

#2315 Model SB2 Processor (iStar 8-way)

- Processor Capacity Card (CCIN 2315)
- Processor 0 (CCIN 245D)
- Processor 1 (CCIN 245D)

Main Storage

All main storage on the Model SB2 is base main storage. The system includes two base Main Storage Expansion Cards (CCIN 2881) and 48 256 MB Main Storage DIMMs (CCIN 300F).

Power and Packaging

The Model SB2 includes an internal battery that is automatically activated in the event of utility power loss. The battery provides full operating power for a short time to all components within the system unit, but not to any external components. This can allow the system to run uninterrupted for a short time (30 seconds or less). For longer power outages, the system will use the battery to attempt an orderly shutdown to avoid losing data in main storage that is not written to disk. An external UPS is recommended to protect the system unit and any external

components against utility power outages. Continuously Powered Mainstore (CPM) is not supported on the Model SB2. An external UPS can allow the system to run uninterrupted for longer than thirty seconds when utility power is lost. It can also maintain power long enough to ensure that the system successfully completes a shutdown to avoid losing data.

System Power

- Processor Enclosure
  - Power Supply (1100 Watt) (CCIN 515B)(Quantity two)
  - Regulator (CCIN 278B)
- Base I/O Tower (#9074)
  - Power Supply (765 Watt) (CCIN 515A) (Quantity two)
  - AC Input/Charger
  - Batteries (Quantity four)
- Dual Line Cord - 830 CEC (#5103)
  - Provides dual line cord capability for the Model SB2 system unit and attached #9074 base I/O tower.
  - Two #14XX line cords are required on the Model SB2 when this feature is ordered initially or as an upgrade to a Model SB2. When ordering #5103 alone as an MES, an additional 14XX line cord is required, for a total of two line cords for the system unit.
  - OS/400 V5R1 and supporting PTFs are required. Refer to Informational APAR II12950 at: `http://as400service.rochester.ibm.com/supporthome.nsf/document/10000035`
  - e-configurator users can refer to this Web site for ordering information: `http://w3-1.ibm.com/sales/systems/ibmsm.nsf/MainFrameset?OpenForm&cdoc=idlcinstall`

#9074 Base I/O Enclosure

The #9074 is the base I/O tower shipped on Model SB2. The #9074 supports up to four disk units, up to 11 PCI IOAs and up to two removable media units.

One internal HSL cable is included as base. Optionally, one of these HSL cables may be selected:

- #1460 - 3m Copper HSL cable
- #1461 - 6m Copper HSL cable
- #1462 - 15m Copper HSL cable

The #9074 has a #9943 Base PCI IOP and a #9778 PCI RAID Disk Unit Controller. It also has PCI slots for up to 11 PCI IOAs, space for four disk units, space for two removable media devices, one battery backup, and redundant/hot swap power supplies.

The #9074 is capable of controlling Ultra2 SCSI disk units.

The 11 PCI IOAs are supported (driven) by the base #9943 PCI IOP and by feature #2843 PCI IOPs or feature #2791 Integrated xSeries Servers.

The #9074 also supports up to two removable media devices (internal tape or CD-ROM/DVD-RAM), which are supported by the #9778.

The Model SB2 is based on the Model 830. For system diagrams, see “iSeries Model 830” on page 159.

I/O Processor and I/O Adapter Support

This section lists the supported IOPs and IOAs. See “I/O Processor” on page 271 and “I/O Adapters and Controllers” on page 283 for full descriptions.

Note

PCI configuration rules for V5R1 hardware are quite flexible. See the “PCI Card Placement Rules” chapter of the *iSeries and AS/400e System Builder*, SG24-2155, for rules for placing PCI card in configurations.

LAN/WAN/Workstation IOAs

- #2743 PCI 1 Gbps Ethernet IOA
- #2744 PCI 100 Mbps Token Ring IOA
- #2760 PCI 1Gbps Ethernet UTP IOA
- #2772 Dual WAN/Modem IOA
- #2773 Dual WAN/Modem IOA
- #2723 PCI 10 Mbps Ethernet IOA
- #2817 PCI 155 Mbps MMF ATM IOA
- #4745 PCI Two Line WAN IOA
- #4746 PCI Twinaxial IOA
- #4750 PCI ISDN BRI U IOA
- #4751 PCI ISDN BRI S/T IOA
- #4761 PCI Integrated Analog Modem
- #4801 PCI Cryptographic Coprocessor
- #4815 PCI 155 Mbps UTP OC3 ATM IOA
- #4816 PCI 155 Mbps MMF ATM IOA
- #4818 PCI 155 Mbps SMF ATM IOA
- #4838 PCI 100/10 Mbps Ethernet IOA
- #9771 Base PCI 2-Line WAN with Modem

Internal Disk Unit Controllers

- #9778 Base PCI RAID Disk Unit Controller

Magnetic Media Controllers

- #2749 PCI Ultra Magnetic Media Controller
- #2765 PCI Fibre Channel Tape Controller
- #2768 PCI Magnetic Media Controller

I/O Processors

- #2843 PCI IOP (64 MB)
- #2790 Integrated Netfinity Server
- #2791 PCI Integrated xSeries Server
- #9943 Base PCI IOP

Internal Disk, Tape, CD-ROM, and DVD-RAM Support

This section lists the supported internal disks, tape drives, CD-ROMs, and DVD-RAMs. See “PCI Disk Units” on page 315 and “Internal Tape, CD-ROM, and DVD-RAM” on page 327 for full descriptions.

Internal Disk Units

- #4317 8.58 GB 10k RPM Disk Unit
- #4318 17.54 GB 10k RPM Disk Unit
- #4331 1.6 GB Read Cache Device

Internal Tape, CD-ROM, and DVD-RAM

- #4425 CD-ROM
- #4430 DVD-RAM
- #4482 4 GB ¼-inch Cartridge Tape
- #4483 16 GB ¼-inch Cartridge Tape
- #4486 25 GB ¼-inch Cartridge Tape
- #4487 50 GB ¼-inch Cartridge Tape

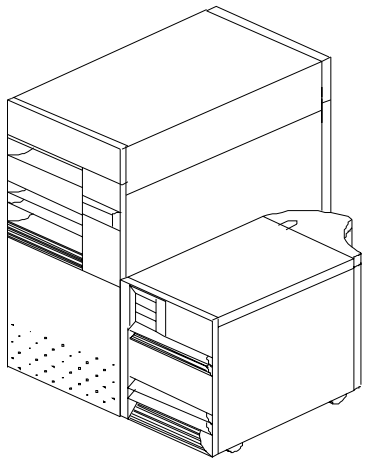
External Towers

The #5077 Migration Tower II attaches to the Model SB2 via HSL (High Speed Link). See “Expansion Towers” on page 237 for full descriptions.

iSeries Server SB3

iSeries Server SB3

iSeries Model SB3



iSeries Model SB3 System Unit

A minimum functional server consists of the base server unit and selected priced features. The Model SB3 supports Hot Plug/Concurrent Add of PCI cards, disk units, and removable media devices. Included in the base server are the physical package and power elements, a DASD controller, an I/O controller, 16384 MB or 24576 MB of main storage, and a #9771 Base PCI 2-Line WAN with Modem as follows:

- System Unit (CEC) and #9079 Base I/O Tower
- Line cord Features (one for the system unit and one for the #9079)
- Clock Card (CCIN 25AA)
- Clock Daughter Card (CCIN 25AF)
- Terminator/Filler Card (CCIN 246C) (2X)—12 way only (processor #2316)
- Power
- Main Storage
  - Main storage cards (CCIN 319A) are shipped as base with each SB3 (CCIN 319A is 128 Mb technology).
  - The number of main storage cards shipped is determined by the processor selected.
  - Processor #2316

    8X 2048 MB Main Storage Cards (CCIN 319A) installed (16384 MB total)
  - Processor #2318

    12X 2048 MB Main Storage Cards (CCIN 319A1) installed (24576 MB total)
- #9755 Bus Expansion/Clock Card—16 HSL Ports (CCIN 25AD)
- PCI and CSP Card (CCIN 28AA)
- Bus Adapter (CCIN 2681)
- Operator Panel (CCIN 247A)
- #9943 Base PCI IOP
  - Provides support for #9778 Base PCI RAID Disk Unit Controller

    Provides support for eight disk units, the required CD-ROM/DVD-RAM, and a feature internal tape or a feature CD-ROM/DVD-RAM.

  - Provides support for base Console/Workstation IOA

    The configurator determines which feature combinations will be on the order based on the System Console specify – #5540, #5544, #5546, or #5548.

- #9771 Base PCI 2-Line WAN w/Modem

Note: In countries where the #9771 is not homologated, the marketing configurator adds a #4745 PCI Two line WAN IOA, a #0032 modem feature, and a #0348 cable to the order. The #4745 is mandatory and cannot be removed from the system until the #9771 homologation is completed. The #0032 and #0348 features may be removed from the order or system at any time.

These features are required:

- Processor (one must be specified)
  - #2316 12-way processor (iStar) (10000 CPW)
  - #2318 24-way processor (iStar) (16500 CPW)
- Integrated Disk Units

  Device Parity Protection: All (0041) is the default for disk data protection but may be removed. With processor #2316, a minimum of four and a maximum of six disk units must be on the order. If six of the 17.54 GB disk units are on the order, RAID or mirroring is required to meet the maximum logical disk unit capacity limit. With processor #2318, order a minimum of four and a maximum of eight of the following disk units. If eight 17.54 GB disk units are on the order, RAID or mirroring is required to meet the maximum logical disk unit capacity limit.
  - #4317 - 8.58 GB 10k RPM Disk Unit
  - #4318 - 17.54 GB 10k RPM Disk Unit
- Integrated CD-ROM and DVD-RAM
  - #4425 - CD-ROM
  - #4430 - DVD-RAM
- System Console/Communications Adapter

  The console on LAN options require a dedicated LAN adapter. A #0367 Operations Console PCI Cable will also be added to the order by the marketing configurator.
  - #5540 System Console on twinaxial workstation controller

    #4746 PCI Twinaxial IOA
  - #5544 System Console on #9771 WAN Adapter

    #0367 Operations Console PCI Cable
  - #5546 System Console on 100 Mbps Token Ring

    #2744 PCI 100Mbps Token-Ring IOA (Console)

  - #5548 System Console on 100 Mbps Ethernet

    #4838 PCI 100/10Mbps Ethernet IOA (Console)

- Uninterruptable Power Supply

  The Model SB3 includes an internal battery that is automatically activated in the event of utility power loss. The battery provides full operating power for a short time to all components within the system unit, but not to any external components. This can allow the system to run uninterrupted for a short time (30 seconds or less). For longer power outages, the system uses the battery to attempt an orderly shutdown to avoid losing data in main storage that is not written to disk. An external UPS is recommended to protect the system unit and any external components against utility power outages. Continuously Powered Mainstore (CPM) is not supported on the Model SB3. An external UPS can allow the system to run uninterrupted for longer than thirty seconds when utility power is lost. It can also maintain power long enough to ensure that the system successfully completes a shutdown to avoid losing data.

The SB3 server is a Customer Setup system. Refer to “Customer Install Features (CIF)” on page 417 for more information.

Card Technology

The new hardware completes the transition to PCI I/O architecture with the introduction of PCI architecture in all the 8xx servers. This I/O structure enables customer setup of the Model 820 and selected features on all models. It also enables Hot Plug PCI for adding and replacing hardware without taking the server down.

With the implementation of new PCI technologies in the iSeries Model SB3 comes the requirement for a better understanding of the configuration rules associated with the various I/O features of the iSeries server. Previous AS/400e models required input/output processors (IOPs) to be in specific slots in the system and expansion towers. If high performance in particular areas was required, a single input/output adapter (IOA) may have been assigned to a single IOP. This resulted in unassigned slots in the tower, wasting valuable slots. The Model SB3 provides more flexibility in the placement of IOPs and IOAs. This results in more efficient use of card slots, potentially resulting in a lower cost of implementation. Increased flexibility of configuration also adds a degree of complexity to the configuration process.

These functions do not have equivalent function PCI cards for the Model SB3:

- ASCII Adapter
- V.25 Autocall cable
- Select standby mode

PCI adapters also do not support X.21 switched WAN dial-up or Shorthold Mode WAN.

The fundamental bus architecture of the iSeries server is unchanged when you use PCI adapters. The AS/400 IOP continues to off load the main processor; isolate the host from adapter and network errors; and manage, configure, and service the adapters. PCI architecture offers advantages in flexibility over non-AS/400e server structures.

Processor Features

- #2316 Model SB3 Processor (iStar 12-way)
  - Processor Capacity Card (CCIN 2316)
  - Processor 0 (CCIN 245F)
  - Processor 1 (CCIN 245E)
- #2318 Model SB3 Processor (iStar 24-way)
  - Processor Capacity Card (CCIN 2318)
  - Processor 0 (CCIN 245F)
  - Processor 1 (CCIN 245E)
  - Processor 2 (CCIN 245E)
  - Processor 3 (CCIN 245E)

Main Storage

All main storage on the Model SB3 is base. The amount of main storage is determined by the processor option.

Power and Packaging

The Model SB3 includes an internal battery that is automatically activated in the event of utility power loss. The battery provides full operating power for a short time to all components within the system unit, but not to any external components. This can allow the system to run uninterrupted for a short time (30 seconds or less). For longer power outages, the system will use the battery to attempt an orderly shutdown to avoid losing data in main storage that is not written to disk. An external UPS is recommended to protect the system unit and any external components against utility power outages. Continuously Powered Mainstore (CPM) is not supported on the Model SB3. An external UPS can allow the system to run uninterrupted for longer than thirty seconds when utility power is lost. It can also maintain power long enough to ensure that the system successfully completes a shutdown to avoid losing data.

System Power

- Processor side, 12 Way
  - Bulks (1000 watt) (CCIN 5154) (Quantity four)
  - Programmable Regulators (CCIN 2730) (Quantity eight)

  - Memory Control Regulator (CCIN 2716)
  - Processor Regulators (CCIN 2714) (Quantity two)
  - Charger
  - Battery Pack
  - SPCN Card (CCIN 285E)
  - AC Power Supply Country Specific Usage
- Processor side, 24 Way
  - Bulks (1000 watt) (CCIN 5154) (Quantity five)
  - Programmable Regulators (CCIN 2730) (Quantity nine)
  - Memory Control Regulator (CCIN 2716)
  - Processor Regulators (CCIN 2714) (Quantity two)
  - Charger
  - Battery Pack
  - SPCN Card (CCIN 285E)
  - AC Power Supply Country Specific Usage
- Base I/O Tower (#9079)
  - Bulks (765 Watt) (CCIN 515A) (Quantity two)
  - Batteries (Quantity four)
  - AC Input/Charger
- Dual Line Cord - SB3 CEC (#5104)
  - Provides dual line cord capability for the Model SB3 system unit and #9079 base I/O tower.
  - Two #14XX line cords are required on the Model SB3 and the #9079 when this feature is ordered initially. When ordering #5104 alone as an MES, an additional 14XX line cord is required for the system unit, and for the #9079, for a total of two line cords on both the system unit and the #9079.
  - OS/400 V5R1 and supporting PTFs are required. Refer to Informational APAR II12950 at: `http://as400service.rochester.ibm.com/supporthome.nsf/document/10000035`
  - e-configurator users can refer to this Web site for ordering information: `http://w3-1.ibm.com/sales/systems/ibmsm.nsf/MainFrameset?OpenForm&cdoc=idlcinstall`

#9079 Base I/O Tower

The #9079 is the base I/O tower shipped on the Model SB3. The #9079 supports up to eight disk units, up to 11 PCI IOAs, and up to two removable media units.

Select two (any combination) of these HSL cables:

- #1460 - 3m Copper HSL cable
- #1461 - 6m Copper HSL cable
- #1462 - 15m Copper HSL cable

Select one of these SPCN cables per tower:

- #1463 - 2m SPCN cable
- #1464 - 6m SPCN cable
- #1465 - 15m SPCN cable
- #1466 - 30m SPCN cable

Specify one line cord for the #9079 Base I/O Tower.

The #9079 has a #9943 Base PCI IOP and a #9778 PCI RAID Disk Unit Controller. It also has PCI slots for up 11 PCI IOAs, space for up to 15 disk units (up to eight disks for the SB3), space for two removable media devices, one battery backup, and redundant/hot swap power supplies.

The #9079 is capable of controlling Ultra2 SCSI disk units.

The 11 PCI IOAs are supported (driven) by the base #9943 PCI IOP and by feature #2843 PCI IOPs or feature #2791 Integrated xSeries Servers.

The mounting for the eight disk units is included in the #9079 (base).

The #9079 also supports up to two removable media devices (internal tape or CD-ROM/DVD-RAM). These removable media devices are supported by the #9778.

#5150 Battery Backup (external)

The #5150 is an external battery backup. When used in conjunction with the internal battery backup, the #5150 can extend the battery backup time on Models 840 and SB3. The Model SB3 is based on the Model 840. For system diagrams, see “Power and Packaging” on page 183.

I/O Processor and I/O Adapter Support

This section lists the supported IOPs and IOAs. See “I/O Processor” on page 271 and “I/O Adapters and Controllers” on page 283 for full descriptions.

Note

PCI configuration rules for V5R1 hardware are quite flexible. See the PCI Card Placement Rules chapter of the *iSeries and AS/400e System Builder*, SG24-2155, for rules for placing PCI card in configurations.

LAN/WAN/Workstation IOAs

- #2743 PCI 1 Gbps Ethernet IOA
- #2744 PCI 100 Mbps Token Ring IOA
- #2760 PCI 1Gbps Ethernet UTP IOA
- #2772 Dual WAN/Modem IOA
- #2773 Dual WAN/Modem IOA
- #2817 PCI 155 Mbps MMF ATM IOA
- #4723 PCI 10 Mbps Ethernet IOA
- #4745 PCI Two Line WAN IOA
- #4746 PCI Twinaxial IOA
- #4750 PCI ISDN BRI U IOA
- #4751 PCI ISDN BRI S/T IOA
- #4761 PCI Integrated Analog Modem
- #4801 PCI Cryptographic Coprocessor
- #4815 PCI 155 Mbps UTP OC3 ATM IOA
- #4816 PCI 155 Mbps MMF ATM IOA
- #4818 PCI 155 Mbps SMF ATM IOA
- #4838 PCI 100/10 Mbps Ethernet IOA
- #9771 Base PCI 2-Line WAN with Modem

Internal Disk Unit Controllers

- #9778 Base PCI RAID Disk Unit Controller
- #9767 Base PCI Disk Unit Controller

Magnetic Media Controllers

- #2749 PCI Ultra Magnetic Media Controller
- #2765 PCI Fibre Channel Tape Controller
- #2768 PCI Magnetic Media Controller

I/O Processors

- #2843 PCI IOP (64 MB)
- #2791 Integrated Netfinity Server
- #2791 PCI Integrated xSeries Server
- #9843 Base PCI IOP

Internal Disk, Tape, CD-ROM, and DVD-RAM Support

This section lists the supported internal disks, tape drives, CD-ROMs, and DVD-RAMs. See “PCI Disk Units” on page 315 and “Internal Tape, CD-ROM, and DVD-RAM” on page 327 for full descriptions.

Internal Disk Units

- #4317 8.58 GB 10k RPM Disk Unit
- #4318 17.54 GB 10k RPM Disk Unit
- #4331 1.6 GB Read Cache Device

Internal Tape, CD-ROM, and DVD-RAM

- #4425 CD-ROM
- #4430 DVD-RAM
- #4482 4 GB ¼-inch Cartridge Tape
- #4483 16 GB ¼-inch Cartridge Tape
- #4486 25 GB ¼-inch Cartridge Tape
- #4487 50 GB ¼-inch Cartridge Tape

External Towers

The #5077 Migration Tower II attaches to the Model SB3 via HSL (High Speed Link). See “Expansion Towers” on page 237 for full a description.

HSL and Towers

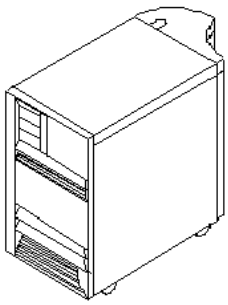
HSL and Towers

Towers and Racks

To house components beyond the capability of the system unit, towers are added. Expansion and migration towers are offered for new or migrated features respectively. Rack mounting options are available for select systems and towers. Towers and rack mounted devices are connected to each other using High Speed Loops (HSL).

Expansion Towers

Expansion Towers provide the iSeries servers with the ability to support additional I/O and Disk Units. The entry iSeries server, the Model 270, supports a single tower while the Model 840 supports up to 23 towers. For information on the number and types of towers supported by each iSeries server, see “iSeries and AS/400e Servers” on page 65.



#5074 PCI Expansion Tower

#5074 PCI Expansion Tower

The #5074 is attached to Models 820, 830, and 840 for adding up to 45 disk units, up to 11 PCI IOA, and up to two removable media units. The #5074 includes the #9691 bus adapter or the #9739 optical bus adapter to provide the HSL interface to the system. The configurator adds the #9691 to the order. The #5074 contains two buses.

Marketing configurators specify the #5074 over the #5075 and the #5079 when a PCI Expansion Tower is required.

Select any two HSL cable features for the first or only tower of an HSL loop. For additional towers on the HSL loop, select one HSL cable per tower.

A list of the supported HSL cables is shown in a table on page 265

Note: The #1462 15m HSL cable can only be used on HSL port A1 of the Model 820 to directly connect a #5033, #5034, or #5035 Migration Tower I.

Select one of these SPCN cables per tower:

- #1463 - 2m SPCN cable
- #1464 - 6m SPCN cable
- #1465 - 15m SPCN cable
- #1466 - 30m SPCN cable
- #0369 - 100m Optical SPCN cable
- #1468 - 250m Optical SPCN cable

The #5074 has a #9943 Base PCI IOP. It also has PCI slots for up to 11 PCI IOAs, space for up to 45 disk units (15 are “base”, 30 additional with #5101), space for two removable media devices, one battery backup, and redundant/hot swap power supplies.

The #5074 can contain Ultra2 SCSI disk units that are controlled by a #4748/#4778 PCI RAID Disk Unit Controller.

The #5074 PCI Expansion Tower supports four 32-bit and seven 32/64-bit PCI slots.

On new orders, select one line cord with each #5074 PCI Expansion Tower.

The 11 PCI IOAs are supported (driven) by feature #2843 PCI IOP or IOPs, #9943 Base PCI IOP, #2790 Integrated Netfinity Servers or #2791 Integrated xSeries Servers.

The mounting for the first 15 disk units is included in the #5074 (base). The mounting for the next 30 disk units is optional by ordering a 30 Disk Expansion, feature code #5101.

The #5074 also supports up to two removable media devices (internal tape, CD-ROM, or DVD-RAM). These removable media devices are supported by the same #4748/#4778 PCI RAID Disk Unit Controller, which supports the first set of 15 disk units.

#5105 Dual Line Cord: I/O Tower

The #5105 provides dual line cord capability for the #5074 PCI Expansion Tower and for the top unit in a #8079 Optional Base Tower. Two 14XX line cords are required for each #5074 tower with a #5101 when a #5105 is on an initial order for a #5074. When ordering a #5105 alone as an MES for a #5074, an additional 14XX line cord is required, for a total of two line cords on the #5074.

Prerequisite: If the #5074 has feature #5101 (30-Disk Expansion Feature) installed, the #5101 must be converted to a #5111.

OS/400 V5R1 and supporting are required. Refer to Informational APAR II12950 at:
`http://as400service.rochester.ibm.com/supporthome.nsf/document/10000035`

e-configurator users can refer to this Web site for ordering information:
`http://w3-1.ibm.com/sales/systems/ibmsm.nsf/MainFrameset?OpenForm&cdoc=idlcinstall`

#5101 30-Disk Expansion Feature

The #5101 is a disk unit expansion enclosure feature for the #5074 Expansion Tower, the #9074 Base I/O Enclosure, and the #9079 Base I/O Tower. The #5101 includes two 15 disk unit enclosures, one 765-watt power supply, backplanes, and cables. One #4748/#4778 PCI RAID Disk Unit Controller is required to support the 15 disk units in each of the two disk unit enclosures included with #5101. Two #4748/#4778 PCI RAID Disk Unit Controllers are required to support 30 disk units.

#5111 30-Disk Expansion With Dual Line Cord Feature

The #5111 is a disk unit expansion enclosure for systems and towers that are dual line cord enabled. It includes two 15 disk unit enclosures, backplanes, and cables. Two #4748/#4778 PCI RAID Disk Unit Controllers are required to support 30 disk units.

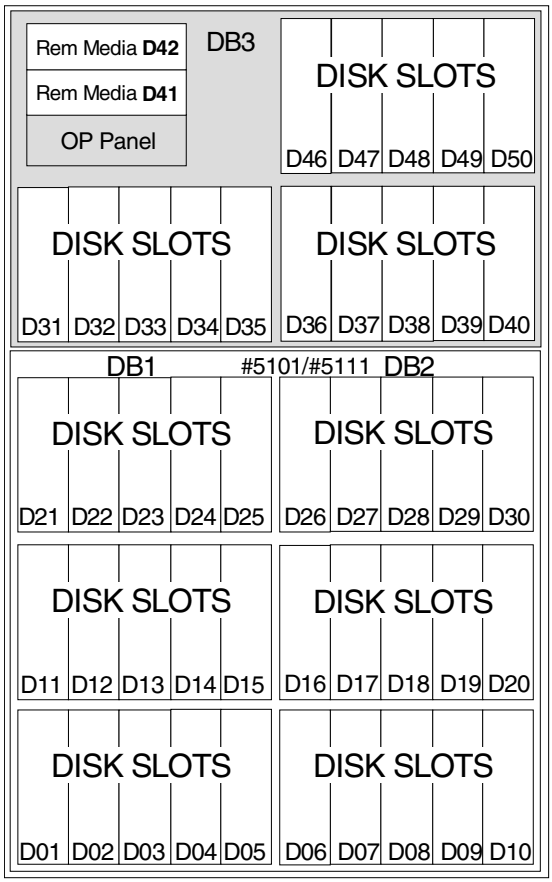
Prerequisites:

- #5103 when ordered for a Model 830 system unit
- #5104 when ordered for a Model 840 system unit
- #5105 when ordered for a stand alone #5074 I/O Tower or the top unit in a #8079
- #5106 for the unit in a #5079 where this expansion enclosure will be installed

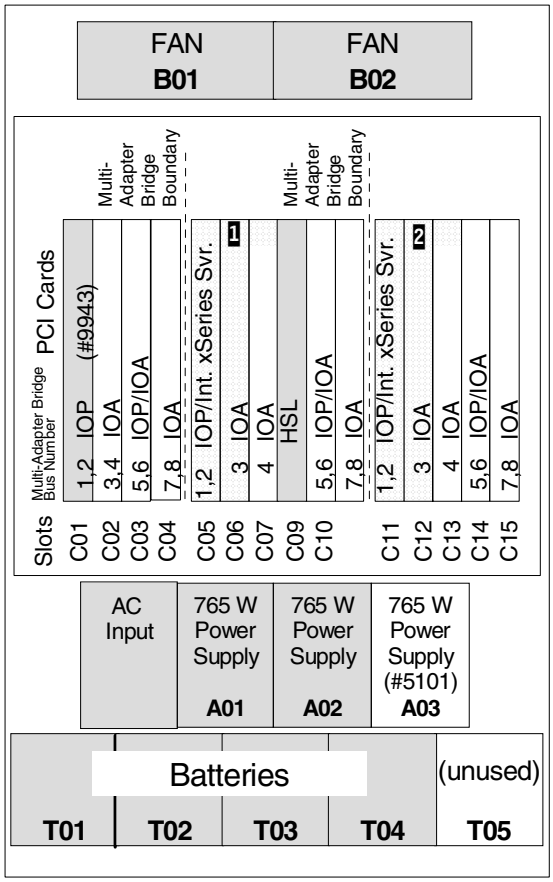
OS/400 V5R1 and supporting PTFs are required. Refer to Informational APAR II12950 at:
`http://as400service.rochester.ibm.com/supporthome.nsf/document/10000035`

#5074 PCI Expansion Tower

Note: Total number of disk bays is 45.



Front



Back

Legend

Base Feature

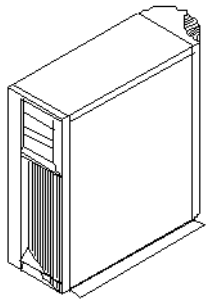
Required Feature

Unavailable if Integrated xSeries Server is installed

Note 1: If C05 has an Integrated xSeries Server, slot C06 is unavailable, and slot C07 is available only as a short slot.

Note 2: If C11 has an Integrated xSeries Server, slot C12 is not available, and slot C13 is available only as a short slot.

#5075 PCI Expansion Tower



#5075 PCI Expansion Tower

The #5075 is attached to Models 270 and 820 for adding up to six disk units and up to seven PCI IOAs. The #5075 has a 32 MB PCI IOP (CCIN 284B) embedded on the backplane and feature #2842 (when attached to a Model 270), or the #2843 (when attached to a Model 820) PCI IOPs may be added. A #4748/#4778 PCI RAID Disk Unit Controller, a #2763 PCI RAID Disk Unit Controller, or a #9767 Base PCI Disk Unit Controller may be installed in PCI slot C01 to control the disk units. The #9767 supports up to four disk units when installed in the #5075. The #5075 contains two buses.

For Model 270 and 820, select any two of the supported High Speed Link (HSL) cables. A list of the supported HSL cables is shown in a table on page 265.

Select one of these SPCN cables (for 270 or 820):

- #1463 - 2m SPCN cable
- #1464 - 6m SPCN cable
- #1465 - 15m SPCN cable

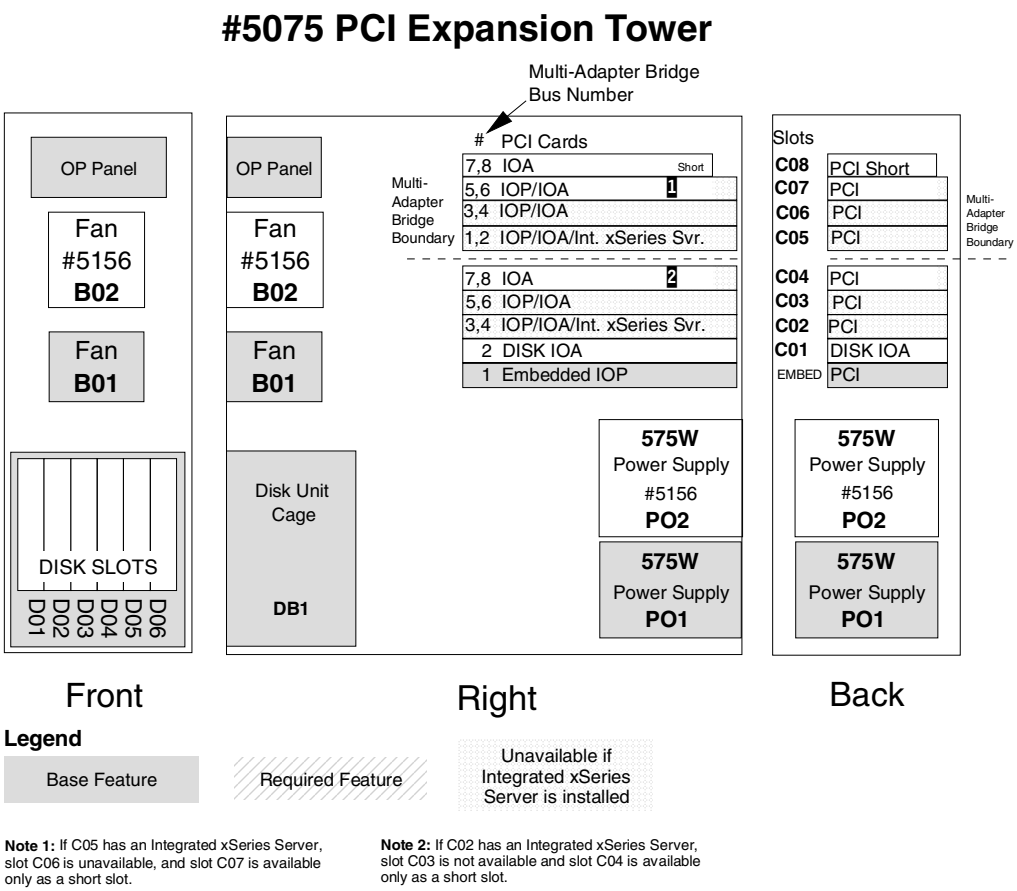
The #5075 is capable of controlling Ultra2 SCSI disk units, and a maximum of one disk unit controller is allowed within a #5075.

On new orders, specify one line cord with each #5075 PCI Expansion Tower. Marketing configurators default to the line cord type of the system, if the system unit line cord type is not the #1413.

When the #5075 is attached to the Model 270, the seven PCI IOAs are supported (driven) by an embedded 32 MB PCI IOP and by feature #2842 PCI IOPs or feature #2890 Integrated Netfinity Servers.

When the #5075 is attached to the Model 820, the seven PCI IOAs are supported (driven) by an embedded 32 MB PCI IOP and by feature #2843 PCI IOPs or feature #2790 Integrated Netfinity Servers.

The #5075 PCI Expansion Tower is not supported on Model 830 systems. When performing a Model 820 to Model 830 upgrade, any #5075 features installed on the Model 820 are not migrated.



Note 1: If C05 has an Integrated xSeries Server, slot C06 is unavailable, and slot C07 is available only as a short slot.

Note 2: If C02 has an Integrated xSeries Server, slot C03 is not available and slot C04 is available only as a short slot.

#7002 HSL Enabler

The #7002 is a feature High Speed Link (HSL) internal flex cable, which enables connection to a #5075 PCI Expansion Tower. It can be ordered only on the Model 270 with processor #2248, #2250, #2422 and #2431.

This cable connects the processor using a right angle bus connector to the back of the machine. Two HSL cables (#14XX) are required to connect the system unit to the expansion tower.

On processor upgrades from #2248, #2250, #2422, or #2431 to other processor features, marketing configurators RPO remove the #7002 to remove this feature from the inventory records.

#5156 Redundant Power and Cooling

The #5156 adds an additional 575-watt power supply for redundancy and an additional cooling fan to the #5075 PCI Expansion Tower, which attaches to Models 270 and 820.

Marketing configurators default, on a Model 820, to a #5156 for any added #5075 when the system unit contains a #5155. If a #5155 (575-watt power supply) is ordered as an MES to an existing Model 820, default one #5156 for each #5075 present or ordered. The #5156s are not mandatory and can be removed from an order.

#5078 PCI Expansion Unit

The #5078 is a “top hat” that installs on the top of the #9079 Base I/O Tower (Model 840 only) or #5074 PCI Expansion Tower and allows PCI IOAs to be installed. The #5078 may be ordered with a #5074/#9079 or added at a later time. If the #5078 is ordered with the #5074/#9079, the #5074/#5079 ships with the #5078 installed.

The #5078 includes the #9691 bus adapter or the #9739 optical bus adapter to provide the HSL interface to the system. The configurator adds the #9691 to the order automatically.

The #5078 contains two buses. PCI cards are supported using the same rules as the #5074/#9079. Internal Disk and removable media devices are not supported in the #5078.

The #5078 may be on the same HSL loop as the #5074/#9079 it is mounted on, or it may be on a separate HSL Loop.

Select any two of the supported HSL cable features for the first or only tower of an HSL loop. For additional towers on the HSL loop, select one HSL cable per tower.

A list of the supported HSL cables is shown in a table on page 265.

When the #5078 is on the same HSL loop as the #5074/#9079 on which it is mounted, the #1461 3m Copper HSL cable is sufficient.

Note: The #1462 15m HSL cable can only be used on HSL port A1 of the Model 820 to directly connect a #5033, #5034, or #5035 Migration Tower I.

Select one of these SPCN cables per tower:

- #1463 - 2m SPCN cable
- #1464 - 6m SPCN cable
- #1465 - 15m SPCN cable
- #1466 - 30m SPCN cable
- #0369 - 100m Optical SPCN cable
- #1468 - 250m Optical SPCN cable

The #5078 PCI Expansion Unit supports four 32-bit and seven 32/64-bit PCI slots.

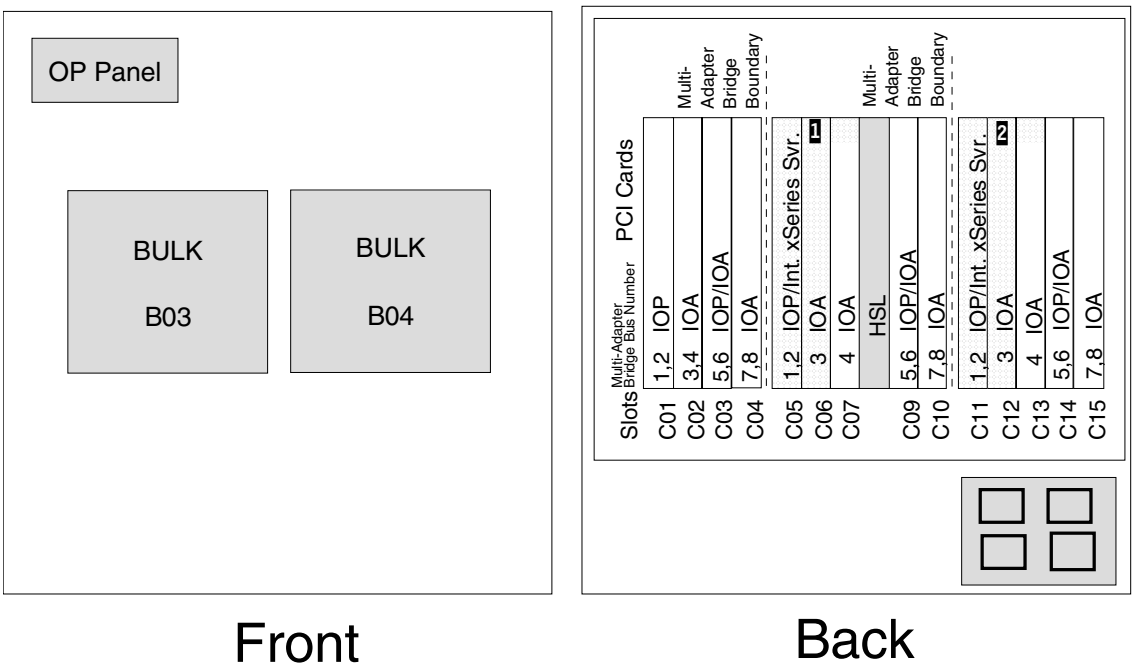
The #5078 includes two electrical cables to connect to a #5074/#9079 power source.

The 11 PCI IOAs are supported (driven) by feature #2843 PCI IOPs, feature #2790 Integrated Netfinity Servers, or feature #2791 PCI Integrated xSeries Servers.

The #5078 can also be mounted in a #0550/#0551 iSeries Rack by ordering feature code #0578 instead of #5078. See page 259 for information on the #0550, #0551, and #0578.

The #5078 PCI Expansion Unit counts as one tower for HSL loop rules.

#5078 PCI Expansion Unit



Legend

Base Feature | Required Feature | Unavailable if Integrated xSeries Server is installed

Note 1: If C05 has an Integrated xSeries Server, slot C06 is unavailable, and slot C07 is available only as a short slot.

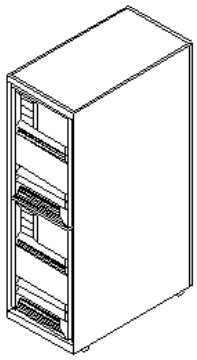
Note 2: If C11 has an Integrated xSeries Server, slot C12 is not available, and slot C13 is available only as a short slot.

#5079 1.8m PCI I/O Expansion Tower

The #5079 1.8m PCI I/O Expansion Tower is attached to Models 820, 830, and 840 for adding up to 90 disk units, up to 22 PCI IOAs, and up to four removable media units. The #5079 includes two #9691 Bus Adapters, two #9739 Optical Bus Adapters, or one each of #9691 and #9739, to provide the HSL interface to the system. The marketing configurator adds two #9691s to the order. The #5079 1.8m PCI I/O Expansion Tower reports to the system as two CCIN 5074s.

The #5079 is essentially two #5074 PCI Expansion Towers, with side covers and casters removed, placed in a 1.8m tower. Each #5079 tower counts as two #5074s toward the system model maximum number of towers.

The upper and lower enclosures (#5074s) in the #5079 are not connected with an HSL cable. If both enclosures of the #5079 are to be placed in the same HSL loop, a #1460 3m Copper HSL cable must be ordered to connect the upper and lower enclosures. Or, if both enclosures of the #5079 are to be placed in the same optical HSL loop, a #1470 6m Optical HSL cable must be ordered to connect the upper and lower enclosures.



#5079 1.8m PCI I/O Expansion Tower

The #5074 is the default when a PCI IOP or IOA is ordered that requires a PCI expansion unit. The #5079 may be specified on the extra controllers screen. For each #5079 ordered, a quantity of two #0574 (#5074 Equivalent) specify codes is added to the order. If a #5079 is to be shared between two systems, one #0574 must be removed from the original ordering system and added to the sharing system, using a Record Purpose Only (RPO) change.

Select any two to four of the supported HSL cables for each additional tower. A list of the supported HSL cables is shown in a table on page 265.

Select two of these SPCN cables per tower:

- #1463 - 2m SPCN cable
- #1464 - 6m SPCN cable
- #1465 - 15m SPCN cable
- #1466 - 30m SPCN cable
- #0369 - 100m Optical SPCN cable
- #1468 - 250m Optical SPCN cable

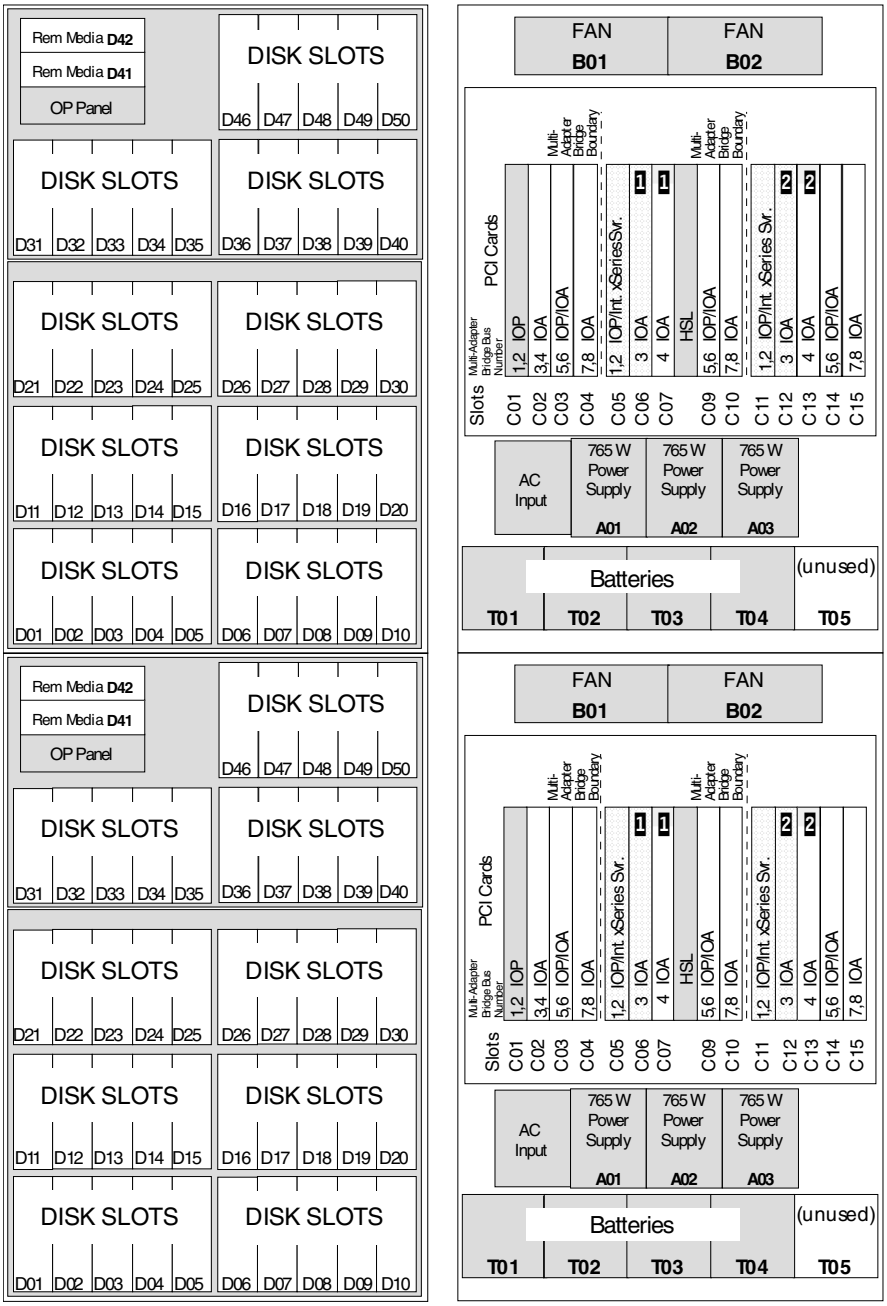
A #5079 has two #9943 Base PCI IOPs, PCI slots for up to 22 PCI IOAs, and space for up to 90 disk units. The #5079 is capable of controlling Ultra2 SCSI disk units. On new orders, select two line cords with each #5079 1.8m PCI I/O Expansion Tower.

The #5079 also supports up to four removable media devices (internal tape, CD-ROM, or DVD-RAM). These removable media devices are supported by the two #4748/#4778 PCI RAID Disk Unit Controllers, which support the first two groups of 15 disk units.

Co-requisite: At least one #0574 specify feature must be ordered for any #5079 initial order.

#5079 PCI Expansion Tower

Note: Total of number of disk bays is 2 x 45



Legend

Base Feature

Required Feature

Unavailable if Integrated xSeries Server is installed

Note 1: If C05 has an Integrated xSeries Server, slot C06 is unavailable, and slot C07 is available only as a short slot.

Note 2: If C11 has an Integrated xSeries Server, slot C12 is not available, and slot C13 is available only as a short slot.

#5106 Dual Line Cord - I/O Tower

The #5106 provides dual line cord capability for a single unit in a #5079 1.8m PCI I/O Expansion Tower. Two 14XX line cords are required for each #5106 on an initial order for a #5079. When ordering a #5106 alone as an MES for an installed #5079, one additional 14XX line cord is required for each #5106 ordered.

Prerequisite: If the #5079 has any feature #5101 (30-Disk Expansion Feature) installed, the #5101 must be converted to a #5111.

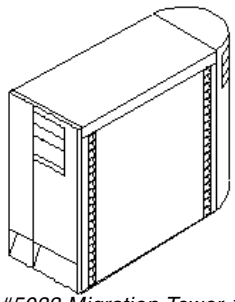
OS/400 V5R1 plus PTFs, or later is required. Refer to Informational APAR II12950 at:
`http://as400service.rochester.ibm.com/supporthome.nsf/document/10000035`

e-configurator users can refer to this Web site for ordering information:
`http://w3-1.ibm.com/sales/systems/ibmsm.nsf/MainFrameset?OpenForm&cdoc=idlcinstall`

Migration Towers

Migration Towers are the result of an upgrade from a AS/400e 6xx, 7xx, or Sxx model to an iSeries server Model 8xx. All the I/O and Disk Units in the former system unit and any attached towers remains accessible to the upgraded system through the connection of the Migration Tower to the HSL Loop. Migration Towers are not supported by the Model 270. One Migration Tower is supported on each Model 8xx.

Configuration rules for towers are fully described in Chapter 4 “Migration rules” of the redbook *AS/4003 to iSeries Migration*, SG24-6055.



#5033 Migration Tower 1

#5033 Migration Tower I (600/S10 System Unit)

The #5033 is a converted 600/S10 system unit/CEC tower used for migrating existing PCI cards, existing disk units, and existing removable media devices. Additional “pre-V4R5” features may be ordered to use vacant card/device slots in this tower. “V4R5 only” feature cards and internal devices are not allowed in this tower.

This feature is for upgrade migration purposes only. It cannot be ordered separately.

The #5033 can only attach to Models 820 and 830. There is a maximum of one #5033 on a Model 820 and 830.

Select any two of the following HSL cable features for this tower:

- #1460 - 3m Copper HSL cable
- #1461 - 6m Copper HSL cable
- #1462 - 15m Copper HSL cable

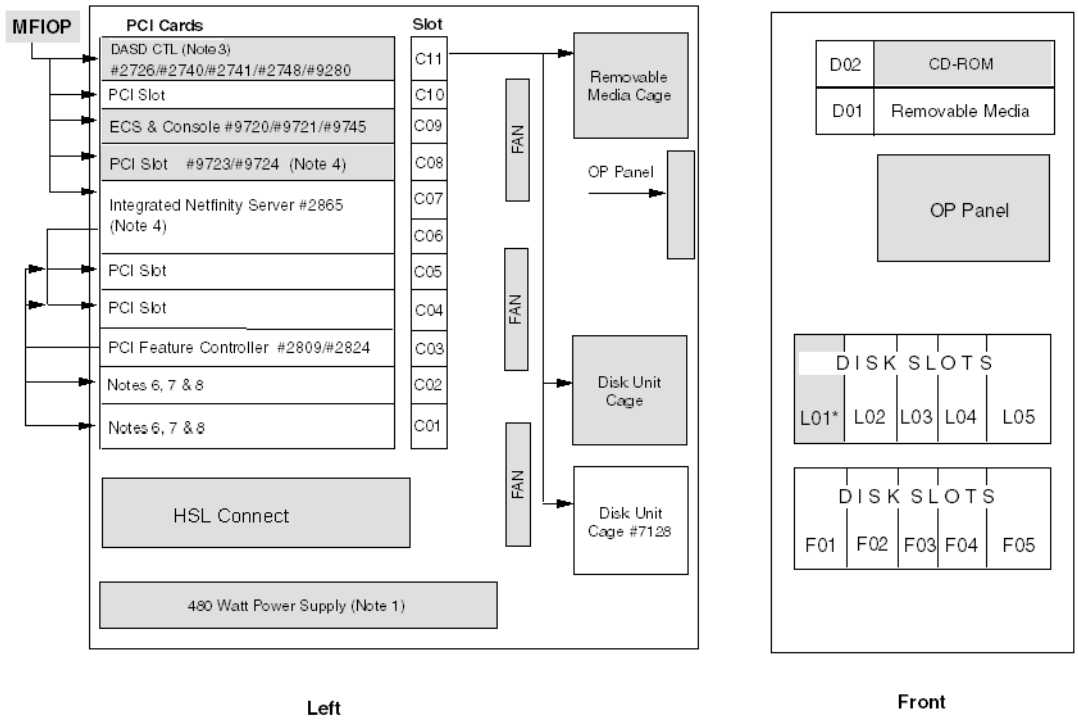
Select one of these SPCN cables:

- #1463 - 2m SPCN cable
- #1464 - 6m SPCN cable
- #1465 - 15m SPCN cable
- #1466 - 30m SPCN cable

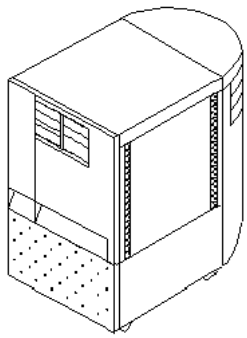
The existing system unit line cord should be used. Available line cord options are identified in the *iSeries and AS400e System Builder*, SG24-2155.

The #5033 is mutually exclusive with #5034, #5035, and #5077.

Note: The #1462 15m HSL cable can only be used on HSL port A1 of the Model 820 to directly connect a #5033 Migration Tower I.



#5034 Migration Tower I (10 Disk S20/620, 720 System)



#5034/#5035 Migration Tower I

The #5034 is a converted Model 620, S20, or 720 (with only 10 possible internal CEC disk unit positions) system unit tower and any existing #5064 or #9364 expansion unit, used for migration of existing PCI/SPD cards, existing disk units, and existing removable media devices, along with any attached PCI/SPD towers. Additional “pre-V4R5” features may be ordered to use vacant card or device slots in the converted CEC and expansion unit and in any attached PCI/SPD tower. “V4R5 only” feature cards and internal devices are not allowed in the converted CEC tower, the expansion unit, or any of the attached PCI/SPD towers.

This feature is for migration upgrade purposes only and cannot be ordered separately.

The #5034 can only attach to Models 820 and 830.

There is a maximum of one #5034 on a Model 820 and 830.

Attaching additional PCI/SPD towers to the #5034 after migrating to the Model 820 is not allowed.

Select any two of these HSL cable features for this tower:

- #1460 - 3m Copper HSL cable
- #1461 - 6m Copper HSL cable
- #1462 - 15m Copper HSL cable

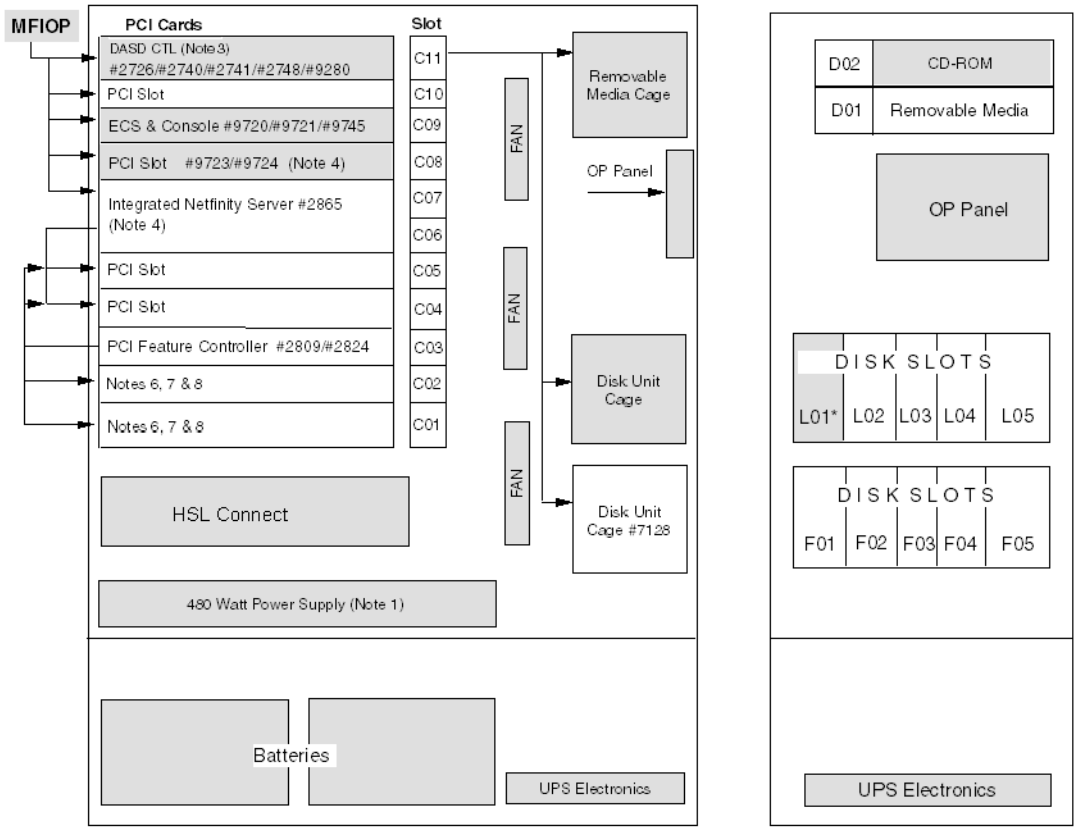
Select one of these SPCN cables:

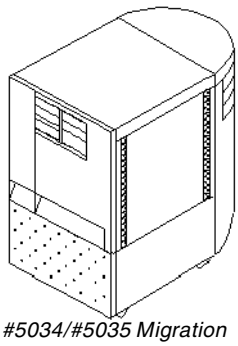
- #1463 - 2m SPCN cable
- #1464 - 6m SPCN cable
- #1465 - 15m SPCN cable
- #1466 - 30m SPCN cable

The existing system unit/CEC line cord should be used. Available line cord options are identified in the *iSeries and AS400e System Builder*, SG24-2155.

The #5034 is mutually exclusive with #5033, #5035, and #5077.

Note: The #1462 15m HSL cable can only be used on HSL port A1 of the Model 820 to directly connect a #5034 Migration Tower I.





#5034/#5035 Migration Tower I

#5035 Migration Tower I (15 Disk S20/620, 720 System)

The #5035 is a converted 620, S20, or 720 (with 15 possible internal CEC disk unit positions) system unit/CEC tower and any existing #5064 or #9364 expansion unit, used for migration of existing PCI/SPD cards, existing disk units and existing removable media devices, along with any attached PCI/SPD towers. Additional “pre-V4R5” features may be ordered to use vacant card/device slots in the converted CEC and expansion unit and in any attached PCI/SPD tower. “V4R5 only” feature cards and internal devices are not allowed in the converted CEC tower, the expansion unit, or any of the attached PCI/SPD towers.

This feature is primarily for migration upgrade purposes. It can be ordered in special circumstances separately as RPQ 847120. See the redbook *AS/400e to iSeries 400 Migration*, SG24-6055, for a further description.

The #5035 can only attach to Models 820 and 830. There is a maximum of one #5035 on a Model 820 and 830.

Attaching additional PCI/SPD towers to the #5035 after migrating to the Model 820 is not allowed.

Select any two of these HSL cable features for this tower:

- #1460 - 3m Copper HSL cable
- #1461 - 6m Copper HSL cable
- #1462 - 15m Copper HSL cable

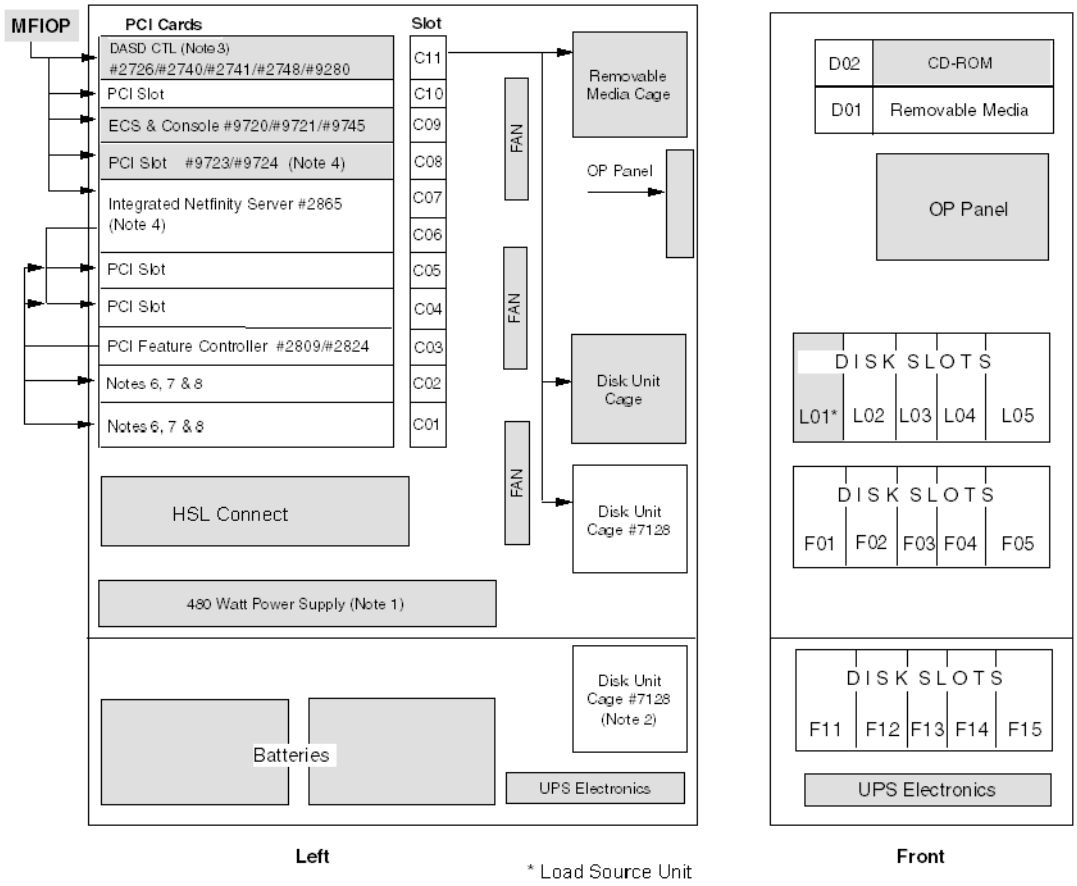
Select one of these SPCN cables:

- #1463 - 2m SPCN cable
- #1464 - 6m SPCN cable
- #1465 - 15m SPCN cable
- #1466 - 30m SPCN cable

The existing system unit/CEC line cord should be used. Available line cord options are identified in the *iSeries and AS400e System Builder*, SG24-2155.

The #5035 is mutually exclusive with #5033, #5034, and #5077.

Note: The #1462 15m HSL cable can only be used on HSL port A1 of the Model 820 to directly connect a #5035 Migration Tower I.



#5077 Migration Tower II

The #5077 is a feature I/O tower, which supports SPD I/O cards and attaches SPD Expansion Towers and #5065/#5066 PCI Expansion Towers. The #5077 is supported on Models 830 and 840, SB2, and SB3.

When upgrading to a Model 830 or 840 from a Model 640, S30, or 730, the #5077 is a manufactured unit and is shipped without a base CD-ROM and without a base optical link card (CCIN 2696).

If upgrading to a Model 830 or 840 from a Model 640, S30, or 730 without a #5055 8 Disk Unit Storage Expansion Unit installed, by default, the #5077 is shipped with a #5057 16 Disk Unit Storage Expansion Unit. The #5057 may be removed from the order. If upgrading from a Model 640, S30, or 730 with the #5055 installed, a #5055 to #5057 conversion is performed.

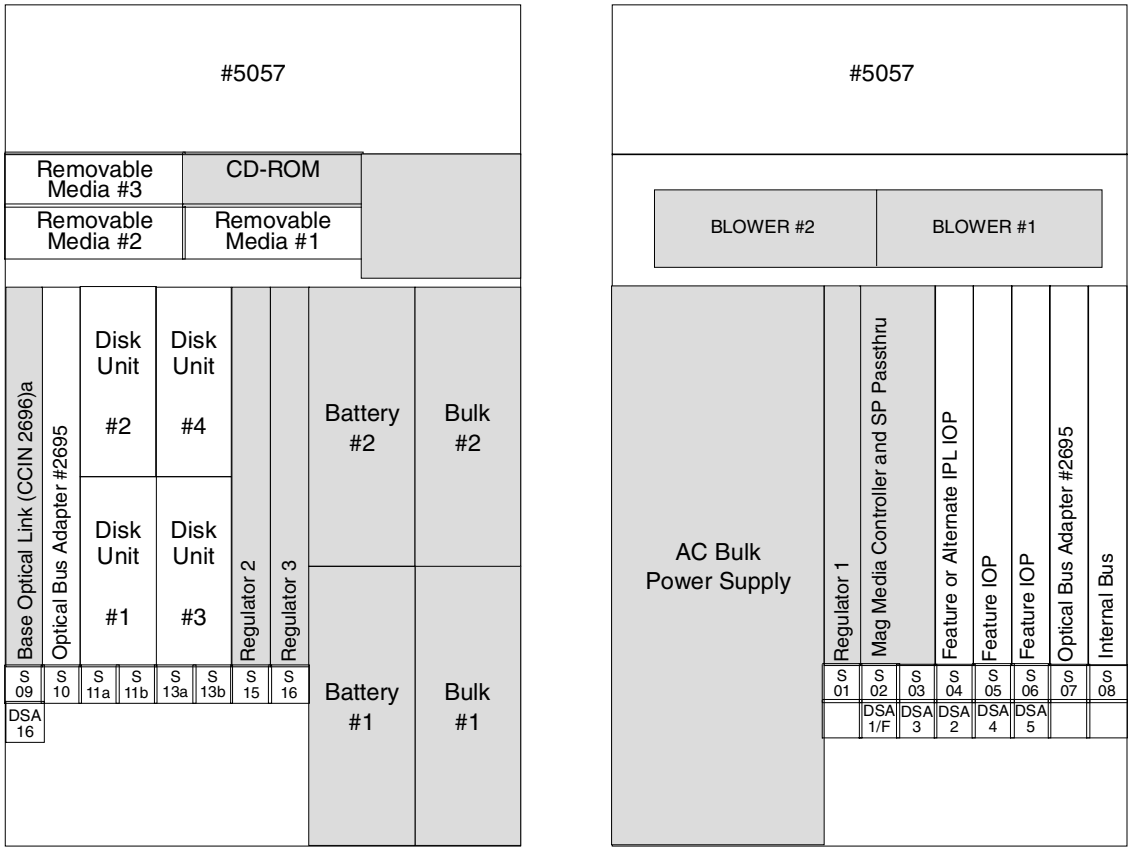
When upgrading to a Model 840 from a Model 650, S40, or 740, the #9251 Base I/O Tower on these models is converted to the #5077.

When upgrading to a Model 840 from a Model 820 or 830 with #5034 or #5035 Migration Tower I, which has SPD cards or SPD towers attached, the #5077 is a manufactured unit and is shipped without a base CD-ROM and with a base optical link card (CCIN 2696).

One or two #2695 Optical Bus Adapters features may be ordered for the #5077.

If a #5077 is a manufactured unit, it ships with a CCIN 671A MFIOP. If the #5077 is converted from a #9251, the base MFIOP is replaced by the CCIN 671A MFIOP. The CCIN 671A MFIOP controls the disk units in the #5077 and the #5057, and removable media devices in the #5077.

#5077 Migration Tower II



Legend

Base Feature

Select one of these HSL cables if the #5077 has only the base optical link card installed. Select one or any two of these HSL cables if the #5077 has one or two #2695 Optical Bus Adapters installed.

- #1460 - 3m Copper HSL cable
- #1461 - 6m Copper HSL cable
- #1462 - 15m Copper HSL cable

Select one of these SPCN cables per tower:

- #1463 - 2m SPCN cable
- #1464 - 6m SPCN cable
- #1465 - 15m SPCN cable
- #1466 - 30m SPCN cable

If the #5077 is a manufactured unit, select one line cord for each #5077 Migration Tower II. If the #5077 is converted from a #9251, a line cord is not required to be selected, because the line cord from the #9251 may be used. However, a line cord may be selected on a #9251 to a #5077 conversion if the line cord type is to be changed. Available line cord options are identified in the *iSeries and AS400e System Builder*, SG24-2155.

The #5077 may be ordered to support clustering on Models 830, 840, SB2, and SB3. In this case, the #5077 is shipped as a manufactured unit with a base CD-ROM and a base optical link card (CCIN 2696). When ordered on a Model 830 or 840, the marketing configurator defaults a #5057 16 Disk Unit Storage Expansion Unit on the order, which may be removed if the customer does not want it. When attached to a Model SB2 or SB3, disk units may not be installed in the #5077 (or #5057).

#5057 Storage Expansion Unit

The #5057 provides space for up to 16 disk units on the #5077 Migration Tower II. The #5057 is shipped on new order #5077s when migrating from a Model 640, S30, or 730, which do not have a #5055. When migrating from a Model 640, S30, or 730, which have a #5055, the #5055 is converted to a #5057.

The #5077 is mutually exclusive with #5033, #5034, and #5035.

SPD Expansion Towers

The Expansion Towers and Unit in this table can attach to the Model 8xx via #5034 or #5035, and #5077 Migration Towers.

Feature	Description	Prerequisites
#5043	Primary rack converted to secondary rack (migrated)	--
#5044	System Unit Expansion Rack (migrated)	Optical Link Processor (OLP) Card #2686
#5052	Storage Expansion Unit	#5143 and #5072 or #5082 and one of #6502, #6512, #6530, #6532, or #6533
#5058	Storage Expansion Unit	#5073 or #5083 and one of #6502, #6512, #6530, #6532, or #6533

#5065	Storage/PCI Expansion Tower	One port on #2688 OLP card in a #5077 or in #9364 System Unit Expansion
#5066	1.8m PCI I/O Expansion Tower	See #5065
#5072	1063M System Unit Expansion Tower	One port on #2688 OLP card in a #5077 or in #9364 System Unit Expansion
#5073	1063M System Unit Expansion Tower	One port on #2688 OLP card in a #5077 or in #9364 System Unit Expansion
#5082	1063M System Unit Expansion Tower	One of #6502, #6512, #6530, #6532, or #6533 and one port on #2688 OLP card in a #5077 or in #9364 System Unit Expansion
#5083	1063M System Unit Expansion	See #5082

SPD Expansion Tower I/O Features

#2686 Optical Link Processor (266 Mbps)

This feature is used for attaching #5044 System Unit Expansion Rack. One #2686 is required per #5044. It requires an Optical Link Processor position in the #9329 or #9331.

#2688 Optical Link Processor (1063 Mbps)

This feature is used for attaching the #5065, #5072, #5082, #5073, and #5083 Expansion Towers. One can attach two towers. It requires an Optical Link Processor position on the #9329/#9330, #9331, or #5077.

Upgrade Options for #5065, #5066 and #5075 Expansion Towers

Converting iSeries expansion towers to migration towers allows you to upgrade to newer, faster, and higher function HSL-attached I/O towers. Conversions are available for:

- #5065 Storage/PCI Expansion Tower to #5074 PCI Expansion Tower
- #5066 1.8m I/O Tower to #5079 1.8m PCI I/O Expansion Tower
- #5075 PCI Expansion Tower to #5074 PCI Expansion Tower

While most features from the expansion towers are supported in the new towers, many require no-charge feature conversions because the feature number is different in the new tower. Those features not supported in the new towers must be re-installed in the system unit or replaced with a new feature.

These no-charge feature conversions are available to move features from the #5065/#5066 towers to #5074/#5079 towers.

From Feature	To Feature	From Feature	To Feature
#2723	#4723	#9723	#4723
#2745	#4745	#2746	#4746
#2748	#4748	#2750	#4750
#2751	#4751	#2761	#4761
#4778	#4778	#2815	#4815
#2816	#4816	#2818	#4818
#2838	#4838	#4802	#4801

The converted features are physically and functionally identical.

Note: The feature numbers and some names change to designate installation information.

These #5065/#5066 features are not supported in the #5074/#5079 towers. They must be replaced.

From Feature	Description	Potential Replacement Feature	Description
#2718	PCI Magnetic Media Controller	#2768	PCI Magnetic Media Controller
#2721	PCI Two-line WAN IOA	#4745	PCI WAN IOA
#2722	PCI Twinaxial Workstation IOA	#4746	PCI Twinaxial Workstation IOA
#2724	PCI 16/4Mbps Token-Ring IOA	#2744	PCI 100Mbps Token-Ring IOA
#2729	PCI Magnetic Media Controller	#2749	PCI Magnetic Media Controller
#2824	PCI LAN/WAN Workstation IOP	#2843	PCI IOP

These #5075 features are not supported in the #5074 tower. They must be re-installed in the system unit or replaced.

From Feature	Description	Potential Replacement Feature	Description
#2763	PCI RAID Disk Unit Controller	#4778	PCI RAID Disk Unit Controller
#2842	PCI IOP	#2843	PCI IOP
#9767	Base PCI Disk Unit Controller	#4748	PCI RAID Disk Unit Controller

Racks

Options are available to rack mount selected iSeries server models and towers. Rack mounting allows multiple components to be mounted in a rack, conserving floor space and providing a secure environment for the devices. Rack mounting is an important consideration in ISP and ASP environments.

#0550 iSeries Rack

The #0550 iSeries Rack is a 1.8-meter rack with an iSeries server 830 installed. The #0550 is ordered as a feature of the iSeries server 830 to be installed in the rack. The 830 server occupies the lower 26 EIA units of the rack, leaving 10 EIA units available for installation of other devices. When a #0550 is ordered, a #5101 30-Disk Unit Expansion is also ordered to be installed in the 830 server.

The IBM configurator does not manage rack space in the #0550 rack.

Note: The #0550 is only valid on an initial order. Existing 830 servers cannot be installed in a rack due to weight restrictions.

Up to two Power Distribution Units (PDU) may be installed in the #0550. The PDUs may be ordered as part of the initial order or added at a later time. Each PDU has six power sockets that provide power for devices that support the #1422 PDU Line Cord. A country specific line cord must be ordered for each PDU to connect to external power. The supported PDUs are:

- #5160 Power Distribution Unit 1 Phase NEMA
- #5161 Power Distribution Unit 1 Phase IEC
- #5162 Power Distribution Unit 2 of 3 Phase

The iSeries server 830 does not support the #1422 PDU Line Cord and cannot be powered by a PDU. A country specific line cord must be ordered for the 830 installed in the #0550 Rack.

#0551 iSeries Rack

The #0551 iSeries Rack is an empty 1.8-meter rack which provides a total 36 EIA units of space. The #0551can be ordered as a feature of an iSeries server as part of an initial order or added at a later time. Specify codes may then be used to indicate how the rack is to be populated. The #0551 iSeries Rack is available in these configurations:

- An empty #0551 Rack
- A #0551 Rack with one iSeries server 270
- A #0551 Rack with two iSeries server 270s
- A #0551 Rack with a #5074/#9079 PCI Expansion Tower
- A #0551 Rack with one to four #0578 PCI Expansion Units

The IBM configurator does not manage rack space in the #0551 rack.

Up to four Power Distribution Units (PDU) may be installed in the #0551. The PDUs may be ordered as part of the initial order or added at a later time. Each PDU has six power sockets that provide power for devices that support the #1422 PDU Line Cord. A country-specific line cord must be ordered for each PDU to connect to external power. The supported PDUs are:

- #5160 Power Distribution Unit 1 Phase NEMA
- #5161 Power Distribution Unit 1 Phase IEC
- #5162 Power Distribution Unit 2 of 3 Phase

The supported specify codes are:

- #0121 270 Lower Unit in Rack Specify
  - The #0121 is only valid on the initial order of an iSeries server 270. It indicates that the server is to be installed in the lower position of a #0551 rack. The 270 server occupies the lower 15 EIA units in the rack. This leaves 21 EIA units available at the top of the rack for additional devices.
  - Feature #7104 System Unit Expansion is required in order for an iSeries server 270 to mount in a #0551 rack.
  - The 270 server and the #7104 may be powered by the Power Distribution Unit (PDU), if installed, using the #1422 PDU Line Cord. If no PDU is installed, a valid country specific line cord must be ordered.

    Note: Two line cords are required.
  - Certain upgrade paths are not supported when an iSeries server 270 is installed in an #0551 rack. Information on supported upgrade paths may be found in “Model 270 Upgrades” on page 126.
- #0122 270 Upper Unit in Rack Specify
  - The #0122 is only valid on the initial order of an iSeries server 270 and indicates that the server is to be installed in the upper position of a #0551 rack.

  - This specify code is only valid when two iSeries 270 servers are ordered at the same time for simultaneous delivery. One system must specify #0551 and #0121, while the second system specifies #0122.
  - The two 270 servers combined require 30 EIA units in the lower part of the #0551 rack. This leaves six EIA units available at the top of the rack for additional devices.
  - Each iSeries server 270 is an independent system.
  - Feature #7104 System Unit Expansion is required in order for an iSeries server 270 to mount in a #0551 rack.
  - The 270 server may be powered by the Power Distribution Unit (PDU), if installed, using #1422 PDU Line Cord. If no PDU is installed, a valid 14-foot country specific line cord must be ordered.

    Note: Two line cords are required.
  - Certain upgrade paths are not supported when an iSeries server 270 is installed in a #0551 rack. Information on supported upgrade paths may be found in “Model 270 Upgrades” on page 126.

- #0123 #5074 Lower Unit in Rack Specify
  - The #0123 may be ordered to place a #5074 PCI Expansion Tower in a #0551 rack when shipped from manufacturing.
  - The #0123 cannot be used to convert an existing #5074 to mount in a rack.
  - The #5074 occupies 18 EIA units in the lower part of the #0551 rack. This leaves 18 EIA units available at the top of the rack for additional devices.
  - Feature #5101 30-Disk Unit Expansion is required in order for a #5074 to mount in a #0551 rack.
  - The #5074 PCI Expansion Unit cannot be powered by the Power Distribution Unit (PDU). A valid country specific line cord must be ordered.
- #0125 #9079 Lower Unit in Rack Specify
  - The #0125 may be ordered to place the #9079 Base I/O Tower in a #0551 rack when shipped from manufacturing as part of an order for an iSeries server 840.
  - The #0125 cannot be used to convert an existing #9079 to mount in a rack.
  - The #9079 occupies 18 EIA units in the lower part of the #0551 rack. This leaves 18 EIA units available at the top of the rack for additional devices.
  - The #5074 PCI Expansion Unit cannot be powered by the Power Distribution Unit (PDU). A valid country specific line cord must be ordered.

- #0127 270 Field Install in Rack Specify
  - The #0127 feature denotes that a Model 270 system is to be mounted in the #0551 rack (either top or bottom). Mounting hardware is included.
  - Feature #7104 System Unit Expansion is required in order for an iSeries server 270 to mount in a #0551 rack.
  - If the system unit is installed in the upper rack position and is not cabled to a PDU, then a 14-ft line cord is required.
- #0578 PCI Expansion Unit in Rack
  - The #0578 is the rack mounted equivalent of a #5078 PCI Expansion Unit and may be installed in any #0550 or #0551 rack with available space. See “#5078 PCI Expansion Unit” on page 243 for a description of the capabilities of the #5078.
  - A #5078 cannot be converted to an #0578.
  - A #0578 may be part of an initial order, an upgrade, or added to an existing system with enough available space in a #0550/#0551 rack.
  - The #0578 occupies eight EIA units in a rack. Up to four #0578s may be mounted in a #0551 depending on the amount of empty space available in the rack. One #0578 may be installed in a #0550 Rack above the 830 server. An #0578 may be placed in a #0551 rack with a 270 server. However, there is no support for attaching the #0578 to the 270 server.
  - Select any two of these HSL cables if the #0578 is the first or only tower/unit of an HSL loop. For additional units on an HSL loop, select one HSL cable per unit.
    - #1460 - 3m Copper HSL cable
    - #1461 - 6m Copper HSL cable
    - #1462 - 15m Copper HSL cable
    - #1470 - 6m Optical HSL cable (Models 830 and 840 only)
    - #1471 - 30m Optical HSL cable (Models 830 and 840 only)
    - #1472 - 100m Optical HSL cable (Models 830 and 840 only)
    - #1473 - 250m Optical HSL cable (Models 830 and 840 only)

    Note: The #1462 15m HSL cable can only be used on HSL port A1 of the Model 820 to directly connect a #5033, #5034, or #5035 Migration Tower I.
  - Select one of these SPCN cables per #0578:
    - #1463 - 2m SPCN cable
    - #1464 - 6m SPCN cable
    - #1465 - 15m SPCN cable
    - #1466 - 30m SPCN cable
    - #0369 - 100m Optical SPCN cable
    - #1468 - 250m Optical SPCN cable

– One or more Power Distribution Units (PDUs) are required when the #0578s are to be installed in a #0550 or #0551 rack. Each #0578 requires two #1422 PDU power cords to be connected to two plugs in the PDU.

IBM 9309 Rack Enclosures

The 9309 Rack Enclosures provide operator control panels, acoustic noise reduction, power control to all units within the rack (under the control of the System Unit), and power control to the next rack SPCN chain. All additional racks attached to the system unit are termed “secondary” racks.

AS/400 9406 models support the 9309 Rack Enclosures. External I/O devices, such as DASD, magnetic tapes, and diskette units, can be accommodated in these 1.6 M racks.

These 9309 Rack and System Unit Rack Enclosures are supported:

- **9309 #9171**: General Purpose I/O Rack with SPCN
- **9406 #5044**: System Unit Expansion Rack (9406-5X0, 620, 640, and 650 models only)

High Speed Links (HSL)

HSL Fabric

HSL at OS/400 V5R1 was initially implemented using copper interconnect cables. These cables allow for high speed and high quality parallel data transfer. In August 2001, technology is introduced using optical fibers and optical adapters to interconnect the Central Electronic Complex (CEC) and the towers of the AS/400e.

The copper HSL cables have a higher bandwidth compared to the optical HSL cables. The optical cables are available in longer lengths (up to 250m compared to 15m for copper). Optical cables are smaller and easier to work with, particularly at installation.

The longer optical cable lengths extend the distance between I/O units and the Model 830 and Model 840 servers from the current 15m to 250m. Expanded I/O location alternatives can help improve data reliability and protection.

The HSL bus structure provides:

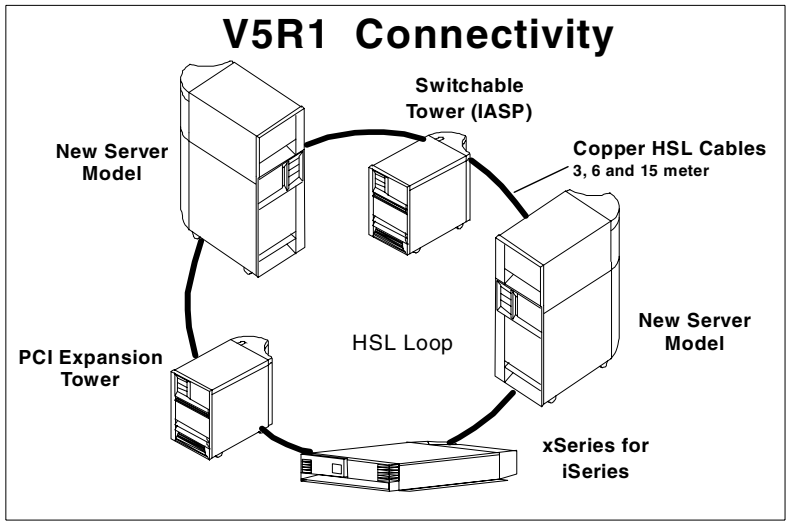
- Performance improvements and future system growth
  - Up to 1 GB/sec technology (copper HSL cables)
  - 700 MB/sec maximum deliverable capacity running full duplex
- Simplified implementation
  - Loop technology for redundancy
  - Multiple towers per loop
  - 3m, 6m, 15m copper HSL cables

  - 6m, 30m, 100m 250m optical HSL cables
  - Migration tower attachment supports SPD I/O towers and #5065/#5066 Storage/PCI Expansion Towers
- Homogeneous HSL network with V5R1 HSL adapters
  - Simple HSL Clusters (two iSeries)
  - xSeries for iSeries HSL connectivity
  - Switchable HSL connected tower with IASP

In system complexes that contain only V5R1 HSL hardware, the HSL implementation consists of loops that may contain any expansions (#5074/#5075/#5078/#5079s) and two iSeries servers. These HSL loops provide redundancy to all attached towers. In addition, the implementation of HSL and OS/400 provide data flow balancing across the loop by assigning communication paths during an IPL to optimize loop throughput based upon loop and tower configurations.

The connectivity of loops is shown in the following figure.

Note: The iSeries Model 270 does not support the 15m HSL cable. The Model 820 has limitations on which segments of the HSL loop can be 15m.



In system complexes that contain only V5R1 HSL, implementation consists of loops that can contain any expansions (#5074, #5075, #5078, and #5079) and two iSeries servers.

For further details, see the product sections within this Handbook or *AS/400e to iSeries 400 Migration*, SG24-6055.

The base rules for tower placement can be found in the *iSeries and AS/400e System Builder,* SG24-2155. HSL rules and migration considerations are described in the redbook *AS/400e to iSeries Migration*, SG24-6055.

HSL cables supported in each iSeries server are identified in the following table.

Feature Code	Description	270	820	830	840	SB2	SB3
#1460	3m Copper HSL Cable	X	X	X	X	X	X
#1461	6m Copper HSL Cable	X	X	X	X	X	X
#1462	15m Copper HSL Cable		X	X	X	X	X
#1470	6m Optical HSL Cable			X	X		
#1471	30m Optical HSL Cable			X	X		
#1472	100m Optical HSL Cable			X	X		
#1473	250m Optical HSL Cable			X	X		

Note: The #1462 15m HSL cable can only be used on HSL port A1 of the Model 820 to directly connect a #5033, #5034, or #5035 Migration Tower I.

To allow the connection of expansion towers to the Optical HSL, a #2739/#9739 Optical Bus Adapter is required for each of the #5074, #0578, and #5078 expansion towers. For the #5079 1.8m PCI I/O Expansion Tower, two of these features are required if both upper and lower #5074 units of the #5079 are to be connected using Optical HSL.

Due to the high bandwidth of HSL, you should see comparable performance, whether using copper or optical HSL, even though optical runs at a slower speed. However, for intensive I/O bandwidth requirements (for example, large system data mining), you may experience some performance degradation with optical HSL. Use less than the allowed maximum number of I/O towers on an optical HSL loop to optimize performance.

OS/400 V5R1 and supporting PTFs are required. Refer to Informational APAR II12949 at:
`http://as400service.rochester.ibm.com/supporthome.nsf/document/10000035`

Integrated xSeries Adapter (direct attach)

The IBM Integrated xSeries Adapter for iSeries provides a direct high-speed attachment of an xSeries server to an iSeries server. It installs in select xSeries servers. It extends iSeries integration with Microsoft Windows 2000 Server to xSeries high performance n-way Intel architecture servers. With the Integrated xSeries Adapter, more Windows users and more complex Windows applications can be integrated with iSeries servers.

The direct attach server consists of an xSeries server tower that contains an Integrated xSeries Adapter (MT1519-100). The Integrated xSeries Adapter reports to the iSeries Hardware Service Manager as CCIN 2689.

The external xSeries server has SPCN control. SPCN cabling for the external xseries server follows the same rules as SPCN cabling for existing HSL attached towers.

The external xSeries server attaches to a Model 270 or Model 8xx server via a copper HSL (optical HSL is not supported). The external xSeries server does not count against the current limits of HSL towers on a per loop, or per system basis except on the Model 840. The 840 has a system tower limit that cannot support the maximum number of I/O towers in addition to the maximum number of external xSeries servers. The Model 840 has a system limit of 47 total towers.

The maximum external xSeries servers by model (these maximums are in addition to the maximum number of I/O towers that can attach to these models) are:

- Model 270 - System maximum is 2
- Model 820 - System maximum is 4
- Model 830 - System maximum is 8
- Model 840 - System maximum is 16

The maximum external xSeries servers per HSL loop by model are:

- Model 270 - Maximum per loop is 2
- Model 820 - Maximum per loop is 4 (system limit)
- Model 830 - Maximum per loop is 5 (limit on first loop is one)
- Model 840 - Maximum per loop is 5 (limit on first loop is five)

These maximums are in addition to the maximum number of I/O towers that can attach per HSL loop to these models.

For performance and stability reasons, place the external xSeries server in the middle of an HSL loop on HSL loops without switched towers. That is, the end of the HSL strings attach to each HSL port. No I/O tower should communicate with the system by having its data flow through an external xSeries server. Switched towers are required to be adjacent to a tower owned by the alternate system. If an external xSeries server must be on a loop with a switched tower, place the external xSeries server so it does not communicate with the system through a private tower.

Each external xSeries server is independent of the number of internal Integrated xSeries Servers and Integrated Netfinity Servers.

For further information, refer to the *AS/400e to iSeries Migration* redbook, SG24-6055.

The latest information on which xSeries or Netfinity Servers can be ordered is contained on the xSeries server Web site: `http://www.iseries.ibm.com/windowsintegration/`

Ordering Information

The HSL adapter for the xSeries is ordered as Machine Type 1519 Model 100. It is supported as a peripheral in the iSeries e-Config configurator tool.

The specify #0092 used in the iSeries configurator assures the correct type and number of cables are on the order.

I/O Processor

I/O Processor

I/O Processor

This chapter discusses system unit (PCI) and migration tower (PCI and SPD) I/O processors for processors 270, 8xx, SB2, and SB3 and associated towers.

V5R1 System Unit Hardware (PCI)

Note

PCI configuration rules for V5R1 hardware are flexible. Refer to the “PCI Card Placement Rules” chapter of the *iSeries and AS/400e System Builder*, SG24-2155, for complete rules for placing these PCI cards in configurations.

Embedded 32 MB PCI IOP (CCIN 284x)

On the Model 270, a 32 MB PCI IOP is embedded on the CEC backplane. For the #2431, #2432, and #2452 processors, the embedded IOP is CCIN 286C. For the #2248, #2250, and #2422 processors, the embedded IOP is CCIN 284D. For the other Model 270 processors, the embedded IOP is CCIN 284E.

The 32 MB PCI IOP is not allowed on Model 270 embedded IOP.

On the Model 820, a 32 MB PCI IOP (CCIN 284C) is embedded on the backplane.

The #5075 contains a 32 MB PCI IOP (CCIN 284B) embedded on its backplane.

#2842 PCI IOP

The #2842 is an I/O processor with 32 MB of memory that drives PCI IOA adapters on the Model 270 and on the #5075 PCI Expansion Tower (when attached to a Model 270). Up to two feature #2842 PCI IOPs may be added to the Model 270.

The #5075 PCI Expansion Tower has a 32 MB PCI IOP (CCIN 284B) embedded on the backplane. When the #5075 is attached a Model 270, up to three feature #2842 PCI IOPs may be added to the #5075.

These IOAs are supported by the embedded PCI IOP (Model 270 and #5075) and the #2842 PCI IOP:

- #2743 - PCI 1 Gbps Ethernet IOA
- #2744 - PCI 100 Mbps Token Ring IOA
- #2749 - PCI Ultra Magnetic Media Controller
- #2760 - PCI 1Gbps UTP Ethernet IOA

- #2763 - PCI RAID Disk Unit Controller
- #2765 - PCI Fibre Channel Tape Controller
- #2766 - PCI Fibre Channel Disk Controller
- #2768 - PCI Magnetic Media Controller
- #2772/#2773 PCI Dual WAN Adapter
- #2817 - PCI 155MBPS MMF ATM Adapter
- #4723 - PCI Ethernet/IEEE 802.3 Adapter
- #4745 - PCI WAN IOA
- #4746 - PCI Twinaxial IOA
- #4748 - PCI RAID Disk Unit Controller
- #4750 - PCI ISDN BRI U IOA
- #4751 - PCI ISDN BRI S/T IOA
- #4761 - PCI Integrated Analog Modem
- #4778/#9778 - PCI RAID Disk Unit Controller
- #4801 - PCI Crypto Coprocessor
- #4815 - PCI ATM 155 MBPS UTP OC3
- #4816 - PCI ATM 155 MBPS MMF
- #4818 - PCI ATM 155 MBPS SMF OC3
- #4838 - PCI 100/10 Mbps Ethernet IOA
- #9767 - Base PCI Disk Unit Controller
- #9771 - Base PCI 2-Line WAN w/Modem

The #2842 can drive a maximum of four IOAs, subject to further restrictions as stated in these IOP descriptions. Further restrictions apply, as stated in the “PCI Card Placement Rules” chapter of the *iSeries and AS/400e System Builder*, SG24-2155.

#2843/#9943 PCI IOP

The #2843/#9943 is an PCI I/O processor with 64 MB of memory that drives PCI IOA adapters on Models 820, 830, 840, SB2, and SB3 on the #5075 PCI Expansion Tower when attached to the Model 820, the #5074 PCI Expansion Tower, the #5079 1.8m PCI I/O Expansion Tower, and the #5078 PCI Expansion Unit.

Up to five feature #2843 PCI IOPs may be added to the Model 820 System Unit. The #5075, when attached to a Model 820, can contain or support up to three #2843 PCI IOP features.

On Models 830, 840, SB2, and SB3, a PCI IOP is not embedded on the backplane, but a #9943 PCI IOP is included as “base” with the system. Up to four feature #2843 PCI IOPs may be added in the system unit of Models 830 and 840. Up to two feature #2843 PCI IOPs may be added in the system unit of Models SB2 and SB3. On the #5074 PCI Expansion Tower, a PCI IOP is not embedded, but a #9943 PCI IOP is included as “base”. Up to five #2843 PCI IOP features may be added to a #5074. Up to six #2843 PCI IOP features may be added to a #5078.

On the #5079 1.8m PCI I/O Expansion Tower, a PCI IOP is not embedded, but two #9943 PCI IOPs are included as “base”. Up to ten #2843 PCI IOP features may be added to the #5079.

Note: The #9943 may only be on initial system orders or on MES orders that add #5074, #5078, or #5079 towers to an installed system. The maximum number of #9943s installed on a system is one in the system unit, plus one in each #5074 and two in each #5079.

These IOAs are supported (driven) by the embedded PCI IOP (Model 820) and the #2843/#9943 PCI IOP:

- #2743 - PCI 1 Gbps Ethernet IOA
- #2744 - PCI 100 Mbps Token Ring IOA
- #2749 - PCI Ultra Magnetic Media Controller
- #2760 - PCI 1Gbps UTP Ethernet IOA
- #2763 - PCI RAID Disk Unit Controller
- #2765 - PCI Fibre Channel Tape Controller
- #2766 - PCI Fibre Channel Disk Controller
- #2768 - PCI Magnetic Media Controller
- #2772/#2773 PCI Dual WAN Adapter
- #2817 - PCI 155MBPS MMF ATM Adapter
- #4723 - PCI Ethernet/IEEE 802.3 Adapter
- #4745 - PCI WAN IOA
- #4746 - PCI Twinaxial IOA
- #4748 - PCI RAID Disk Unit Controller
- #4750 - PCI ISDN BRI U IOA
- #4751 - PCI ISDN BRI S/T IOA
- #4761 - PCI Integrated Analog Modem
- #4778/#9778 - PCI RAID Disk Unit Controller
- #4801 - PCI Crypto Coprocessor (not allowed on CEC base/embedded IOPs)
- #4815 - PCI ATM 155 MBPS UTP OC3
- #4816 - PCI ATM 155 MBPS MMF
- #4818 - PCI ATM 155 MBPS SMF OC3
- #4838 - PCI 100/10 Mbps Ethernet IOA
- #9767 - Base PCI Disk Unit Controller
- #9771 - Base PCI 2-Line WAN w/Modem

The #2843/#9943 can drive a maximum of four IOAs. Refer to the “PCI Card Placement Rules” chapter of the *iSeries and AS/400e System Builder*, SG24-2155, for complete rules for placing these PCI cards in configurations.

#2790 PCI Integrated Netfinity Server

#2791 Integrated xSeries Server

The #2790 PCI Integrated Netfinity Server contains a 700 MHz slot 1 processor and four memory slots in the Netfinity IOP.

The #2791 Integrated xSeries Server contains an 850 MHz Socket 370 processor and four memory slots in the Netfinity IOP.

The #2790/#2791 is supported in the CEC of Models 820, 830, 840, SB2, and SB3, in the #5074 PCI Expansion Tower, in the #5078 PCI Expansion Unit, in the #5079 1.8m PCI I/O Expansion Tower, and in the #5075 PCI Expansion Tower when it is attached to the Model 820.

Each memory slot can contain either a 128 MB, a 256 MB, or a 1024 MB Netfinity IOP Memory card. This provides a total memory capacity ranging from 128 MB to 4 GB.

Note: When the maximum memory is installed, only 3712 MB will be addressable.

At least one memory card in the Netfinity IOP is required.

The feature numbers of the Netfinity IOP memory cards are:

- #2795 - 128 MB Netfinity IOP Memory
- #2796 - 256 MB Netfinity IOP Memory
- #2797 - 1 GB Netfinity IOP Memory

Allowable Main Storage Increments (MB)							
128	256	384	512	640	768	896	1024
1152	1280	1408	1536	1664	1792		2048
2176	2304	2432	2560				3072
3200	3328						4096

At least one LAN IOA is required. Refer to the “PCI Card Placement Rules” chapter of the *iSeries and AS/400e System Builder*, SG24-2155, for details and limitations.

The #2790/#2791 supports up to three, in any combination, of these LAN IOA features:

- #2743 PCI 1Gbps Ethernet IOA
- #2760 PCI 1Gbps Ethernet UTP IOA
- #4838 PCI 100/10 Mbps Ethernet IOA
- #2744 PCI 100 Mbps Token-Ring IOA

One #0225 (1 Gbps Ethernet on the Integrated Netfinity Server) is required for each 1 Gbps Ethernet adapter selected to run on the #2790/#2791.

One #0224 (100/10 Mbps Ethernet on the Integrated Netfinity Server) is required for each #4838 selected to run on the #2790/#2791.

One #0223 (100 Mbps Token-Ring on the Integrated Netfinity Server) is required for each #2744 selected to run on the #2790/#2791.

Native AS/400 functions are not supported, and the #2790/#2791 servers do not support external host LAN.

The #2790/#2791 requires three PCI card slots on the system or expansion tower backplane. Two slots are consumed by the #2790/#2791. The third slot is reduced to a short card slot, which will be used by the first LAN IOA card.

The #2790/#2791 will ship with a keyboard/mouse splitter cable.

The #2790/#2791 supports only the Window NT and Windows 2000 operating systems. These points apply:

- #0325 IPCS Extension Cable for Windows is the default (but may be removed).
- A minimum of 128 MB Netfinity IOP Memory is required.
- #1700 (IPCS Keyboard/Mouse for Windows) is the default (in those countries that offer it).
- A display must be connected to the Integrated Netfinity Server to support Windows.
- For non-US keyboard/mouse and display, see: `http://www.as400.ibm.com/nt`

#2890 PCI Integrated Netfinity Server

#2891 Integrated xSeries Server

The #2890 PCI Integrated Netfinity Server contains a 700 MHz slot 1 processor and four memory slots in the Netfinity IOP.

The #2891 Integrated xSeries Server contains a 850 MHz Socket 370 processor and four memory slots in the Netfinity IOP.

The #2890/#2891 is supported only in the Model 270 system unit and in the #5075 PCI Expansion Tower when it is attached to the Model 270.

Each memory slot can contain either a 128 MB, a 256 MB, or a 1024 MB Netfinity IOP Memory card. This provides a total memory capacity ranging from 128 MB to 4 GB.

Note: When the maximum memory is installed, only 3712 MB will be addressable.

At least one Netfinity IOP memory card is required.

The feature numbers of the Netfinity IOP memory cards are:

- #2795 - 128 MB Netfinity IOP Memory
- #2796 - 256 MB Netfinity IOP Memory
- #2797 - 1 GB Netfinity IOP Memory

Allowable Main Storage Increments (MB)							
128	256	384	512	640	768	896	1024
1152	1280	1408	1536	1664	1792		2048
2176	2304	2432	2560				3072
3200	3328						4096

At least one LAN IOA is required. Refer to the “PCI Card Placement Rules” chapter of the *iSeries and AS/400e System Builder*, SG24-2155, for complete rules for placing these PCI cards in configurations.

The #2890/#2891 supports up to three, in any combination, of these LAN IOA features:

- #2743 PCI 1 Gbps Ethernet IOA
- #2760 PCI 1 Gbps Ethernet UTP IOA
- #4838 PCI 100/10 Mbps Ethernet IOA
- #2744 PCI 100 Mbps Token-Ring IOA

One #0225 (1 Gbps Ethernet on the Integrated Netfinity Server) is required for each 1 Gbps Ethernet adapter selected to run on the #2890/#2891.

One #0224 (100/10 Mbps Ethernet on the Integrated Netfinity Server) is required for each #4838 selected to run on the #2890/#2891.

One #0223 (100 Mbps Token-Ring on the Integrated Netfinity Server) is required for each #2744 selected to run on the #2890/#2891.

Native iSeries and AS/400e functions are not supported. The #2890/#2891servers do not support external host LAN.

The #2890/#2891 requires two PCI card slots in the Model 270 system unit. One slot is consumed, and the second slot is reduced to a short card slot, which is used by the first attached LAN IOA card.

The #2890/#2891 requires three PCI card slots on the expansion tower backplane. Two slots are consumed by the #2890/#2891, and the third slot is reduced to a short card slot, which will be used by the first LAN IOA card.

The #2890/#2891 ships with a keyboard/mouse splitter cable.

The #2890/#2891 supports only the Window NT and Windows 2000 operating systems. These points apply:

- A #0325 IPCS Extension Cable for Windows is the default (but may be removed).
- A minimum of 128 MB Netfinity IOP Memory is required.
- The #1700 (IPCS Keyboard/Mouse for Windows) is the default (in those countries that offer it).
- A display must be connected to the Integrated Netfinity Server to support Windows.

For non-US keyboard/mouse and display, see `http://www.as400.ibm.com/nt`

Migration Tower Hardware PCI

#2809 PCI LAN/WAN/Workstation IOP

This feature controller IOP can be used for attaching PCI LAN, WAN, and Workstation IOAs to the system. The #2809 supports different combinations of cards depending on where it is installed in the #503x Migration Tower. It is supported for migration only in the #503x Migration Tower.

#2824 PCI LAN/WAN/Workstation IOP

This IOP is a feature I/O processor with 32 MB of memory installed in the #5034 and #5035 Migration Tower I and in the #5065 PCI Expansion Tower and the #5066 1.8M I/O Tower. It is supported for migration only in the #503x Migration Tower.

#2851 PCI Integrated PC Server

The #2851 Integrated PC Server contains a 166 MHz Pentium processor, four IOP memory slots, and two LAN IOA slots. Supported for migration only in #503x Migration Towers.

#2854 PCI Integrated PC Server

The #2854 Integrated PC Server contains a 200 MHz Pentium processor, four IOP memory slots, and two LAN IOA slots. Supported for migration only in #503x Migration Towers.

#2865 PCI Integrated Netfinity Server

The Integrated Netfinity Server contains an Intel 333 MHz Pentium II processor, four main storage slots, and two LAN IOA slots. The Integrated Netfinity Server provides high performance serving to LAN attached PCs. OS/2 Warp Server for AS/400, Novell NetWare, Lotus Domino, Flowmark, Firewall for AS/400, and Microsoft Windows NT Server are supported on the Integrated Netfinity Server. This adapter requires two (reserved) PCI card positions. One is for the processor card, and one for a bridge card that acts as the interface to the system. The IPCS also comes with a special cable, which allows for a connection on the back of the bridge card to industry-standard keyboard, mouse, serial, and parallel connectors. Between one and four of these memory features must be installed in the Integrated Netfinity Server and allows between 32 MB and 512 MB of main storage:

- #2861—32 MB IOP Memory
- #2862—128 MB IOP Memory
- #2867—256 MB IOP Memory

When running OS/2, a maximum of 512 MB IOP memory is supported.

One or two of these LAN IOA features must be installed in the Integrated Netfinity Server:

- #2723—PCI Ethernet IOA
- #2724—PCI 16/4 Mbps Token-Ring IOA
- #2838—PCI 100/10 Mbps Ethernet IOA

Only one of the LAN IOAs can be a #2838 100/10 Mbps Ethernet IOA. If the #2838 is run on the #2865 Integrated Netfinity Server, the #0222 100/10 Mbps Ethernet on IPCS is required.

If Windows NT is running on the #2865 Integrated Netfinity Server, these considerations apply to the Integrated Netfinity Server:

- The #0325 IPCS Extension Cable for Windows NT (required)
- The #1700 IPCS Keyboard/Mouse for Windows NT (default in certain countries)
- A display must be connected to the IPCS to support Windows NT
- A minimum of 64 MB IOP memory on the Integrated Netfinity Server

For keyboard/mouse and display support in countries outside of the USA, consult the Web site at: `http://www.as400.ibm.com`

Migration Tower Hardware SPD

#2629 SPD LAN/WAN/Workstation IOP

This adapter uses one SPD slot. It supports up to three of these IOAs:

- #2699 Two-Line WAN IOA
- #6149 16/4 Mbps Token-Ring IOA

- #6180 Twinaxial Workstation IOA
- #6181 Ethernet/IEEE 802.3 IOA

One #2629 supports any combination of adapters with one restriction. There is a maximum of two LAN IOAs.

Up to seven #2629s can be placed into each 1063 Mbps System Unit Expansion Tower #5072. The #2629 is not allowed in slot 14 of the #5072 tower. No restrictions apply when using the #2629 with a #5073 tower.

#2810 LAN/WAN IOP

This IOP is used in SPD cages for attaching the #2838 PCI 100/10 Mbps Ethernet IOA or one of the #281x PCI ATM IOAs. It is a high workload IOP and has configuration limitations.

#6616 Integrated PC Server (Formerly FSIOP)

The #6616 Integrated PC server contains a 166 MHz Pentium processor, two IOP memory slots, and two LAN IOA slots. Supported for migration only.

#6617 Integrated PC Server

The #6617 Integrated PC server contains a 200 MHz Pentium processor, two IOP memory slots, and three LAN IOA slots. Supported for migration only.

#6618 Integrated Netfinity Server

The Integrated Netfinity Server contains an Intel 333 MHz Pentium II processor, four main storage slots, and three LAN IOA slots. The IPCS provides high-performance LAN serving to LAN-attached PCs. OS/2 Warp Server for AS/400, Novell IntraNetWare, Lotus Domino, Flowmark, Firewall for AS/400, and Windows NT server are supported on the Integrated Netfinity Server.

The #6618 Integrated Netfinity Server requires three IOP slots. It comes with no base main memory and supports up to four of these memory features to allow between 32 MB and 1024 MB of memory:

- #2861 32 MB IOP Memory Card
- #2862 128 MB IOP Memory Card
- #2867 256 MB IOP Memory Card

When running OS/2, the memory maximum is 512 MB.

Each LAN slot can contain either a Token-ring or an Ethernet IOA from this list, up to a maximum of three. At least one IOA feature is required:

- #2723/#9723 PCI Ethernet IOA (10 Mbps)
- #2724/#9724 PCI 16/4 Mbps Token Ring IOA
- #2838/#9738 PCI 100/10 Mbps Ethernet IOA

If the #2724/#9724 is selected, a #0220 (token-ring on IPCS) is required for each #2724/#9724 selected to run on the #6618. If the #2723/#9723 is selected, a #0221 (Ethernet on IPCS) is required for each #2723/#9723 selected to run on the #6618. If the #2838/#9738 is selected, a #0222 (100/10 Mbps Ethernet on IPCS) is required for each #2838/#9738 selected to run on the #6618.

All three PCI slots can be used for the Integrated Netfinity Server with only two of the three slots supporting native AS/400 functions. A maximum of two #2838/#9738 can be used on each Integrated Netfinity Server: one native and one Windows NT dedicated. The #6618 cannot be placed in a #5044.

An external cable is included to enable connectivity to IPCS hardware (keyboard or mouse), which also allows for optional use of parallel and serial ports. If you run Windows NT on the #6618, these considerations apply:

- The #0325 IPCS Extension Cable for Windows NT (can be ordered)
- A #1700 IPCS Keyboard/Mouse for Windows NT (default in certain countries and ordable).
- A display must be connected to the IPCS to support Windows NT
- A minimum of 64 MB IOP memory on the Integrated Netfinity Server

For keyboard or mouse and display support in countries outside the USA, consult the Web site at: `http://www.as400.ibm.com`

I/O Adapter

I/O Adapter

I/O Adapters and Controllers

This chapter discusses system unit (PCI) and migration tower (PCI and SPD) I/O adapters for processors 270, 8xx, SB2, and SB3 and associated towers.

Homologation

Homologation is the process to obtain country government approval to ship a device and connect it to the country telecommunications network. The action is similar to Federal Communications Commission (FCC) approval in the United States.

There are features on the system that require homologation by country government organizations, usually Post Telephone and Telegram departments (PTTs). This table lists features as examples of those that must meet specific homologation regulations in each country before they can be ordered and delivered.

The following table summarizes the PCI features that may require homologation in certain countries. The features are described in detail later in this chapter.

Feature Code	Description
#0032	High speed modem
#2750	PCI ISDN Bri U IOA - 2-wire
#2751	PCI ISDN Bri S/T IOA - 4-wire
#2761	Integrated Analog Modem
#2772	Two line WAN with integrated modems
#2773	Two line WAN with integrated modems
#4750	PCI ISDN Bri U IOA - 2-wire
#4751	PCI ISDN Bri S/T IOA 4-wire
#4761	Integrated Analog Modem
#9771	Base PCI Two-Line WAN with Modem

PCI Card Technology

The fundamental bus architecture of the AS/400e server remains unchanged with the implementation of PCI adapters. The AS/400e IOP architecture continues to off load cycles from the main processor, isolate the host from adapter and network errors, and manage,

configure, and service the adapters. PCI architecture continues to offer advantages over other system structures.

There are several types of PCI cards, each of which requires a specialized slot on the AS/400e Model 250 backplane:

- **Low-Speed PCI Adapter Cards**: Low-speed PCI cards require a PCI card slot and a PCI controller to drive them. This PCI controller can either be included on the backplane or as a separate PCI card that attaches to the backplane.
- **High-Speed PCI Adapter Cards**: High-speed PCI cards require a higher bandwidth connection to the PCI controllers than low-speed PCI cards require. The PCI controller can be included on the backplane or as a separate PCI card that attaches to the backplane.
- **Low-Speed/High-Speed PCI Adapter Cards**: The Low-speed/High-Speed PCI cards can be installed in either a low-speed slot or high-speed slot.
- **PCI Controller Cards**: PCI controller cards support a number of low-speed PCI card slots and a number of high-speed PCI card slots depending on how the backplane is wired. They require a controller position on the backplane.
- **Integrated xSeries Server for iSeries Controller Cards**: The latest manufacturing variance of the PCI controller cards, the Integrated xSeries Server for iSeries supports PCI card slots and requires a PCI controller to drive it. The Integrated xSeries Server occupies a reserved two-slot controller position on the backplane. One slot is for the Integrated xSeries Server processor card, and one is for the Integrated iSeries Server Bridge card.

V5R1 System Unit Hardware (PCI)

Note

PCI configuration rules for V5R1 hardware are flexible. Refer to the “PCI Card Placement Rules” chapter of the *iSeries and AS/400e System Builder*, SG24-2155, for complete rules for placing these PCI cards in configurations.

#2743 PCI 1 Gbps Ethernet IOA

The #2743 PCI 1 Gbps Ethernet IOA feature allows the iSeries servers to attach to IEEE standard 802.3Z high speed Ethernet LANs (1 Gbps). The adapter supports multi-mode fiber media attachment from the adapter to a Gb-capable switch with at least one port that supports a 1000 BASE-SX interface with IEEE 802.3z and 802.3u compliance. The #2743 supports a multi-mode fiber interface with a 62.5 micron or 50.0 micron cable for attachment to customer supplied cabling.

The #2743 PCI 1 Gbps Ethernet IOA supports a 1000 Mbps (1 Gbps) full duplex interface only and TCP/IP protocol only. Cannot negotiate down to a lower speed. Stations on 10 Mb, 100 Mb, and 1000 Mb (1 Gb) switched LANs can interface with the #2743 through a switch that is capable of handling the lower speed. The #2743 can run under a #2790 or #2890 Integrated Netfinity Server and under a #2791 or #2891 PCI Integrated xSeries Server in V5R1. A #0225 1Gbps Ethernet Specify is needed for each #2743 running under one of these Integrated Servers.

#2744 PCI 100/16/4 Mbps Token Ring IOA

The #2744 PCI 100 Mbps Token-Ring IOA provides a single attachment to a 100 Mbps, 16 Mbps, or 4 Mbps IBM Token Ring network. The feature consists of an IOA card, internal code, which supplies IEEE 802.5 Media Access Control (MAC), and IEEE 802.2 Logical Link Control (LCC) functions. The 100/16/4 Token Ring IOA is capable of operating in half or full duplex mode.

The #2724/#9724 comes standard with an 8ft/2.44m Token-Ring cable. Alternately, a separately purchased twisted-pair cable to the RJ-45 connection on the IOA may be attached.

If the #2744 is selected to run on a #2790 or #2890 Integrated Netfinity Server or on a #2791 or #2891 PCI Integrated xSeries Server, one #0223 (100 Mbps Token-Ring on Integrated Netfinity Server) is required for each #2744 ordered.

#2760 1 Gbps/100 Mbps/10 Mbps UTP Ethernet UTP IOA

The #2760 PCI UTP Ethernet IOA feature allows to attach to IEEE standard 802.3Z high-speed Ethernet LANs (1 Gbps) to provide a significant performance improvement over other LAN solutions. The adapter supports a UTP CAT 5 media interface. The #2760 supports half and full duplex mode, and TCP/IP only. This adapter can negotiate to a lower speed and can directly attach to 10 Mbps or 100 Mbps networks. A #2760 is supported under a #2790 or #2890 Integrated Netfinity Server and under a #2791 or #2891 PCI Integrated xSeries Server in V5R1. A #0225 1 Gbps Ethernet Specify is needed for each #2743 running under one of these Integrated Netfinity Servers or Integrated xSeries Servers. Use Enhanced Category 5 cable for the best results.

#2765 PCI Fibre Channel Tape Controller

The #2765 PCI Fibre Channel Tape Controller provides fibre channel attachment capability for external tape devices. The #2765 supports point-to-point and arbitrated loop topologies. Each #2765 is shipped with a wrap connector (PN#05N6767).

These options are available to attach SC-type fibre cables:

- The #0371 is a two meter LC-SC Adapter kit that can be used to connect the #2765 to a 50 µm (50 micron) cable.
- The #0372 is a two meter LC-SC Adapter kit that can be used to connect the #2765 to a 62.5 µm (62.5 micron) cable.

Fibre channel attachment for tape drives offers tremendous performance capabilities and long distance options. It is also easier for you to share these valuable resources with multiple systems.

The tape subsystems that are supported by the #2765 PCI Fibre Channel Tape Controller are:

- 3590 Models E11 or E1A with feature #9510 (on new orders)
- 3590 Models E11 or E1A with feature #3510 (upgrade of installed SCSI tape drives to fibre channel)
- 3583 with drive feature #8005
- 3584 with drive feature #1456

Only one tape unit can be connected per IOA.

#2766 PCI Fibre Channel DASD Controller

The #2766 PCI Fibre Channel DASD Controller provides fibre channel attachment capability for external disk devices. The #2766 supports point-to-point and arbitrated loop topologies. Each #2766 is shipped with a wrap connector (PN#05N6767). Just as for the #2765, these options are available to attach SC-type fibre cables:

- The #0371 is a two meter LC-SC Adapter kit that can be used to connect the #2765 to a 50 µm (50 micron) cable.
- The #0372 is a two meter LC-SC Adapter kit that can be used to connect the #2765 to a 62.5 µm (62.5 micron) cable.
- The #2766 requires a dedicated IOP. No other IOA is allowed on an IOP with the #2766.

Some iSeries customers may find SAN-attached DASD devices to be appealing for their environment. If consolidating large amounts of DASD from different platforms is important, you should consider SAN. Note, however, a complex commercial business environment usually requires good, predictable response time to maintain user productivity and satisfaction. Carefully consider the performance implications of sharing resources in this environment, because the sharing may introduce more variable performance. For critical workloads, dedicated direct attach DASD resource can ensure more predictable performance. Feature #2766, PCI Fibre Channel Disk Controller, for attachment into Storage Area Networks for DASD is offered as an optional feature, when ordered with RPQ 847126.

Important note

The #6501 is withdrawn from marketing as of 31 July 2001. A #2766 Fibre Channel Adapter supported on the iSeries with OS/400 V5R1, can be used to attach the Enterprise Storage Server (ESS).

#2772 and #2773 two line WAN adapters

The #2772 and #2773 are basically the same interface. The #2772 is the non-CIM (Complex Impedance Matching) version of this card. Both are 2-line WAN adapters, with two ports (RJ11) supporting V.90 56K Async PPP and FAX applications at data rates up to 14.4K via internal modems. Connection to the V.90 ports is via a telephone cable. Both of these features do not support remote power on. The new cards can be used for the purpose of Multilink. These cards need country-specific telephone cables (a minimum of one and a maximum of two per card). Feature #2773, the Complex Impedance Matching version, is intended for Australia and New Zealand only. Compared with the existing #4761, with eight analog modem ports, the #2772/#2773 and #4761 both have fax capabilities, but the #4761 is more robust in this area. This is because the #4761 handles the fax process in the card, where the #2772/#2773 passes it off to the system. The #2772/#2773 is a good option for those wanting to add some additional ports, but not wanting to add eight and if you do not need V.34 synchronous support that is provided by the #4761. All cable features must be the same on the same iSeries server.

Cable features supported with the #2772 are:

- #1010 Modem Cable-Austria
- #1011 Modem Cable-Belgium
- #1012 Modem Cable-Africa
- #1013 Modem Cable-Israel
- #1014 Modem Cable-Italy
- #1015 Modem Cable-France
- #1016 Modem Cable-Germany
- #1017 Modem Cable-UK
- #1018 Modem Cable-Iceland/Sweden
- #1020 Modem Cable-Hong Kong and New Zealand
- #1021 Modem Cable-Fin/Nor
- #1022 Modem Cable-Netherlands
- #1023 Modem Cable-Swiss
- #1024 Modem Cable-Denmark
- #1025 Modem Cable-US/Canada

Cable features supported with the #2773 are:

- #1019 Modem Cable-Australia
- #1020 Modem Cable-HK/NZ

#2817 155 Mbps MMF ATM

The #2817 is a 155 Mbps Asynchronous Transfer Mode (ATM) PCI card that allows the server to be attached into an ATM network using the Multi-Mode Fiber (MMF) 62.5 micron interface. This interface is intended for connection to both local area switches and direct connection to service provider equipment. The #2817 will typically be used where 155 Mbps speeds are required over distances of less than 2Km. This card is a 64-bit card, but is allowed to plug into any 32-bit or 64-bit slot. This feature replaces #4816, on orders with V5R1 OS/400 in the configuration.

The #2817 ATM is a Non-Assist IOA. Functions that the card might handle are moved to the system level. Such things as fragmentation reassembly, address verification, IP filtering, and checksum generation verification are handled by the system. This allows the card to process data faster. Increased performance has also come from the more optimized transmit/receive path.

#4723 PCI 10 Mbps Ethernet IOA

Provides a single attachment to one Carrier Sense Multiple Access/Collision Detect Local Area Network. It consists of an adapter card and internal code, which supplies Ethernet Version 2 and IEEE 802.3 Media Access Control (MAC), plus 802.2 Logical Link Control (LLC) functions. The Ethernet/IEEE 802.3 IOA is capable of operating in half or full duplex mode.

It has an RJ-45 connector and a 15-pin D-shell connector for attachment of customer-supplied cabling. A vendor AUI Ethernet cable or RJ-45 twisted-pair cable must be ordered separately.

The #4723 is not supported under a #2790 or #2890 Integrated Netfinity Server, nor under the #2791 or #2891 PCI Integrated xSeries Server.

#4745 PCI Two-Line WAN IOA

Supports up to two multiple protocol communications ports when one of two (in any combination) of these cables are attached:

- #0348 V.24/EIA232 20ft/6m PCI cable
- #0349 V.24/EIA232 50ft/15m PCI cable
- #0353 V.35 20ft/6m PCI cable
- #0354 V.35 50ft/15m PCI cable
- #0355 V.35 80ft/24m PCI cable

- #0356 V.36 20ft/6m PCI cable
- #0358 V.36 150ft/45m PCI cable
- #0359 X.21 20ft/6m PCI cable
- #0360 X.21 50ft/15m PCI cable
- #0365 V.24/EIA232 80ft/24m PCI cable
- #0367 Operations Console cable*

*Only one #0367 Operations Console cable is allowed per #4745.

#4746 PCI Twinaxial Workstation IOA

The #4746 is an 8-port twinaxial workstation IOA with a 20-foot attachment cable for attaching up to 40 5250-type displays and printers. Each port supports seven attached devices and allows up to 56 attached addresses of which only 40 can be active. When the attached display supports address sharing, a maximum of 120 shared sessions are supported.

#4750 PCI ISDN BRI U IOA

The #4750 is a 4-port (8-channel) ISDN BRI (basic rate interface) full-sized PCI card. Based on the latest DSP technology, the #4750 allows connections to fax or data modems connected to the telephone network with analog phone lines as well as to other IDSN devices. Each port consists of 2B+D configuration. The #4750 is the “U”-bus (2 wire) version IOA.

- For data mode support, B-channel supports digital data at 64 Kbps.
- For modem mode support, B-channel supports V.90 and lesser modulations.

Four 30-ft RJ-45 to RJ-45 network cables are shipped with each card.

The #4750 IOA supports full duplex mode. It supports the PPP, IDLC, and Fax protocols.

This feature requires country certification or homologation.

#4751 PCI ISDN BRI S/T IOA

The #4751 is a 4-port (8-channel) ISDN BRI (basic rate interface) full-size PCI card. Based on the latest DSP technology, the #4751 allows connections to fax or data modems connected to the telephone network with analog phone lines, as well as to other IDSN devices. Each port consists of 2B+D configuration. The #4751 is the “S/T”-bus (4 wire) version IOA.

- For data mode support, the B-channel supports digital data at 64 Kbps.
- For modem mode support, the B-channel supports V.90 and lesser modulations.

Four 30-foot RJ-45 to RJ-45 network cables are shipped with each card.

The #4751 IOA supports full duplex mode. It supports the PPP, IDLC, and Fax protocols.

This feature requires country certification or homologation.

#4761 Integrated Analog Modem

Based on the latest DSP technology, the #4761 allows the modem function to be integrated into the IOA and has eight analog modem ports. Eight 30-foot (9.3 m) phone cables are shipped with each #4761. The #4761 runs these protocols without the need for an external modem:

- SLIP/PPP uses V.90, so maximum line speed is 56 Kbps
- SDLC uses V.34, so maximum line speed is 33.6 Kbps
- Fax uses V.17 to achieve a 14.4 Kbps maximum line speed

Fax is supported on any or all modem ports and requires an asynchronous line description for each port used for fax. An asynchronous line description can only be used for Fax. ECS line not supported. To the iSeries server, the #4761 appears like a single IOA with eight individual resources available. For configuration purposes, each #4761 counts as eight communications lines. It supports full duplex.

This feature requires country certification or homologation.

#4801 PCI Crypto Coprocessor

The #4801 is a hardware cryptography solution based on the IBM #4758 card. The #4801 is a half-length PCI card that offers rich cryptography function, secure storage of cryptographic keys, and triple DES capability. The level of the cryptographic function is determined by the Cryptographic Access Provider Licensed Program, which is used to set the key length in the adapter.

The #4801 is available worldwide.

Note: On new systems from the plant, the #4801 is shipped with the system, but due to temperature requirements (card temperature must not drop below 5 F (-15 C)), it is not installed.

#4802 PCI Crypto Coprocessor

The #4802 is a hardware cryptography solution based on the IBM #4758 card. The #4802 is a half-length PCI card that offers rich cryptography function, secure storage of cryptographic keys, and triple DES capability. The level of the cryptographic function is determined by the Cryptographic Access Provider Licensed Program, which is used to set the key length in the adapter. The #4802 provides greater security by use of 168-bit key (compared to a 56-bit key of the #4800).

The #4802 is only supported in the #5065 Storage/PCI Expansion Tower and the #5066 1.8m I/O Tower.

The #4800 is not supported on the 8xx models nor in #503X/#5077 migration towers and their attached expansion towers. Convert each #4800 PCI Crypto Coprocessor installed in a Model 7xx or attached expansion towers to a #4802 PCI Crypto Coprocessor.

Note: On new shipments from the plant, the #4802 is shipped with the system but due to temperature requirements (card temperature must not drop below 5 F (-15 C)), it is not installed.

The #4802 is available worldwide.

#4815 PCI 155 Mbps Unshielded Twisted Pair ATM IOA

This feature allows iSeries servers to be attached to an Asynchronous Transfer Mode (ATM) network using the Unshielded Twisted Pair (UTP-5) interface. This interface is intended for connection to both local area switches and direct connection to service provider equipment. The #4815 is typically used where 155 Mbps speeds are required over distances of less than 100 meters.

#4816 PCI 155 Mbps Multi-Mode Fiber OC3 ATM IOA

The #4816 PCI ATM IOA is supported, but is no longer orderable with V5R1 and replaced by feature #2817. This feature allows iSeries servers to be attached to an Asynchronous Transfer Mode (ATM) network using the Multi-Mode Fiber (MMF) 62.5 micron interface. This interface is intended for connection to both local area switches and direct connection to service provider equipment. The #4816 is typically used where 155 Mbps speeds are required over distances of less than 2 km.

#4818 PCI 155 Mbps Single-Mode Fiber OC3 ATM IOA

This feature allows iSeries servers to be attached to an Asynchronous Transfer Mode (ATM) network using the Single-Mode Fiber (SMF) 9 micron interface. This interface is intended primarily for direct connection to service provider equipment but can be used for local area switches. The #4818 is typically used where 155 Mbps speeds are required over distances from 16 to 40 km.

#4838 PCI 100/10 Mbps Ethernet IOA

This feature allows iSeries servers to attach to a standardized 100 Mbps high-speed Ethernet LAN. It also allows the attachment to existing 10 Mbps Ethernet LANs. The adapter comes with an RJ-45 connector for attachment to UTP-5 media. Cabling for 10 Mbps must be CAT-3 or CAT-5. Cabling for 100 Mbps must be CAT 5 that meets or exceeds Industry Standard

EIA/TIA T568A or T568B. The maximum cable length is 100 meters. The Ethernet/IEEE 802.3 IOA is capable of operating in half or full duplex mode.

If the #4838 is selected to run on a #2790 or #2890 Integrated Netfinity Server or #2791 or #2891 PCI Integrated xSeries Server, one #0224 (100/10Mbps Ethernet on Integrated Netfinity Server) is required for each #4838 ordered.

#9771 Base PCI 2-Line WAN with Modem

The #9771 is a 2-line WAN adapter, with one port supporting multiple protocol communications and the other port supporting V.90 56K Async Data on PPP via an internal modem. Connection to the V.90 port is via telephone cable.

Connection to the WAN port is through one of these cables:

- #0348 V.24/EIA232 20 ft PCI cable
- #0349 V.24/EIA232 50-ft PCI cable
- #0353 V.35 20 ft PCI cable
- #0354 V.35 50-ft PCI cable
- #0355 V.35 80-ft PCI cable
- #0356 V.36 20 ft PCI cable
- #0358 V.36 150-ft PCI cable
- #0359 X.21 20 ft PCI cable
- #0360 X.21 50-ft PCI cable
- #0365 V.24/EIA232 80-ft PCI cable

Electronic Customer Support (ECS) on the telephone cable (RJ-11) port over TCP/IP is supported in V5R1, or with V4R5 and PTF SF64124 (5769-SS1). Download and install V4R5 Client Access Express Service Pack 2 or later to obtain Wizard (5769-XE1 SF64217). Then use Operational Navigator to configure this Universal Connection as stated in cover letter SF64124. This Universal Connection operates using the integrated high-speed V.90. This includes electronic fix retrieval and problem reporting.

In addition, this internal modem provides the ability for IBM to provide remote support over a dial-up connection.

PM/400 and Electronic Service Agent for AS/400 over TCP/IP is available. These applications are also enabled over the Universal Connection. In addition, the ability to inventory multiple systems hardware and software information is provided. This is done by consolidating multiple systems onto one Management Central system prior to transmission over this connection. For additional information, see:
`http://www.iseries.ibm.com/tstudio/planning/esa/esa.htm`

You can also refer to: `http://www.iseries.ibm.com/tstudio/planning/esa/esa.htm`

Fax is supported on the V.90 port with V5R1.

ECS also operates on the WAN port of the #9771 by changing the *RSRCNAME parameter of the QESLINE and QTILINE line descriptions to that of the WAN port on the #9771 card.

When the #9771 is selected to support ECS, specify one of these cables for connection to the WAN port:

- #0348 V.24/EIA232 20-ft PCI cable (the default)
- #0349 V.24/EIA232 50-ft PCI cable
- #0365 V.24/EIA232 80-ft PCI cable

The #9771 now supports the Operations Console as a system console. Remote power-on is not supported.

#2763 PCI RAID Disk Unit Controller

The #2763 is an Ultra2 SCSI disk unit controller with a 10 MB write-cache that provides RAID-5 protection for internal disk units and also supports internal tape and CD-ROM units.

In addition to providing RAID-5 protection for disks, the #2763 is also designed to work as a high-performance controller for disks protected by system mirroring or disks with no protection. In the RAID-5 configuration, disk unit protection is provided at a lower cost than mirroring and with greater performance than system checksums.

The #2763 controller supports a maximum of 12 disk units and up to two removable media devices and is available on the Model 270, the Model 820, and the #5075 PCI Expansion Tower.

A minimum of four drives of the same capacity are needed for a valid RAID-5 configuration. A maximum of three arrays are allowed, with a maximum of 10 drives allowed per array. All drives in an array must be of the same capacity.

The #2763 feature is hot pluggable.

#4778/#9778 PCI RAID Disk Unit Controller

The #4778/#9778 is an Ultra2 SCSI adapter with a maximum compressed write cache size of 104 MB that provides RAID-5 protection and compression for internal disk units, as well as supports internal tape units, CD-ROM, and DVD-RAM units. This new disk controller is available on all 270 and 8xx models.

The #4778/#9778 supports both disk compression and enhanced modes. The mode of operation is determined by a hardware jumper. The Ultra2 SCSI adapter #4778/#9778 is shipped in enhanced mode, which enables compression of the write cache, while Extended Adaptive Cache (a Read Cache Device is needed for Extended Adaptive Cache, see below) a

or RAID-protection are also supported. By moving the hardware jumper, the adapter will function in disk compression mode, and you can start compression for selected drives under control of the adapter.

In addition to providing RAID-5 protection for disks, the #4778/#9778 is also designed to work as a high performance controller for disks protected by system mirroring or disks with no protection.

The #4778/#9778 also supports the #4331 1.6 GB Read Cache Device, which is used by Extended Adaptive Cache to provide increased performance. The Read Cache Device (#4331) is supported only when #4778/#9778 is in enhanced mode.

The #4778/#9778 controller supports a maximum of 18 disk units.

Note: Due to system CEC and external tower disk unit cage SCSI bus designs, only the Model 270 will have a suitable system configuration to allow 18 disk units to attach to a single #4778. All other CEC/tower disk unit configurations will restrict the number of attaching disk units to 15 or less.

Note: Requires OS/400 V5R1 or later.

#4748/#9748 PCI RAID Disk Unit Controller

The #4748/#9748 is an Ultra2 SCSI disk unit controller with a 26 MB write-cache that provides RAID-5 protection for internal disk units and also supports internal tape and CD-ROM units. The #4748/#9748 supports both compression and non-compression modes. The mode of operation is determined by a hardware jumper, which is in the non-compression mode position when shipped. By moving the hardware jumper, the controller functions in compression mode.

In addition to providing RAID-5 protection for disks, the #4748/#9748 is also designed to work as a high-performance controller for disks protected by system mirroring or disks with no protection. In the RAID-5 configuration, disk unit protection is provided at less cost than mirroring and with greater performance than system checksums.

The #4748/#9748 controller supports a maximum of 18 drives. A minimum of four drives of the same capacity are needed for a valid RAID-5 configuration. A maximum of four arrays are allowed, with a maximum of ten drives allowed per array. All drives in an array must be of the same capacity.

The #4748/#9748 also supports two removable media devices. This feature supports the #4331 1.6 Gb Read Cache Drive for increased performance. The Read Cache Drive #4331 is only supported in non-compression mode.

The #4748 feature is hot pluggable.

The #4748 is supported in all 8xx processors and the Model 270.

#9767 PCI Disk Unit Controller

The #9767 is an Ultra2 SCSI disk unit and removable media device controller.

The #9767 is the default controller in the Model 270 and controls up to six disk units and up to two removable media devices (internal tape or CD-ROM/DVD-RAM).

The #9767 is the default controller in the Model 820 when RAID (#0041 Device Parity Protection-All) is not on the order and controls up to six disk units on the pre-V5R1processors and up to four disk units on the new V5R1 processors. Up to two removable media devices (internal tape or CD-ROM/DVD-RAM) are also supported.

In the #5075 PCI Expansion Tower, the #9767 supports up to four disk units.

#2749 PCI Ultra Magnetic Media Controller

The #2749 is an Ultra SCSI controller for attachment of an external tape device or an external optical device.

When attaching Ultra SCSI to a #2749, the instantaneous data transfer rate is 40 MB/sec, and the sustained rate is 38 MB/sec.

The #2749 feature is hot pluggable.

The devices that are supported by the #2749 include:

- 3490E
  - C11/C22/C1A/C2A ½-inch Cartridge Tape Subsystem with the #5040
  - E01/E11 ½-inch Cartridge Tape Subsystem
  - F00/F01/F11/F1A ½-inch Cartridge Tape Subsystem
- 3494
  - L10 ½-inch Cartridge Tape Library Control Unit Frame (one 3490E-C1A/C2A with the #5040 or one or two 3490E-F1A)
  - L12 ½-inch Cartridge Tape Library Control Unit Frame (one or two 3590-B1A)
  - D10 ½-inch Cartridge Tape Library Device Frame (one 3490E-C1A/C2A with the #5040 or one or two 3490E-F1A)
  - D12 ½-inch Cartridge Tape Library Device Frame (one to six 3590-B1A)
- 3570
  - B00/B01/B02/B11/B12/B1A Cassette Tape Subsystem
  - C00/C01/C02/C11/C12/C1A Cassette Tape Subsystem

- 3575-L06/L12/L18/L24/L32 ½-inch Cartridge Tape Subsystem
- 3580-H11 Ultrium Tape Drive
- 3581-H17 Ultrium Tape Autoloader
- 3583-Lxx Ultrium Scalable Tape Library
- 3584-L32 or D32 UltraScalable Tape Library
- 3590-B11/B1A/E11/E1A ½-inch Cartridge Tape Subsystem
- 3995-C40/C42/C44/C46/C48 Optical Library Dataserver
- 7208-012/222/232/234/342 8mm Cartridge Tape Unit
- 9348-001 ½-inch Reel Tape Unit–Rack Mount
- 9348-002 ½-inch Reel Tape Unit–Table Top
- 9427-21x 8mm Tape Library

Refer to the card placement rules for supported systems and valid slots.

#2768 PCI Magnetic Media Controller

The #2768 is an Ultra SCSI controller for attachment of an external tape device or an external CD-ROM device that has a Single Ended SCSC interface.

The devices that are supported by #2768 are:

- 7207-Model 122 QIC-SLR Tape Bridge Box
- 7210-Model 020 CD-ROM Bridge Box
- 7210-Model 025 DVD-RAM drive
- 7329-308 SLR100 ¼-inch Tape Autoloader

The #2768 PCI Magnetic Media Controller supports one, or a combination, of these devices:

- One 7207- Model 122
- One 7210- Model 020
- One 7210- Model 025
- One 7329- Model 308
- One 7210- Model 025 and one 7210- Model 025 (the two devices are daisy-chained)
- One 7210- Model 025 and one 7210- Model 020 (the two devices are daisy-chained with the 7210- Model 025 physically connected first; no #0120 attachment specify code is required for the 7210- Model 020)
- One 7207- Model 122 and one 7210- Model 020 (the two devices are daisy-chained with the 7207- Model 122 physically connected first; no #0120 attachment specify code is required for the 7210- Model 020)

- One 7207- Model 122 and one 7210- Model 025 (the two devices are daisy-chained with the 7207- Model 122 physically connected first)

The #2768 feature is hot pluggable.

Migration Tower PCI Hardware

#2720/#9720 PCI WAN/Twinaxial IOA

This combined twinaxial/communication adapter supports 28 active twinaxial addresses. It ships with a cable and a 4-port expansion box, with each port supporting seven attached addresses. When the attached display supports address sharing, a maximum of 112 shared sessions are supported. It also supports a single communications line. See “#9720 Base PCI WAN/Twinaxial IOA” on page 97 for a discussion of the communications capabilities of this adapter. When the attached display supports address sharing, a maximum of 112 shared sessions are supported.

The #9720 is supported for migration only.

#2721/#9721 PCI Two-Line WAN IOA

The #2721/#9721 supports up to two multiple protocol communications ports and is supported for migration only.

#2722 PCI Twinaxial Workstation IOA

The #2722 is an 8-port twinaxial workstation IOA with a 20-foot attachment cable for attaching up to 40 5250-type displays and printers. Each port supports seven attached addresses. This allows up to 56 attached addresses of which only 40 can be active. When the attached display supports address sharing, a maximum of 120 shared sessions are supported. The #2722 is specified when additional PCI twinaxial workstations controllers are required.

#2723/#9723 PCI Ethernet IOA (10 Mbps)

This feature provides a single attachment to one Carrier Sense Multiple Access/Collision Detect Local Area Network. It consists of an adapter card and internal code that supplies Ethernet Version 2 and IEEE 802.3 Media Access Control (MAC), plus 802.2 Logical Link Control (LLC) functions. The Ethernet/IEEE 802.3 IOA is capable of operating in half or full duplex mode. RJ-45 cabling for 10 Mbps must be CAT-3 or CAT-5. If CAT 5 is used, it must meet or exceed Industry Standard EIA/TIA T568A or T568B.

It has an RJ-45 connector and a 15-pin D-shell connector for attachment of customer-supplied cabling. A vendor AUI Ethernet cable or RJ-45 twisted-pair cable must be ordered separately.

If the #2723/#9723 is selected to run on a #2866 Integrated Netfinity Server, one #0221 (Ethernet on Integrated Netfinity Server) is required for each #2723/#9723 this is ordered.

#2724/#9724 PCI 16/4 Mbps Token-Ring IOA

This feature provides a single attachment to either a 16 Mbps or 4 Mbps token-ring. The feature consists of an IOA card, internal code, which supplies IEEE 802.5 Media Access Control (MAC), and IEEE 802.2 Logical Link Control (LCC) functions. The IOA is capable of operating in half or full duplex mode.

The #2724/#9724 comes standard with an 8ft/2.44m token-ring cable. An alternately or a separately purchased twisted-pair cable to the RJ-45 connection on the IOA may be attached.

The #2724/#9724 provides one LAN attachment for the #6618 Integrated Netfinity Server. The #6618 is a prerequisite for the #2724/#9724, and it uses one LAN IOA slot in the #6618.

If the #2724/#9724 is selected to run on a #2866 Integrated Netfinity Server, one #0220 (token-ring on Integrated Netfinity Server) is required for each #2724/#9724 ordered.

#2745/9745 PCI Two-Line WAN IOA

Supports up to two multiple protocol communications ports when one or two (in any combination) of these cables are attached:

- #0348 V.24/EIA232 20ft/6m PCI cable
- #0349 V.24/EIA232 50ft/15m PCI cable
- #0353 V.35 20ft/6m PCI cable
- #0354 V.35 50ft/15m PCI cable
- #0355 V.35 80ft/24m PCI cable
- #0356 V.36 20ft/6m PCI cable
- #0358 V.36 150ft/45m PCI cable
- #0359 X.21 20ft/6m PCI cable
- #0360 X.21 50ft/15m PCI cable
- #0365 V.24/EIA232 80ft/24m PCI cable
- #0367 Operations Console cable*

*Only one #0367/#9745 Operations Console cable is allowed per #2745.

#2746 PCI Twinaxial Workstation IOA

The #2746 is an 8-port twinaxial workstation IOA with a 20-foot attachment cable for attaching up to 40 5250-type displays and printers. Each port supports seven attached addresses and allows up to 56 attached addresses of which only 40 can be active. When the attached display supports address sharing, a maximum of 120 shared sessions are supported. The #2746 is specified when additional PCI twinaxial workstation controllers are

required. This IOA is a direct replacement for the #2722. Feature #2746 requires V4R4 or later, and can be installed in either high or low speed slots.

#2750 PCI ISDN BRI U IOA

The #2750 is a 4-port (8-channel) ISDN BRI (basic rate interface) full-sized PCI card. Based on the latest DSP technology, the #2750 allows connections to fax or data modems connected to the telephone network with analog phone lines as well as to other IDSN devices. Each port consists of 2B+D configuration. The #2750 is the “U”-bus (2 wire) version IOA.

- For data mode support, B-channel supports digital data at 64 Kbps.
- For modem mode support, B-channel supports V.90 and lesser modulations.

A wrap cable/plug and four 30-foot RJ-45 to RJ-45 network cables are shipped with each card.

The #2750 IOA supports full duplex mode. It supports the PPP, IDLC, and Fax protocols.

This feature requires country certification or homologation.

#2751 PCI ISDN BRI S/T IOA

The #2751 is a 4-port (8-channel) ISDN BRI (basic rate interface) full-size PCI card. Based on the latest DSP technology, the #2751 allows connections to fax or data modems connected to the telephone network with analog phone lines, as well as to other IDSN devices. Each port consists of 2B+D configuration. The #2751 is the “S/T”-bus (4 wire) version IOA.

- For data mode support, the B-channel supports digital data at 64 Kbps.
- For modem mode support, the B-channel supports V.90 and lesser modulations.

A wrap cable and plug and four 30-foot RJ-45 to RJ-45 network cables are shipped with each card.

The #2751 IOA supports full duplex mode. It supports the PPP, IDLC, and Fax protocols.

This feature requires country certification or homologation.

#2761 Integrated Analog Modem

Based on the latest DSP technology, the #2761 allows the modem function to be integrated into the IOA and supports multiple analog modem ports (eight phone lines). Each line supports V.90 and lesser modulations. The #2761 IOA supports full duplex mode.

A wrap cable/plug and eight 30-foot UTP phone cables are shipped with each card.

This feature supports the SLIP, PPP, SDLC, and Fax protocols. An asynchronous line description is required that can only be used for fax. The #2761 is configured as a single IOA with eight individual resources available.

This feature requires country certification or homologation.

#2815 PCI 155 Mbps Unshielded Twisted Pair ATM IOA

This feature allows the iSeries server to be attached to an Asynchronous Transfer Mode (ATM) network using the Unshielded Twisted Pair (UTP-5) interface. This interface is intended for connection to both local area switches and direct connection to service provider equipment. The #2815 is typically used where 155 Mbps speeds are required over distances of less than 100 meters.

#2816 PCI 155 Mbps Multi-Mode Fiber OC3 ATM IOA

This feature allows the iSeries server to be attached to an Asynchronous Transfer Mode (ATM) network using the Multi-Mode Fiber (MMF) 62.5 micron interface. This interface is intended for connection to both local area switches and direct connection to service provider equipment. The #2816 is typically used where 155 Mbps speeds are required over distances of less than 2 km.

#2818 PCI 155 Mbps Single-Mode Fiber OC3 ATM IOA

This feature allows the iSeries server to be attached to an Asynchronous Transfer Mode (ATM) network using the Single-Mode Fiber (SMF) 9 micron interface. This interface is intended primarily for direct connection to service provider equipment but can be used for local area switches. The #2818 is typically used where 155 Mbps speeds are required over distances from 16 to 40 km.

#2838/#9738 PCI 100/10 Mbps Ethernet IOA

This feature allows the iSeries server to attach to a standardized 100 Mbps high-speed Ethernet LAN. It also allows attachment to existing 10 Mbps Ethernet LANs. The Ethernet/IEEE 802.3 IOA is capable of operating in half or full duplex mode. The adapter comes with an RJ-45 connector for attachment to UTP-5 media. Cabling for 10 Mbps must be CAT-3 or CAT-5. Cabling for 100 Mbps must be CAT-5 that meets or exceeds Industry Standard EIA/TIA T568A or T568B.

If the #2838/#9738 is selected to run on a #2866 Integrated Netfinity Server, then one #0222 (100/10 Mbps Ethernet on Integrated Netfinity Server) is required for each #2838/#9738 ordered.

#4802 PCI Crypto Coprocessor

The #4802 is a hardware cryptography solution based on the IBM #4758 card. The #4802 is a half-length PCI card that offers rich cryptography function, secure storage of cryptographic keys, and triple DES capability. The level of the cryptographic function is determined by the Cryptographic Access Provider Licensed Program, which is used to set the key length in the adapter. The #4802 provides greater security by use of 168-bit key (compared to a 56-bit key of the #4800).

The #4802 is available worldwide.

Each #4800 PCI Crypto Coprocessor installed in a Model 6xx/Sxx/7xx or attached expansion towers must be converted to a #4802 PCI Crypto Coprocessor. The #4800 is not supported on the 8xx models nor in #503X/#5077 migration towers and their attached expansion towers.

Note: On new shipments from the plant, the #4802 is shipped with the system but not installed.

#2718 PCI Magnetic Media Controller

The #2718 provides SCSI External attach capability for the 7207 Model 122 4 GB External QIC Tape Drive, the 7210-025 DVD-RAM, and the 7329-308 SLR100 ¼-inch Tape Autoloader. See “#2768 PCI Magnetic Media Controller” on page 296 for connectivity rules.

#2726 PCI RAID Disk Unit Controller Ultra SCSI

The #2726 PCI RAID Disk Unit Controller provides unprotected, mirrored, or RAID-5 protection for internal disk units. It includes a 4M write cache for better performance and improved device utilization. The #2726 also supports one CD-ROM drive and one internal tape unit when placed in the #503x. When placed in the #5064/#9364 System Unit Expansion, the #2726 can support up to three internal tape units.

The #2726 controls Ultra, Fast Wide, and Fast Narrow SCSI disk units located in the #503x and the #5064/#9364 System Unit Expansion with Expansion Unit for PCI cards #9329. The Ultra SCSI disks provide the best performance when attached to the #2726. These Ultra SCSI disks are 17.54 GB Disk Unit #6824, 8.58G Disk Unit #6813, 4.19G Disk Unit #6807, 1.96 GB Disk Unit# 6806, and their base disk equivalents and the #1334 (17.54G), #1333 (8.58 GB), #1337 (4.19 GB), and #1336 (1.96 GB) Disk Unit Migration Kits. These are all supported in the #503x and #5064/#9364 System Unit Expansion. The #2726 also controls migrated disks that are not Ultra SCSI. In that case, the disks do not perform at Ultra SCSI speeds.

The #2726 PCI RAID Disk Unit Controller supports a maximum of 15 one or two-byte disk units. A minimum of four disk units of equal capacity are required to implement RAID-5 protection. A maximum of 10 disk units per RAID-5 array are supported. Parity information can be spread across four or eight disk units. A maximum of three RAID-5 arrays are

supported on one #2726. Disk units not supported in a RAID-5 array can be attached to the #2726 in either unprotected or a mirrored environment.

Concurrent maintenance of disks attached to the #2726 is only supported if the disks are part of a RAID array or are mirrored.

The supported internal tape drives include:

- 1.2G ¼-inch Cartridge Tape Unit Kit, #1349
- 2.5G ¼-inch Cartridge Tape Unit Kit, #1350
- 13G ¼-inch Cartridge Tape Unit Kit, #1355
- 7G 8mm Cartridge Tape Unit Kit, #1360
- 2.5G ¼-inch Cartridge Tape Unit, #6481
- 4G ¼-inch Cartridge Tape Unit, #6482
- 13G ¼-inch Cartridge Tape Unit, #6485
- 16 G ¼-inch Cartridge Tape Unit
- 25G ¼-inch Cartridge Tape Unit, #6486
- 7G 8mm Cartridge Tape Unit, #6490

The #2726 occupies one High Speed PCI card slot. It is supported on the 9406 Model 720 only. A maximum of one #2726, #2740, #2741, or #9728 can be installed in the system unit and one #2726 or #2741 in the #5064/#9364 System Unit Expansion with the #9329 Expansion Unit for PCI cards. If RAID is to be implemented or more than five disk units are required in the system unit, the #2726 should be ordered in place of a #9728 Base PCI Disk Unit Controller.

The #2726 does not offer support for compression. The #2741 PCI Raid Disk Unit Controller supports compression when used with V4R3, and it effectively supersedes the #2726. If a maximum of only ten disks is required and there is no requirement for compression, the #2740 can be ordered as an alternative to the #2741.

#2729 PCI Magnetic Media Controller SCSI PCI

The #2729 PCI Magnetic Media Controller SCSI provides for attachment of one of these devices:

- 3490E-C11/C22/C1A/C2A ½-inch Cartridge Tape Subsystem with #5040
- 3490E-E01/E11 ½-inch Cartridge Tape Subsystem
- 3490E-F00/F01/F11/F1A ½-inch Cartridge Tape Subsystem
- 3494-L10 ½-inch Cartridge Tape Library Control Unit Frame (one 3490E-C1A/C2A with #5040 or one or two 3490E-F1A)
- 3494-L12 ½-inch Cartridge Tape Library Control Unit Frame (one or two 3590-B1A)
- 3494-D10 ½-inch Cartridge Tape Library Device Frame (one 3490E-C1A/C2A with #5040 or one or two 3490E-F1A)
- 3494-D12 ½-inch Cartridge Tape Library Device Frame (one to six 3590-B1A)

- 3570-B00/B01/B02/B11/B12/B1A Cassette Tape Subsystem
- 3570-C00/C01/C02/C11/C12/C1A Cassette Tape Subsystem
- 3575-L06/L12/L18/L24/L32 ½-inch Cartridge Tape Subsystem
- 3590-B11/B1A/E11/E1A ½-inch Cartridge Tape Subsystem
- 3995-C40/C42/C44/C46/C48 Optical Library Dataserver
- 7208-012 5.0G 8mm Cartridge Tape Unit
- 7208-222 7.0G 8mm Cartridge Tape Unit
- 7208-232 Dual 5.0G 8mm Cartridge Tape Unit
- 7208-234 Dual 7.0G 8mm Cartridge Tape Unit
- 7208-342 20.0G 8mm Cartridge Tape Unit
- 9348-001 ½-inch Reel Tape Unit–Rack Mount
- 9348-002 ½-inch Reel Tape Unit–Table Top
- 9427-21x 8mm Tape Library

The #2729 does not provide Hardware Data Compression (HDC).

When attaching Ultra SCSI to a #2729, the instantaneous data transfer rate is 20 MB/sec, and sustained 13 MB/sec.

The #2729 occupies one High-Speed PCI card slot. It requires OS/400 V4R1 or later. It is supported on the 9406 Models 170 and 720, and the #5065 Storage/PCI Expansion Tower/#5066 1.8 I/O Tower. A maximum of one #2729 can be installed in the system unit and two #2729s in the #5064/#9364 System Unit Expansion with #9329/#9330 Expansion Unit for PCI cards. Up to three #2729s can be installed in #5065 Storage/PCI Expansion Tower.

The #2809/#2824 PCI Feature Controller or the base PCI LAN/WAN Workstation IOP in the #5065 Storage/PCI Expansion Tower/#5066 1.8 I/O Tower is a prerequisite for the #2729.

OS/400 V4R2 or later is required for the #2729 to support the 3995 Optical Library Dataserver.

#2740 PCI RAID Disk Unit Controller

The #2740 is functionally equivalent to the #2726 PCI RAID Disk Unit Controller. However, the #2740 can only be located in the System Unit. It cannot be located in the System Unit Expansion #5064/#9364. The #2740 is supported on the 9406 Models 170 and 720 only. The #2740 supports a maximum of 10 one- or two-byte disk units. A maximum of two RAID-5 arrays are supported on one #2740. A maximum of one #2740, #2726, #2741, #2748, or #9728 can be installed in the system unit. The #2740 does not offer support for compression. However, if only a maximum of 10 disks are required and there is no requirement for compression, the #2740 should be ordered.

Concurrent maintenance of disks attached to the #2740 is only supported if the disks are mirrored or part of a RAID array. Otherwise, the #2740 offers the same support as the #2726.

Refer to “#2726 PCI RAID Disk Unit Controller Ultra SCSI” on page 301 for more information. The #2740 requires OS/400 V4R2 or later.

#2741 PCI RAID Disk Unit Compression Controller

The #2741 is functionally equivalent to the #2726 PCI RAID Disk Unit Controller. See “#2726 PCI RAID Disk Unit Controller Ultra SCSI” on page 301 for a full description of the #2726. The #2741 supports a maximum of 15 disk units but offers an enhancement over the #2726 in that it supports data compression when used with OS/400 V4R3. The #2741 requires V4R2 or later of OS/400. For all new orders with V4R2 or later, the #2741 is ordered in place of the #2726.

Concurrent maintenance of disks attached to the #2741 is only supported if the disks are mirrored or part of a RAID array.

A maximum of one #2741, #2726, #2740, #2748, or #9728 can be installed in the system unit and one #2741 or #2726 in the #5064/#9364 System Unit Expansion with #9329 Expansion Unit for PCI cards. If only a maximum of 10 disks is required and there is no requirement for compression, the #2740 can be ordered instead of #2741.

#2748 PCI RAID Disk Unit Compression Controller

The #2748 is an Ultra2 SCSI disk and tape controller with a 26 MB write cache that provides RAID-5 protection for internal disk units. In addition to RAID, the #2748 also offers DASD compression capabilities. The #2748 IOA is shipped with compression disabled. Compression is enabled by moving a jumper on the IOA. The #2748 supports Extended Adaptive Cache with restriction that compression must not be active on the same #2748 subsystem.

The #2748 is designed to control Ultra2, Ultra, and Fast Wide SCSI disk units. It supports up to 15 disk units, one CD-ROM, and one internal tape unit. In addition to RAID-5 and compression, the #2748 is also designed to work as a high performance controller for disks protected by system mirroring or disks with no protection. In the RAID-5 configuration, disk unit protection is provided at a lower cost than mirroring. This feature supports Concurrent DASD Add/Maintenance. Note these additional points:

- The #2748 is a replacement for #2741
- High Speed PCI Card slots required: One
- This feature is CE *installation only*

#9728 Base PCI Disk Unit Controller Ultra SCSI

The #9728 Base PCI Disk Unit Controller is the base controller. It is an Ultra SCSI controller, which provides mirroring or unprotected support for up to five disks. The #9728 does not include any write cache, and it does not support RAID. It supports the internal CD-ROM drive and one internal tape unit, as well as five disks.

The #9728 controls Ultra, Fast Wide, and Fast Narrow SCSI disk units. The Ultra SCSI disks provide the best performance when attached to the #9728. These Ultra SCSI disks are 17.54G Disk Unit #6824, 8.58G Disk Unit #6813, 4.19G Disk Unit #6807, 1.96G Disk Unit #6806, and their base disk equivalents and the #1334 (17.54G), #1333 (8.58G), #1337 (4.19G), and #1336 (1.96G) Disk Unit Migration Kits. The #9728 also controls migrated disks that are not Ultra SCSI. In that case, the disks do not perform at Ultra SCSI speeds.

The Base PCI Disk Unit Controller supports a maximum of five one- or two-byte disk units. It is represented in the rack configuration list as CCIN 2728. The #9728 is supported for migration only.

Migration Tower SPD Hardware

#2699/9699 SPD Two-Line WAN IOA

The #2699 supports up to two multiple protocol communications ports, where one or two (in any combination) of the cable features shown in the following table are attached.

Cable Length	Attachment			
	EIA232/V.24	V.35	EIA449/V.36	X.21
20ft/6m	#0330	#0338	#0335	#0341
50ft/15m	#0331	#0339	#0336	#0342
80ft/24m	N/A	#0340	N/A	N/A
150ft/45m	N/A	N/A	#0337	N/A

These functions do not have an equivalent function on the #2699 IOA:

- ASCII Adapter
- V.25 Autocall cable
- Select standby mode
- X.21 switched WAN dialup or short-hold mode WAN
- Asynchronous communication speeds of less than 300 bps
- Data Rate Select signal on the EIA 232/V.24 interface. This function is used by some older 2400 bps modems to reduce the speed to 1200 bps.
- LPDA-1 (Link Problem Determination Aids). This is a diagnostic function supported by some (primarily older IBM) modems.
- V.54 local and remote loop back (diagnostics functions supported by some modems)

The #2629 LAN/WAN/Workstation IOP is a prerequisite for the #2699. The #2699 takes up one of the three slots on the #2629.

The #9699 is supported for migration only.

#6149 16/4 Mbps Token-Ring IOA

This feature provides a single attachment to either a 16 Mbps or a 4 Mbps IBM Token-Ring Network. The feature consists of an adapter card, internal code (supplies IEEE 802.5 Media Access Control (MAC) and IEEE 802.2 Logical Link Control (LLC) functions), and an 8 ft/2.44m Token-Ring cable. The 16/4 Mbps Token-Ring IOA is capable of operating in half or full duplex mode.

The #6149/#9249 comes standard with an 2.44 meter token-ring cable. Alternatively, the customer can attach a separately purchased twisted pair cable to the RJ-45 connection on the IOA.

The #2629 LAN/WAN/Workstation IOP is a prerequisite for the #6149. It uses one IOA slot and no I/O card slots.

#6180/#9280 Twinaxial Workstation IOA

The #6180/#9280 is an 8-port twinaxial workstation IOA with a 20-foot attachment cable for attaching up to 40 5250-type displays and printers. Each port supports seven attached addresses allowing for up to 56 attached addresses, of which only 40 can be active. When the attached display supports address sharing, a maximum of 120 shared sessions are supported. The #6180 requires a #2629 LAN/WAN/Workstation SPD IOP as a prerequisite.

One #6180/#9280 is allowed in slot C of the #5038 MFIOP, unless the system console is ASCII. All other twinaxial workstation IOAs must be placed in a #2629 LAN/WAN/Workstation IOP. One IOA slot is required to support #6180/#9280.

The following table shows the feature requirements for the initial order of the system.

System Console Specify	Minimum Shipped Feature Codes			Other Feature Codes Based on Workstations Required
	MFIOP	No Charge WSC	Required WSC	
#5540	#9754	#9280		#6180
#5543	#9754			
#5543	#9754	#9280		#6180
#5544	#9754	Note 1		

#5544	#9754	#9280	Note 1	#6180
1 When Operations Console is selected, a #0328 Operations Console Cable (6m) must also be ordered.				

#6181/#9381 Ethernet/IEEE 802.3 IOA (10 Mbps)

The #6181/#9381 feature provides a single attachment to one Carrier Sense Multiple Access/Collision Detect Local Area Network. It consists of an adapter card and internal code, which supplies Ethernet Version 2 and IEEE 802.3 Media Access Control (MAC), plus IEEE 802.2 Logical Link Control (LLC) functions. The #6181/#9381 is capable of operating in half or full duplex mode at a speed of 10 Mbps.

The #6181/#9381 has an RJ-45 connector and a 15 pin D-shell connector for attachment of customer supplied cabling. An AUI Ethernet cable or RJ-45 twisted pair cable must be ordered separately. Cabling must meet or exceed Industry Standard EIA/TIA T568B.

The #2629 LAN/WAN/Workstation IOP is a prerequisite for the #6181. It uses one IOA slot and no I/O card slots.

#2624 Storage Device Controller SPD

The #2624 Storage Device Controller supports the ¼-inch cartridge and 8mm cartridge internal tape devices, 9331-011, 9331-012, or #6135 external diskette devices, and internal CD-ROM devices.

As a feature on a #5072, #5073, or #5044 System Unit Expansion Tower, the #2624 supports up to three internal tape or CD-ROM devices and one external diskette unit.

The internal tapes that are supported by the #2624 are:

- 1.2G ¼-inch Cartridge Migration Kit #1379
- 2.5G ¼-inch Cartridge Migration Kit #1380
- 2.5G ¼-inch Cartridge #6380
- 7G 8mm Cartridge #6390
- CD-ROM #6325

The #2624 does not support any other internal media.

The #2624 is not supported on the 9406 Model 170 or Model 720 with no SPD card slots. Unless the customer requires a #2624 to support a diskette drive or CD-ROM, the #6513 Internal Tape Device Controller should be selected in place of #2624. For more information on the #6513, see “#6513 Internal Tape Device Controller SPD” on page 308.

#6501 Tape/Disk Device Controller SPD

The #6501 Tape/Disk Device Controller provides a SCSI interface with a two-byte wide data path and an instantaneous data rate of 20 MB/sec and a sustained rate of 17 MB/sec.

The #6501 provides attachment for these storage devices:

- 3490E-C11/C22/C1A/C2A ½-inch Cartridge Tape Subsystem with #5040
- 3490E-E01/E11 ½-inch Cartridge Tape Subsystem
- 3490E-F00/F01/F11/F1A ½-inch Cartridge Tape Subsystem
- 3570-B00/B01/B02/B11/B12/B1A Cassette Tape Subsystem
- 3570-C00/C01/C02/C11/C12/C1A Cassette Tape Subsystem
- 3575-L06/L12/L18/L24/L32 ½-inch Cartridge Tape Subsystem
- 3590-B11/B1A ½-inch Cartridge Tape Subsystem
- 3494-L10 ½-inch Cartridge Tape Library Control Unit Frame (one 3490E-C1A/C2A with #5040 or one or two 3490E-F1A)
- 3494-L12 ½-inch Cartridge Tape Library Control Unit Frame (one or two 3590-B1A)
- 3494-D10 ½-inch Cartridge Tape Library Device Frame (one 3490E-C1A/C2A with #5040 or one or two 3490E-F1A)
- 3494-D12 ½-inch Cartridge Tape Library Device Frame (one to six 3590-B1A)
- 9337-2xx, 4xx, 5xx Disk Array Subsystems
- 2105 Enterprise and Versatile Storage Servers

The #6501 has two ports. It supports up to four devices in total for the two ports. Tape units that have a library capability count as one device for the library and one device for each tape drive. The #6501 does not support Hardware Data Compression (HDC). Tape subsystems attached to the #6501 support a compaction algorithm using their own controller.

#6513 Internal Tape Device Controller SPD

This feature provides a two-byte wide SCSI interface for attachment of one or two internal tape drives in the 9406 Model 730, 740, and SB1 System Unit. On the 9406 Model 720 with the #9364/#5064 System Unit Expansion and the #9331 Expansion Unit for SPD Cards, the #6513 supports up to three internal tape drives located in the System Unit Expansion. It provides support for up to four internal tape drives in the #5072 and #5073 System Unit Expansion Towers. The #6513 provides attachment for these internal tape devices:

- #1349 1.2 GB ¼-inch Cartridge Tape Unit Kit
- #1350 2.5 GB ¼-inch Cartridge Tape Unit Kit
- #1355 13 GB ¼-inch Cartridge Tape Unit Kit
- #1360 7 GB 8mm Cartridge Tape Unit Kit
- #1379 1.2 GB ¼-inch Cartridge Tape Unit Kit
- #1380 2.5 GB ¼-inch Cartridge Tape Unit Kit
- #6380 2.5 GB ¼-inch Cartridge Tape Unit
- #6381 2.5 GB ¼-inch Cartridge Tape Unit
- #6382 4 GB ¼-inch Cartridge Tape Unit

- #6385 13 GB ¼-inch Cartridge Tape Unit
- #6390 7 GB 8mm Cartridge Tape Unit
- #6481 2.5 GB ¼-inch Cartridge Tape Unit
- #6482 4 GB ¼-inch Cartridge Tape Unit
- #6485 13 GB ¼-inch Cartridge Tape Unit
- #6386 / #6486 25 GB ¼-inch Cartridge Tape Unit
- #6490 7 GB 8mm Cartridge Tape Unit

The #6513 occupies one I/O card slot position.

#6533 RAID Disk Unit Contrlr (4 MB Cache) Ultra SCSI Compress SPD

The #6533 disk controller provides unprotected, mirroring, or RAID-5 protection for internal disk units and includes a 4 M write cache for better performance and improved device utilization. The #6533 also supports hardware data compression when used with V4R3 or later.

The #6533 supports a maximum of sixteen one or two-byte disk units. A minimum of four disk units of equal capacity are required to implement RAID-5 protection.

The #6533 requires OS/400 V4R2 or later.

#6534 Magnetic Media Controller SCSI SPD

The #6534 Magnetic Media Controller SCSI provides for attachment of one of these devices:

- 3490E-C11/C22/C1A/C2A ½-inch Cartridge Tape Subsystem with #5040
- 3490E-E01/E11 ½-inch Cartridge Tape Subsystem
- 3490E-F00/F01/F11/F1A ½-inch Cartridge Tape Subsystem
- 3494-L10 ½-inch Cartridge Tape Library Control Unit Frame (one 3490E-C1A/C2A with #5040 or one or two 3490E-F1A)
- 3494-L12 ½-inch Cartridge Tape Library Control Unit Frame (one or two 3590-B1A)
- 3494-D10 ½-inch Cartridge Tape Library Device Frame (one 3490E-C1A/C2A with #5040 or one or two 3490E-F1A)
- 3494-D12 ½-inch Cartridge Tape Library Device Frame (one to six 3590-B1A)
- 3570-B00/B01/B02/B11/B12/B1A Cassette Tape Subsystem
- 3570-C00/C01/C02/C11/C12/C1A Cassette Tape Subsystem
- 3575-L06/L12/L18/L24/L32 ½-inch Cartridge Tape Subsystem
- 3590-B11/B1A ½-inch Cartridge Tape Subsystem
- 3995-C40/C42/C44/C46/C48 Optical Library Dataserver
- 7208-012 5.0G 8mm Cartridge Tape Unit
- 7208-222 7.0G 8mm Cartridge Tape Unit
- 7208-232 Dual 5.0G 8mm Cartridge Tape Unit
- 7208-234 Dual 7.0G 8mm Cartridge Tape Unit
- 7208-342 20.0G 8 mm Cartridge Tape Unit

- 9348-001 ½-inch Reel Tape Unit–Rack Mount
- 9348-002 ½-inch Reel Tape Unit–Table Top
- 9427-21x 8mm Tape Library

When attaching Ultra SCSI to a #6534, the instantaneous data transfer rate is 20 MB/sec, and sustained is 17 MB/sec.

The #6534 offers improved performance over #6501 for external tape attachment, and therefore, effectively replaces it.

The #6534 does not provide Hardware Data Compression (HDC).

CCIN 671A MFIOP with RAID

The CCIN MFIOP with RAID is a SCSI controller that provides unprotected, mirrored, or RAID-5 protection for internal disk units in a #5077 Migration Tower and the #9057 16 Disk Unit Storage Expansion Unit. It includes a 4M write cache for better performance and improved device utilization. The CCIN 671A also controls the internal CD-ROM drive and one internal tape unit and contains three IOA slots for communications, LAN, and twinaxial I/O adapters.

The CCIN 671A MFIOP with RAID supports a maximum of 20 one or two-byte disk units. A minimum of four disk units of equal capacity are required to implement RAID-5 protection. A maximum of 10 disk units per RAID-5 array are supported. Parity information can be spread across four or eight disk units. A maximum of four RAID-5 arrays are supported on one CCIN 671A. Disk units not supported in a RAID-5 array can also be attached to the CCIN 671A in either an unprotected or a mirrored environment. The CCIN 671A supports also data compression.

High Workload SPD IOP Placement Rules for Magnetic Media

If you place any of these IOPs in combination on the same SPD bus, follow the rules provided in the following table. Refer to the *iSeries and AS400e System Builder*, SG24-2155, for additional details.

Limitations to Combinations of High Workload IOPs (SPD Type)		
Subsystem	**High Workload IOP**	**Bus Capacity**
Tape	#2624	Non streaming
DASD	#2748, #6501, #6533	Streaming
Tape	#6501, #6513, #6534, #2718	Streaming
Tape IOP with 3590 Tape	#6534	Streaming

Limitations to Combinations of High Workload IOPs (SPD Type)		
Subsystem	**High Workload IOP**	**Bus Capacity**
Optical	#6534	Streaming
LAN	#2810	Streaming
Limitations on combinations • Maximum of five high workload IOPs per bus. • Maximum of three dissimilar high workload IOPs per bus. • In #5044 System Unit Expansion Rack, no DASD controllers are allowed on the same bus with a 3590 tape controller.		
Note: • These guidelines are for all system buses and include the first system bus. • Exceeding these guidelines will cause performance degradation.		

Certain tape devices listed in the above table are also supported by the #6534 Magnetic Media Controller. The #6534 should be selected on new orders.

Internal Storage

Internal Storage

Internal Magnetic Media

Disk storage, tape, and CD-ROM internal to the system unit or tower complex are discussed in this section. Information on speeds, specifications, and feature descriptions is presented, including disk protection and Alternate IPL options.

PCI Disk Units

PCI disk support is summarized in the following table.

PCI Internal Disks			System and Expansion Units Supported						RAID/ Mirror [1]
Feature	Description	Bytes	250	270	8xx	#5074 #5075 #5079	#503x	#5065 #5066	
#1312	1.03 GB Disk Kit	1					S		B / 5
#1313	1.96 GB Disk Kit	1					S		A / 4
#1322	1.03 GB Disk Kit	2					S		B / 5
#1323	1.96 GB Disk Kit	2					S		A / 4
#1325	1.03 GB Disk Kit	2					S		B / 5
#1326	1.96 GB Disk Kit	2					S		A / 4
#1327	4.19 GB Disk Kit	2					S		C / 6
#1333	8.53 GB Disk Kit	2					S		D / 7
#1334	17.54 GB Disk Kit	2					S		E / 8
#1336	1.96 GB Disk Kit	2					S		A / 4
#1337	4.19 GB Disk Kit	2					S		C / 6
#4308	4.19 GB Disk Unit	2						S	F / 6
#4314	8.58 GB Disk Unit	2		S	S	S			G / 7
#4317	8.58 GB Disk Unit	2		N	N	N		M	G / 7
#4318	17.54 GB Disk Unit	2		N	N	N		M	H / 8
#4324	17.54 GB Disk Unit	2		S	S	S			H / 8
#4331	1.6 Gb Read Cache Device	2		N	N	N		M	

#6806	1.96 GB Disk Unit	2					S		A / 4
#6807	4.19 GB Disk Unit	2					S		C / 6
#6813	8.58 GB Disk Unit	2	S				M		D / 7
#6817	8.58 GB 10K RPM Disk Unit	2	N	R	R	R	M		D / 7
#6818	17.54 GB 10K RPM Disk Unit	2	N	R	R	R	M		E / 8
#6824	17.54 GB Disk Unit	2	S				M		E / 8
#6831	1.6 Gb Read cache Device	2	N				M		
#8813	Opt. Base 8.58 GB Disk Unit	2					S		D / 7
#8817	Opt. Base 8.58 GB Disk Unit	2					S		D / 7
#8818	Opt. Base 17.54 GB Disk Unit	2					S		E / 8
#8824	Opt. Base 17.54 GB Disk Unit	2					S		E / 8
#8917	Opt. Base 8.58 GB Disk Unit	2	N						D / 7
#8918	Opt. Base 17.54 GB Disk Unit	2	N						E / 8
#8924	Opt. Base 17.54 GB Disk Unit	2	S						E / 8
#9313	Base 8.58 GB Disk Unit	2	S						D / 7

Notes:

1. Like lettered disks can be part of the same RAID array, and like numbered disks can mirror each other.

N Available as a new disk.

M Available via MES only.

R Using the RPQ 847102 that ships the disk mounting hardware and instructions required to convert feature #6717#/6817 to feature #4317 and feature #6718/#6818 to feature #4318.

S Supported but not orderable.

SPD Disk Units

SPD internal disk support is summarized in the following table.

SPD Internal Disks			System and Expansion Units Supported					RAID / Mirror[1]
Feature	Description	Bytes	#5077	#5052	#5057 #5058	#5082	#5055 #5083	
#1602	1.03 GB Single Disk Kit	1	S	S [2]	S[2]	S	S	B / 5
#1603	1.96 GB Single Disk Kit	1	S	S [2]	S[2]	S	S	A / 4
#6605 #6652	1.03 GB Disk Unit	2	S	S	S	S	S	B / 5
#6606 #6650	1.96 GB Disk Unit	2	S	S	S	S	S	A / 4
#6607	4.19 GB Disk Unit	2	S	S [4]	S	S [4]	S [4]	C / 6
#6713	8.85 GB Disk Unit	2	S	X [3,4]	X	X [3,4]	X [4]	D / 7
#6714	17.54 GB Disk Unit	2	S	X [3,4]	X	X [3,4]	X [4]	E / 8
#6717	8.58 GB Disk Unit	2	N	X [3]	X	X [3]	X	D / 7
#6718	17.54 GB Disk Unit	2	N	X [3]	X	X [3]	X	E / 8
#6906	1.96 GB Disk Unit	2	S	S [3]	S	S [3]	S	B / 5
#6907	4.19 GB Disk Unit	2	S	S [3,4]	S	S [3,4]	S [4]	C / 6
#7607	Base 4.19 GB Disk Unit	2	S	S	S	S	S	C / 6
#7713	Base 8.85 GB Disk Unit	2	S	S [3]	S	S [3]	S	D / 7
#8617	Base 8.58 GB Disk unit	2	S	S [3]	S	S [3]	S	D / 7
#8618	Base 17.54 GB Disk Unit	2	S	S [3]	S	S [3]	S	E / 8
#8713	Base 8.85 GB Disk Unit	2	S	S [3]	S	S [3]	S	D / 7
#8714	Base 17.54 GB Disk Unit	2	S	S [3]	S	S [3]	S	E / 8
#9606	Base 1.96 GB Disk Unit	2	S	S	S	S	S	A / 4
#9707	Base 4.19 GB Disk Unit	2	S	S	S	S	S	C / 6
#9907	Base 4.19 GB Disk Unit	2	S	S [3]	S	S [3]	S	C / 6

Notes:

1. Like lettered disks can be part of the same RAID array, and like numbered disks can mirror each other.
2. Single-byte disks cannot be placed into slots K8 through K16. In the case of the #5055 System Expansion Unit, single-byte disks cannot be placed into any slots.
3. Not Ultra-SCSI or Ultra2 SCSI when attached to this storage expansion unit.
4. If not coming from a supported upgrade path, order RPQ 843977 for the hardware to mount one disk unit from one server to another server.

N Available as a new disk.

S Supported but not orderable.

X Available as a migrated disk.

Disk Units

This section outlines a comparison of disk storage specifications and provides descriptions for disk units supported on the iSeries server.

Disk Storage Specifications Comparison

This table shows the specifications of the current and legacy IBM internal disk technologies supported on the iSeries servers.

Disk Type	Disk Diameter	Capacity	Avg. Seek Time	Average Latency	RPM	Data-Rate (Burst)	Areal Density (M/inch)	Read Ahead Cache
#4308	3.5"	4.19 GB	R 6.5 ms W 8.0 ms	4.17 ms	7200	40 MB/s	1109 to 1253	1 MB
#4314	3.5"	8.58 GB	R 6.5 ms W 7.5 ms	4.17 ms	7200	40 MB/s	1109 to 1253	1 MB
#4317	3.5"	8.58 GB	R 5.3 ms W 6.3 ms	2.99 ms	10 K	80 MB/s	1353 to 2024	4 MB
#4318	3.5"	17.54 GB	R 4.9 ms W 5.9 ms	2.99 ms	10 K	80 MB/s	3197 to 3535	2 MB
#4324	3.5"	17.54 GB	R 7.0 ms W 8.0 ms	4.17 ms	7200	40 MB/s	3025	1.79 MB
#6605	3.5"	1.031 GB	7.8 ms	4.17 ms	7200	20 MB/s	562	512 KB
#6606	3.5"	1.967 GB	7.8 ms	4.17 ms	7200	20 MB/s	532	512 KB
#6607	3.5"	4.19 GB	8.3 ms	4.17 ms	7200	20 MB/s	829	512 KB
#6650	3.5"	1.96 GB	9.5 ms	5.56 ms	5400	20 MB/s	354	512 KB

Disk Type	Disk Diameter	Capacity	Avg. Seek Time	Average Latency	RPM	Data-Rate (Burst)	Areal Density (M/inch)	Read Ahead Cache
#6652	3.5"	1.03 GB	8.9 ms	5.56 ms	5400	20 MB/s	354	512 KB
#6713	3.5"	8.58 GB	8.3 ms	4.17 ms	7200	40 MB/s	829	1024 KB
#6714	3.5"	17.54 GB	8.5 ms	4.17 ms	7200	40 MB/s	1253	1024 KB
#6717	3.5"	8.58 GB	R 5.3 ms W 6.3 ms	2.99 ms	10 K	40 MB/s	1353 to 2024	4 MB
#6718	3.5"	17.54 GB	R 4.9 ms W 5.9 ms	2.99 ms	10 K	40 MB/s	3197 to 3535	2 MB
#6806	3.5"	1.96 GB	7.8 ms	4.17ms	7200	40 MB/s	532	512 KB
#6807	3.5"	4.19 GB	8.3 ms	4.17ms	7200	40 MB/s	829	512 KB
#6813	3.5"	8.58 GB	8.3 ms	4.17ms	7200	40 MB/s	829	1024 KB
#6817	3.5"	8.58 GB	R 5.3 ms W 6.3 ms	2.99 ms	10 K	40 MB/s	1353 to 2024	4 MB
#6818	3.5"	17.54 GB	R 4.9 ms W 5.9 ms	2.99 ms	10 K	40 MB/s	3197 to 3535	2 MB
#6824	3.5"	17.54 GB	8.5 ms	4.17ms	7200	40 MB/s	1253	1024 KB
#6906	3.5"	1.96 GB	7.8 ms	4.17ms	7200	40 MB/s	532	512 KB
#6907	3.5"	4.19 GB	8.3 ms	4.17ms	7200	40 MB/s	829	512 KB
#8617	3.5"	8.58 GB	R 5.3 ms W 6.3 ms	2.99 ms	10 K	40 MB/s	1353 to 2024	4 MB
#8618	3.5"	17.54 GB	R 4.9 ms W 5.9 ms	2.99 ms	10 K	40 MB/s	3197 to 3535	2 MB
#8813	3.5"	8.58 GB	8.3 ms	4.17ms	7200	40 MB/s	829	1024 KB
#8817	3.5"	8.58 GB	R 5.3 ms W 6.3 ms	2.99 ms	10 K	40 MB/s	1353 to 2024	4 MB
#8818	3.5"	17.54 GB	R 4.9 ms W 5.9 ms	2.99 ms	10 K	40 MB/s	3197 to 3535	2 MB
#8824	3.5"	17.54 GB	8.5 ms	4.17ms	7200	40 MB/s	1253	1024 KB
#9707	3.5"	4.19 GB	8.3 ms	4.17ms	7200	40 MB/s	829	512 KB

Disk Unit Descriptions

#1312 One-Byte 1.03 GB Disk Unit Conversion Kit

Provides the hardware for migrating one 1.03 GB one-byte SCSI disk unit to 7xx systems.

#1313 One-Byte 1.96 GB Disk Unit Conversion Kit

Provides the hardware for migrating one 1.96 GB one-byte SCSI disk unit to 7xx systems.

#1322 Two-Byte 1.03 GB Disk Unit Conversion Kit

Provides the hardware for migrating one 1.03 GB two-byte SCSI disk unit to 7xx systems.

#1323 Two-Byte 1.96 GB Disk Unit Conversion Kit

Provides the hardware for migrating one 1.96 GB two-byte SCSI disk unit to 7xx systems.

#1325 Two-Byte 1.03 GB Disk Unit Conversion Kit

Provides the hardware for migrating one 1.03 GB two-byte SCSI disk unit to 7xx systems.

#1326 Two-Byte 1.96 GB Disk Unit Conversion Kit

Provides the hardware for migrating one 1.96 GB two-byte SCSI disk unit to 7xx systems.

#1327 Two-Byte 4.19 GB Disk Unit Conversion Kit

Provides the hardware for migrating one 4.19 GB two-byte SCSI disk unit to 7xx systems.

#1333 Two-Byte 8.58 GB Disk Unit Conversion Kit (Ultra SCSI)

Provides the hardware for migrating one 8.58 GB two-byte SCSI disk unit to 7xx systems.

#1334 Two-Byte 17.54 GB Disk Unit Conversion Kit (Ultra SCSI)

Provides the hardware for migrating one 17.54 GB two-byte SCSI disk unit to 7xx systems.

#1336 Two-Byte 1.96 GB Disk Unit Conversion Kit (Ultra SCSI)

Provides the hardware for migrating one 1.96 GB two-byte SCSI disk unit to 7xx systems.

#1337 Two-Byte 4.19 GB Disk Unit Conversion Kit (Ultra SCSI)

Provides the hardware for migrating one 4.19 GB two-byte SCSI disk unit to 7xx systems.

#1602 One-Byte 1.03 GB Disk Unit Conversion Kit

Provides the hardware for migrating one 1.03 GB one-byte SCSI disk unit to 7xx systems.

#1603 One-Byte 1.96 GB Disk Unit Conversion Kit

Provides the hardware for migrating one 1.96 GB one-byte SCSI disk unit to 7xx systems.

#4308 Two-Byte 4.19 GB Disk Unit Ultra SCSI

This feature provides 4.19 GB of disk capacity and an Ultra SCSI interface. Supported in migration towers only. It is a CIF.

#4314 Two-Byte 8.58 GB Disk Unit Ultra

This feature provides 8.58 GB of disk capacity and an Ultra SCSI interface. It is a CIF.

#4317 Two-Byte 8.58 GB 10k RPM Disk Unit Ultra2

This feature provides 8.58 GB of disk capacity and an Ultra2 SCSI interface. It is a CIF.

#4318 Two-Byte 17.54 GB 10k RPM Disk Unit Ultra2

This feature provides 17.54 GB of disk capacity and an Ultra2 SCSI interface. The minimum OS/400 level to run this disk unit is V4R4. It is a CIF.

#4324 Two-Byte 17.54 GB Disk Unit Ultra

This feature provides 17.54 GB of disk capacity and an Ultra SCSI interface. It is a CIF.

#4331 1.6 Gb Read Cache Device

The #4331 is a 1.6-inch high solid state disk device that provides 1.6 Gb of capacity for Large Read Cache function required by high performance disk unit controllers. This #4331 feature has CCIN 6731 and is a CIF.

#6605 1.03 GB Two-Byte Disk Unit

Provides a 3 ½-inch single disk unit with 1.03 GB capacity for additional disk storage.

#6606 1.96 GB Two-Byte Disk Unit

Provides a 3 ½-inch single disk unit with 1.96 GB capacity for additional disk storage.

#6607 4.19 GB Two-Byte Disk Unit

Provides a 3 ½-inch single disk unit with 4.19 GB capacity for additional disk storage.

#6650 1.96 GB Two-Byte Disk Unit

Provides a 3 ½-inch single disk unit with 1.96 GB capacity for additional disk storage.

#6652 1.03 GB Two-Byte Disk Unit

Provides a 3 ½-inch single disk unit with 1.03 GB capacity for additional disk storage.

#6713 8.58 GB Two-Byte Disk Unit (Ultra SCSI)

Provides a 3 ½-inch single disk unit with 8.58 GB capacity for additional disk storage.

#6714 17.54 GB Two-Byte Disk Unit (Ultra SCSI)

Provides a 3 ½-inch single disk unit with 17.54 GB capacity for additional disk storage.

#6717 Two-Byte 8.58 GB 10k RPM Disk Unit Ultra

These features provide 8.58 GB of disk capacity and Ultra SCSI interface. Requires an Ultra2 SCSI storage slot for best performance. This disk unit is not supported on disk controllers #6502/#6512/#6530.

#6718 Two-Byte 17.54 GB 10k RPM Disk Unit Ultra

These features provide 17.54 GB of disk capacity and Ultra SCSI interface. Requires an Ultra2 SCSI storage slot for best performance. This disk unit is not supported on disk controllers #6502/#6512/#6530.

#6806 1.96 GB Two-Byte Disk Unit (Ultra SCSI)

Provides a 3 ½-inch single disk unit with 1.96 GB capacity for additional disk storage.

#6807 4.19 GB Two-Byte Disk Unit (Ultra SCSI)

Provides a 3 ½-inch single disk unit with 4.19 GB capacity for additional disk storage.

#6813 8.58 GB Two-Byte Disk Unit (Ultra SCSI)

Provides a 3 ½-inch single disk unit with 8.58 GB capacity for additional disk storage.

#6817 Two-Byte 8.58 GB 10k RPM Disk Unit Ultra

This feature provides 8.58 GB of high performance (10k RPM) disk capacity with an Ultra SCSI (LVD) interface. This disk unit is not supported on disk controllers #6502/#6512/#6530.

#6818 Two-Byte 17.54 GB 10k RPM Disk Unit Ultra

This feature provides 17.54 GB of high performance (10k RPM) disk capacity with a Ultra SCSI (LVD) interface. This disk unit is not supported on disk controllers #6502/#6512/#6530.

#6824 17.54 GB Two-Byte Disk Unit (Ultra SCSI)

Provides a 3 ½-inch single disk unit with 17.54 GB capacity for additional disk storage.

#6831 1.6 Gb Read Cache Device

The #6831 is a 1.6-inch high solid state disk device which provides 1.6 Gb of capacity for Large Read Cache function required by high performance disk unit controllers. This #6831 feature has CCIN 6731.

#6906 1.96 GB Two-Byte Disk Unit (Ultra SCSI)

Provides a 3 ½-inch single disk unit with 1.96 GB capacity for additional disk storage.

#6907 4.19 GB Two-Byte Disk Unit (Ultra SCSI)

Provides a 3 ½-inch single disk unit with 4.19 GB capacity for additional disk storage.

#8617 Optional Base Two-Byte 8.58 GB 10k RPM Disk Unit Ultra

Provides 8.58 GB of disk capacity and an Ultra SCSI interface. Requires an Ultra2 SCSI storage slot for best performance. This disk unit is not supported on disk controllers #6502/#6512/#6530.

#8618 Optional Base Two-Byte 17.54 GB 10k RPM Disk Unit Ultra

Provides 17.54 GB of disk capacity and an Ultra SCSI interface. Requires an Ultra2 SCSI storage slot for best performance. This disk unit is not supported on disk controllers #6502/#6512/#6530.

#8713 8.58 GB Optional Base Two-Byte Disk Unit (Ultra SCSI)

Provides a 3 ½-inch single disk unit with 8.58 GB capacity as an optional base disk.

#8714 17.54 GB Optional Base Two-Byte Disk Unit (Ultra SCSI)

Provides a 3 ½-inch single disk unit with 17.54 GB capacity as an optional base disk unit.

#8813 8.58 GB Optional Base Two-Byte Disk Unit (Ultra SCSI)

Provides a 3 ½-inch single disk unit with 8.58 GB capacity as an optional base disk unit.

#8817 Optional Base Two-Byte Disk Unit 8.58 GB 10k RPM Disk Unit Ultra

This feature provides 8.589 GB of high performance (10k RPM) disk capacity with an Ultra SCSI (LVD) interface. This disk unit is not supported on disk controllers #6502/#6512/#6530.

#8818 Optional Base Two-Byte Disk Unit 17.54 GB 10k RPM Disk Unit Ultra

This feature provides 17.54 GB of high performance (10k RPM) disk capacity with an Ultra SCSI (LVD) interface. This disk unit is not supported on disk controllers #6502/#6512/#6530.

#8824 17.54 GB Optional Base Two-Byte Disk Unit (Ultra SCSI)

Provides a 3 ½-inch single disk unit with 17.54 GB capacity as an optional base disk.

#9606 1.967 GB Base Disk Unit

Provides a 3 ½-inch single disk unit with 1.967 GB capacity as base disk unit.

#9707 4.19 GB Base Two-Byte Disk Unit (Ultra SCSI)

Provides a 3 ½-inch single disk unit with 4.19 GB capacity as a PCI base disk unit.

#9907 4.19 GB Base Two-Byte Disk Unit (Ultra SCSI)

The default SPD base disk unit provides a 3 ½-inch single disk unit with 4.19 GB capacity.

RPQ 843977 AS/400 DASD Mounting

RPQ 843977 is for customers who want to move 4, 8, or 17 GB disk units from one server to another server.

This RPQ ships the disk mounting hardware and instructions required to mount one unit of disk device type #6607/#6907 (4.194 GB), one #6713 (8.58 GB), or one #6714 (17.54 GB) in the system unit of a Model 740, 730, 640, 650, S30, S40, and the #5052, #5055, #5057, #5058, #5070, #5071, #5072, #5073, #5080, #5081, #5082, and #5083 disk expansion features. These target enclosures use SPD technology.

After the disk drives are installed, process an RPO change to add a #6607/#6907 feature for each #6607/#6907 device type added, a #6713 feature for each #6713 device that is added, and a #6714 feature for each #6714 device type added.

This RPQ does not specifically apply to the 8xx models. However, once DASD is located in the “migrated to” enclosure, some of that DASD can then be moved under RPQ 847102.

RPQ 847102 10K RPM DASD Mounting

RPQ 847102 is for customers who want to move 8 or 17 GB 10K RPM disk units from one server to another server.

This RPQ ships the disk mounting hardware and instructions required to convert one #6717/#6817 disk device type (8.58 GB) to one #4317, and one #6718/#6818 to a #4318 disk device type. This conversion allows the customer to move their 8.5GB 10K RPM and 17GB

10K RPM files from current towers to the #5065/#5066 PCI Storage Tower, iSeries 270, and 8xx servers.

After the conversion, process an RPO change to add a #4317/#4318 feature for each #4317/#4318 device type added to the tower or iSeries server, and process an RPO change to remove a #6717/#6817 and #6718/#6818 device type removed from the current tower.

RPQ 847123 10K RPM DASD Mounting 170 to 270

RPQ 847123 is for customers who want to convert #6717/#8817 feature to #4317, and #6818/#8818 feature to #4318. This conversion allows the customer to move their 8.58 GB 10K RPM and 17 GB RPM files from the Model 170 to the Model 270.

This RPQ ships the disk mounting hardware and instructions required to convert one feature #6817/#8817 to feature #4317 and one #6818/#8818 feature to #4318 feature.

After the conversion, process an RPO change to add the appropriate number of #4317 and #4318 features and move the appropriate number of #6817/#8817 and #6818/#8818 features.

Load Source

Beginning with the V5R1 announcement, one of these specify codes is required on all initial orders of an iSeries server:

- #0826 - #4314 Load Source specify
- #0827 - #4324 Load Source specify
- #0828 - #4317 Load Source specify
- #0829 - #4318 Load Source specify

Manufacturing uses this specify to place the corresponding disk unit feature in the load source position. These specify codes can be changed on model upgrades or on simple MES orders.

Disk Protection

This section looks at the functions that can be used to protect iSeries disk drives.

Device Parity Protection

Device parity protection is a hardware function that protects data from being lost because of a disk unit failure or damage to a disk. Calculating and saving a parity value for each bit of data protects data. Conceptually, the parity value is computed from the data at the same location on each of the other disk units in the device parity set. When a disk failure occurs, the data on

the failing unit can be reconstructed by using the saved parity value and the values of the bits in the same locations on the other disk.

Device parity protection is a high-availability function. It allows the iSeries server to continue to operate when a single disk failure has occurred. The system runs in an exposed mode until the repair operation is complete and the data is rebuilt. If a failure occurs, correct the problem quickly. Otherwise, in the unlikely event that another disk fails, you can lose data.

The base disk unit controller in the 9406 Model 250, Model 270, and Model 820 does not support device parity protection.

The disk array subsystems supplied by IBM enhance the selection of recovery options available on the iSeries server. This method of protection is based on the Redundant Array of Independent Disks (RAID) specifications that were published by the University of California in 1987. The high-availability models with device parity protection use a technique similar to RAID-5 data-redundancy technology to protect data. Throughout this documentation, RAID and RAID-5 are often referenced, and are for the most part, synonymous with Device Parity Protection.

RAID-5

A minimum of four disk units of the same capacity are required for a valid RAID-5 configuration. Parity information can be spread across four or eight of the disk units in an array and is automatically maintained as part of the RAID-5 protection feature. Internal disk units of different technology (that is, different feature numbers), but of the same capacity, can be either mirrored or RAID-5 protected.

Having parity spread across eight disk units gives better performance in the event of a disk unit failure since the data required to dynamically rebuild the data on the failed disk is accessed from an eighth of the disk units as opposed to a quarter. If one disk unit fails, it cannot be used to read or write data. The disk unit controller then reads the parity and data from the same data areas as the other disk units to dynamically rebuild the original data from the failed disk unit to satisfy ongoing read requests. When data needs to be written, the controller generates the parity information for the failed disk unit as if it were still operating. As far as the iSeries server is concerned, the disk units continue to respond to I/O even though a single disk unit has failed.

RAID-5 protection is supported for all internal disks provided that it is supported by the disk controller. A RAID controller is required when concurrent maintenance support is used.

Mirroring

Mirrored protection is a function that increases the availability of iSeries servers in the event of a failure of a disk-related hardware component. It can be used on all models of the iSeries servers. Software support is a part of the Licensed Internal Code. Different levels of mirrored

protection are possible, depending on the hardware that is duplicated. Mirroring involves duplicating disk-related hardware, such as a disk unit, disk controller, disk input/output processor (IOP), and bus, or, on Models 820, 830 and 840, and a tower. In these three 8xx models, there are two buses per tower. Therefore, tower level mirroring would be used in place of bus-level mirroring because a tower comprises a single point of failure. When a disk-related mirrored component fails, the system remains available.

Integrated Hardware Disk Compression

Data is dynamically compressed or uncompressed by the DASD controller as data is written to and read from disk. Disk compression has no affect on the main CPU utilization since compression is performed by the DASD controller input/output processor (IOP).

Support for Integrated Hardware Disk Compression is provided by DASD controllers #2741, #2748, #4748/#9748, #6533, and CCIN 671A MFIOP. Compression is limited to user ASPs.

The compression ratio results of DASD varies. The compression ratio achieved and the impact on DASD performance depends on the data and how it is accessed.

Internal Tape, CD-ROM, and DVD-RAM

The following table shows which tape units are supported in the 250, 270, and 8xx systems, expansion towers, and migration towers.

Internal Tape Media		System and Expansion Unit Supported								
Fea-ture	Size	250	270	820	830/ 840	#5077	#5072/ #5073	#5074/ #5079	#503x	#5065/ #5066
#1349	1.2 GB ¼”								S	
#1350	2.5 GB ¼”								S	
#1355	13 GB ¼”								S	
#1360	7 GB 8mm								S	
#1379	1.2 GB ¼”					S	S			
#1380	2.5 GB ¼”					S	S			
#4425	CD-ROM				N			N		M
#4430	DVD-RAM				N			N		
#4482	4 GB ¼”				N			N		M
#4483	16 GB ¼”				N			N		M

#4486	25 GB ¼”				N			N		M
#4487	50 GB ¼”				N			N		
#4525	CD-ROM		N	N						
#4530	DVD-RAM		N	N						
#4582	4 GB ¼”		N	N						
#4583	16 GB ¼”		N	N						
#4586	25 GB ¼”		N	N						
#4587	50 GB ¼”		N	N						
#6325	CD-ROM					N	M			
#6380	2.5 GB ¼”					S	S			
#6381	2.5 GB ¼”	N				N	M			
#6382	4 GB ¼”	N				N	M			
#6383	16 GB ¼”	N				N	M			
#6385	13 GB ¼”	S				S	S			
#6386	25 GB ¼”	N				N	M			
#6390	7 GB 8mm					S	S			
#6425	CD-ROM								M	
#6480	2.5 GB ¼”								M	
#6481	2.5 GB ¼”								M	
#6482	4 GB ¼”								M	
#6483	16 GB ¼”								M	
#6485	13 GB ¼”								S	
#6486	25 GB ¼”								M	
#6490	7 GB 8mm								S	

Notes:

- All tape features #44xx and #45xx are Customer Install Features (CIF). Orders for these devices are installed by the customer. The IBM Customer Engineer (CE) can install these CIF as a billable service.

N Available as a new tape.
S Supported but not orderable.
M Available via MES.

Tape Units

Through optional tape compaction or compression, the tape drives identified in the following table can double their storage capacities (except the #6380 2.5 GB drive). The following table shows the current internal tape read/write compatibilities.

Format	Capacity	Media	2.5GB[4]	2.5 GB[4]	4 GB	16 GB	13 GB[4]	25 GB	50GB
			#6380	#6381 #6481	#4482 #4582 #6382 #6482	#4483 #4583 #6383 #6483	#6385 #6485	#4486 #4586 #6386 #6486	#4587 #4487
SLR100	50 GB	SLR100							R/W
MLR3 [1]	25 GB	MLR3-25GB	--	--	--	--	--	R/W	R/W
QIC5010 [1]	16 GB	MLR1-16GB	--	--	--	R/W	R/W	R/W	R
QIC5010 [1]	13 GB	DC5010	--	--	--	R/W	R/W	R/W	R
QIC4DC [2]	8 GB	SLR5-4GB	--	--	R/W	R	--	R	R
QIC4GB	4 GB	SLR5-4GB	--	--	R/W	R	--	R	R
QIC2DC [2]	5 GB	DC9250	--	R/W	R/W	R	--	R	
QIC2GB	2.5 GB	DC9250	R/W	R/W	R/W	R	R/W	R	
QIC1000	1.2 GB	DC9120	R/W	R/W	R/W	--	R/W	--	
QIC525	525 MB	DC6525	R/W	R/W	R/W	--	R/W	--	
QIC525	320 MB	DC6320	R/W	R/W	R/W	--	R/W	--	
QIC120	120 MB	DC6150	R/W	R/W	R/W	--	R/W	--	
QIC24 [3]	60 MB	DC6150	R	R	--	--	--	--	

1. Indicates that the capacity can typically double when the compression option is selected.
2. QIC-2DC and QIC-4DC are compression formats. Cartridge capacity is data dependent. Capacities shown are typical.
3. QIC24 format is written by S/36.
4. Available as a migration feature only during an upgrade

List of cartridge part numbers:

- 50 GB 455 M IBM SLR100 Data Cartridge (35L0968)
- 25 GB with IBM MLR3-25 GB Data Cartridge (59H4128)
- 16 GB with IBM MLR1-16 GB Data Cartridge (59H4175)
- 13 GB with IBM DC5010 Data Cartridge (withdrawn from marketing)
- 8 GB (QIC4DC compressed format) with IBM SLR5-4 GB Data Cartridge (59H3660)
- 5 GB 45 M IBM SLR100 Data Cartridge (35L0661)
- 5 GB (QIC2DC compressed format) with IBM DC9250 Data Cartridge (16G8436)

- 4 GB (QIC4GB format) with IBM SLR5-4 GB Data Cartridge (59H3660)
- 2.5 GB (QIC2GB format) with IBM DC9250 Data Cartridge (16G8436)
- 2 GB with IBM MLR1-2 GB Data Cartridge (35L0589)
- 1.2 GB (QIC1000 format) with IBM DC9120 Data Cartridge (21F8730)
- 525 MB (QIC525 format) with IBM DC6525 Data Cartridge (21F8597)
- 120 MB (QIC120 format) with IBM DC6150 Data Cartridge (21F8578)

The following table shows the current speeds of the internal tape units.

Feature	Description	OS/400 Version (minimum)	Compaction Algorithm[1]	Supported Formats	Data Transfer Rate (Native)[4]	Max Capacity (Compressed)[2]
#6381 #6481	2.5GB QIC	V3R0M5	HDC, LZ1	QIC2DC[3]	600 K/sec	5 GB
				QIC2GB	300 K/sec	5 GB
				QIC-1000	300 K/sec	2.4 GB
				QIC-525	200 K/sec	1 GB
				QIC-120	120 K/sec	240 MB
#4482 #4582 #6382 #6482	4GB QIC	V4R1	LZ1	QIC-4DC[3]	760 K/sec	8 GB
				QIC4GB	380 K/sec	8 GB
				QIC2DC[3]	600 K/sec	5 GB
				QIC2GB	300 K/sec	5 GB
				QIC1000	300 K/sec	2.4 GB
				QIC525	200 K/sec	1 GB
				QIC120	120 K/sec	240 MB
#6385 #6485	13GB QIC	V3R7	LZ1	QIC-5010	1.5 M/sec	26 GB
				QIC2GB	300 K/sec	5 GB
				QIC1000	300 K/sec	2.4 GB
				QIC525	200 K/sec	1 GB
				QIC120	120 K/sec	240 MB

Feature	Description	OS/400 Version (minimum)	Compaction Algorithm[1]	Supported Formats	Data Transfer Rate (Native)[4]	Max Capacity (Compressed)[2]
#4483 #4583 #6383 #6483	16GB QIC	V4R1	LZ1	QIC-5010	1.5 M/sec	32 GB
				QIC-4DC[3]	760 K/sec	8 GB
				QIC4GB	380 K/sec	8 GB
				QIC2DC[3]	600 K/sec	5 GB
				QIC2GB	300 K/sec	5 GB
#4486 #4586 #6386 #6486	25GB QIC	V4R1	LZ1	MLR3	2 M/sec	50 GB
				QIC-5010	1.5 M/sec	32 GB
				QIC-4DC[3]	760 K/sec	8 GB
				QIC4GB	380 K/sec	8 GB
				QIC2DC[3]	600 K/sec	5 GB
				QIC2GB	300 K/sec	5 GB
#4487 #4587	50GB QIC	V5R1	LZ1	SLR100	5 M/sec	100 GB
				MLR3	2 M/sec	50 GB
#6390 #6490 #1261	7GB 8mm	V3R0M5	LZ1	FMT7GB	500 k/sec	14 GB
				FMT5GB	500 k/sec	10 GB
				FMT2GB	240 k/sec	2.3 GB native (no compression in the drive)

1. Indicates whether the attachment IOP supports Hardware Data Compression (HDC) and whether the tape subsystem controller supports a compaction algorithm, either Improved Data Recording Capability (IDRC) or Lempel Ziv 1 (LZ1). These algorithms enable more data to be written to tape up to the maximum shown.
2. Compressed values assume a 2:1 compression. Actual results may vary depending on the type and volume of data.
3. QIC2DC and QIC4DC are compressed formats. Cartridge capacity is data dependent. The capacities shown are typical.
4. Effective Data Transfer Rate typically doubles when data is compressed or compacted.

Alternate IPL

Throughout this book and in the *iSeries and AS400e System Builder*, SG24-2155, the term *Alternate IPL* (ALT-IPL) is used to describe both Alternate IPL devices and Alternate Installation Devices. It is important to understand the differences.

Important

An Alternate IPL device must be attached to an IOA adapter card that is controlled by the base IOP in the system. Any other tape drive can be an Alternate Installation Device.

Alternate Installation Device support allows you to perform installation and recovery procedures using a combination of devices. Prior to V4R1, these types of activities could only be performed using devices attached to the first system bus. The first system bus connects to the service processor IOP. Typically this is where the optical device or tape devices used for installations are attached. On OS/400 V4 systems, you can use a combination of devices that are attached on the first system bus and on additional buses. The alternate installation device is not attached to the first system bus.

On the Model 270 and Model 8xx V4R5 systems, the Alternate IPL device is attached to an I/O adapter that is controlled by the base IOP in the system.

If you use the alternate installation function, the system uses existing support (a device on the first system bus) to install or recover enough of the Licensed Internal Code required to perform an IPL with an IPL-type D. When using the alternate installation device support, the system continues the operation using media in the alternate installation device. This function supports installation and recovery from tape media, such as SAVSYS tapes or distribution tapes that you created, which contain Licensed Internal Code and may contain the operating system, licensed programs, and data.

See the *Backup and Recovery Manual*, SC41-5304, for more information.

Tape Unit Descriptions

4 GB ¼-Inch Internal Cartridge Tape Unit Technology

This tape may be used for save/restore, Alternate IPL, program distribution, migration, and ¼-inch cartridge tape exchange. Backward read/write capability to previous generations of QIC drives protects the customers investment in QIC technology.

This tape is not compatible with System/36 tape units. For read and write compatibility, refer to internal tape read/write compatibilities table on page 329.

13 GB ¼-Inch Internal Cartridge Tape Unit Technology (Supported but not orderable)

The 13 GB tape unit provides 16 GB capacity native and 32 GB capacity compressed with a data transfer rate of 1.5 MB/s (native) and 3 MB/s (with compression) using a 1500-foot cartridge tape. The #6485 also provides 13 GB capacity native and 26 GB capacity

compressed with a data transfer rate of 1.5 MB/s (native) and 3 MB/s (with compression) using a 1200-foot cartridge tape.

Tape tensioning control improvements in the tape unit eliminate the need for an auto-retension pass during the data cartridge load sequence. This is a major time saver since the auto-retension pass on earlier QIC tape units can take up to five minutes. The #6485 Tape Unit retensions the data cartridge only when a loss of tension is detected. For typical operating conditions, this is infrequent.

It may be used for save/restore, Alternate IPL, program distribution, migration, and QIC tape exchange.

However, the tape compression used by the #6381/#6481 2.5 GB and #4482/#4582/#6382/#6482 4 GB tape drives is not compatible with the compaction on the #6385/#6485 13 GB. Uncompacted or uncompressed tapes are compatible within each device's format limitations.

This tape is not compatible with System/36 tape units. For read and write compatibility, refer to internal tape read/write compatibilities table on page 329.

16 GB ¼-Inch Internal Cartridge Tape Unit Technology

This tape can be used for save/restore, Alternate IPL, program distribution, migration, and ¼-inch cartridge tape exchange. Backward read/write capability to the previous MLR1-S (Fjord) format and backward read capability to the last three QIC (Fjeld) formats protects the customer's investment in QIC technology.

It provides 16 GB capacity native and 32 GB capacity compressed with a data transfer rate of 1.5 MB/s (native) and 3 MB/s (with compression) using a 1500-foot cartridge tape.

It also is capable of 13 GB capacity native and 26 GB capacity compressed with a data transfer rate of 1.5 MB/s (native) and 3 MB/s (with compression) using a 1200-foot cartridge tape.

However, the tape compression used by the #6381/#6481 2.5 GB and #4482/#4582/#6382/#6482 4 GB tape drives is not compatible with the compaction on the #4483/#4583/#6383/#6483 16 GB. The #6385/#6485 uncompacted or uncompressed tapes are compatible within each device's format limitations.

This tape is not compatible with System/36 tape units. For read and write compatibility, refer to internal tape read/write compatibilities table on page 329.

25 GB ¼-Inch Internal Cartridge Tape Unit Technology

The 25 GB tape can be used for save/restore, Alternate IPL, program distribution, migration, and ¼-inch Cartridge tape exchange.

Tape tensioning control improvements in the tape unit eliminate the need for an auto-retension pass during the data cartridge load sequence. This is a major time saving since the auto-retension pass on earlier QIC tape units can take up to five minutes. The Tape Unit retensions the data cartridge only when a loss of tension is detected. For typical operating conditions, this is expected to happen infrequently.

However, the tape compression used by the #6381/#6481 2.5 GB and #4482/#4582/#6382/#6482 4 GB tape drives is not compatible with the compaction on the #4486/#4586/#6386/#6486 25 GB tape drives. Uncompacted or uncompressed tapes are compatible within each device's format limitations.

This tape is not compatible with System/36 tape units. For read and write compatibility, refer to internal tape read/write compatibilities table on page 329.

50 GB ¼-Inch Cartridge Tape Unit Technology

The 50 GB ¼-inch Cartridge Tape Unit that may be used for save/restore, Alternate IPL, program distribution, migration, and ¼-inch cartridge tape exchange.

The 50 GB tape technology provide 50GB of storage capacity. With data compression, up to 100 GB can be stored per cartridge, providing unattended backup capability for a broad range of medium sized iSeries servers.

These tape features are an iSeries specific implementation of Scalable Linear Recording (SLR) technology, identified as SLR100. The unit can store data at a rate of 5 MB per second (10 Mb per second with 2:1 compression). This data rate is twice the rate of previous ¼-inch tape backup used on the iSeries. In addition to reading and writing on new SLR100 50 GB or 5 GB data cartridges, there is backward write and read compatibility with MLR3(SLR50) and backward read compatibility with MLR1(DC 5010) tape formats.

This tape is not compatible with System/36 tape units. For read and write compatibility, refer to internal tape read/write compatibilities table on page 329.

Individual Internal Tape Features

#4482 4 GB ¼-Inch Cartridge Tape Unit

Can be mounted in the system unit of Models 830 and 840, and in the #5074/#5079 PCI Expansion Towers. The #4482 is a CIF.

#4483 16 GB ¼-Inch Cartridge Tape Unit

Can be mounted in the system unit of Models 830 and 840, and in the #5074/#5079 PCI Expansion Towers. The #4483 is a CIF.

#4486 25 GB ¼-Inch Cartridge Tape Unit

Can be mounted in the system unit of Models 830 and 840, and in the #5074/#5079 PCI Expansion Towers. The #4486 is a CIF.

#4487 50 GB ¼-Inch Cartridge Tape Unit

Can be mounted in the system unit of Models 830 and 840, and in the #5074/#5079 PCI Expansion Towers. The #4487 is a CIF.

#4582 4 GB ¼-Inch Cartridge Tape Unit

Can be mounted in the system unit of the Model 270 or 820. The #4582 is a CIF.

#4583 16 GB ¼-Inch Cartridge Tape Unit

Can be mounted in the system unit of the Model 270 or 820. The #4483 is a CIF

#4586 25 GB ¼-Inch Cartridge Tape Unit

Can be mounted in the system unit of the Model 270 or 820. The #4586 is a CIF.

#4587 50 GB ¼-Inch Cartridge Tape Unit

Can be mounted in the system unit of the Model 270 or 820. The #4587 is a CIF.

#5032 Removable Media Cluster Box

The #5032 requires a 9309 rack. This is a rack-mounted box that allows the attachment between one and four #6368 1.2G QIC or #6369 2.5G QIC Tape Units. The #5032 is supported for migration only and cannot be ordered as a new feature. It attaches to the #2621 Removable Media Device Attachment.

#6368 1.2 GB ¼-inch Cartridge Tape Unit

The #6368 can be used for save/restore, Alternate IPL, migration, and ¼-inch cartridge tape exchange using appropriate media and density.

#6369 2.5 GB ¼-inch Cartridge Tape Unit

The #6369 can be used for save/restore, Alternate IPL, migration, and ¼-inch cartridge tape exchange using appropriate media and density.

#6380 2.5 GB ¼-inch Cartridge Tape Unit

The #6380 can be used for save/restore, Alternate IPL, migration, and ¼-inch cartridge tape exchange using appropriate media and density. #6381 2.5 GB ¼-Inch Cartridge (QIC).

Can be mounted in a system unit of a model 250. It is supported, but not orderable.

The standard ¼-inch cartridge is the #6382. Therefore, the #6381 should only be ordered when compatibility with the System/36 tape is required.

With special compaction using LZ1 (Lempel Ziv 1), the #6381 tape unit supports up to 5 GB. The #6381 may be used for save/restore, Alternate IPL, program distribution, migration, and QIC tape exchange. For read and write compatibility, refer to the internal tape read/write compatibilities table on page 329.

#6382 4 GB ¼-Inch Cartridge (QIC)

The #6382 is not compatible with System/36 tape units.

With special compaction using LZ1 (Lempel Ziv 1), the #6382 tape unit supports up to 8 GB. It may be used for save/restore, Alternate IPL, program distribution, migration, and QIC tape exchange. For read and write compatibility, refer to internal tape read/write compatibilities table on page 329.

#6383 16 GB ¼-Inch Cartridge Tape Unit

The #6383 is not compatible with System/36 tape units.

One #6383 can be controlled by the MFIOP. Extra #6383s must be controlled by the #6513. It requires OS/400 V4R1.

#6385 13 GB ¼-Inch Cartridge (QIC)

The #6385 is not compatible with System/36 tape units. It is supported but not orderable.

#6386 25 GB ¼-Inch Cartridge (QIC)

Supported only on the #5072, #5073, and #9251 system expansion towers and in the Model 170 and 730 system towers.

#6390 7 GB 8mm Cartridge Tape Unit

The #6390 can be used for save/restore, Alternate IPL, migration, and 8mm cartridge tape exchange using appropriate media and density.

#6480 2.5 GB ¼-Inch Cartridge Tape Unit

The #6480 can be used for save/restore, Alternate IPL, migration, and ¼-inch cartridge tape exchange using appropriate media and density.

#6481 2.5 GB ¼-Inch Cartridge (QIC)

The compatibility standard ¼-inch cartridge is the #6482. Therefore, the #6481 should only be ordered when compatibility with System/36 tape is required.

With special compaction using Lempel Ziv 1 (LZ1), the #6481 tape unit supports up to 5 GB. It may be used for save/restore, Alternate IPL, program distribution, migration, and QIC tape exchange.

#6482 4 GB ¼-Inch Cartridge (QIC)

The #6482 is not compatible with System/36 tape units.

With special compaction using LZ1, the #6482 tape unit supports up to 8 GB. It may be used for save/restore, Alternate IPL, program distribution, migration, and QIC tape exchange.

#6483 16 GB ¼-Inch Cartridge Tape Unit

The #6483 is not compatible with System/36 tape units.

Note: This tape contains different mounting parts when ordered for a Model 620, 720, or S20 that supports tape concurrent maintenance, than when ordered for a Model 600 or S10 that does not support tape concurrent maintenance.

#6485 13 GB ¼-Inch Cartridge (QIC)

The #6485 is not compatible with System/36 tape units. It is supported, but not orderable.

#6486 25 GB ¼-Inch Cartridge (QIC)

Supported only in the 720 System unit or #9364 System Unit Expansion.

#6490 7 GB 8mm Cartridge Tape Unit

Can be used for save/restore, Alternate IPL, migration, and 8mm cartridge tape exchange using appropriate media and density.

CD-ROM and DVD-RAM

Internal CD-ROM and DVD-RAM Drives

iSeries server code is distributed on CD-ROM media. One CD-ROM or DVD-RAM drive is required on all 270 and 8xx models and must be ordered as a separate feature on the system unit. The CD-ROM can also be used for Alternate IPL but not as a save/restore device for the system. The DVD-RAM can be an Alternate IPL and save/restore device.

Feature	Description	OS/400 Version (minimum)	Supported Formats	Data Transfer Rate (Native)	Max Capacity (Compressed)[1]
#4425 #4525	CD-ROM	V4R4	CD-ROM Read Only		650 MB (read only)
#4430 #4530	DVD-RAM	V4R5	CD-ROM Read Only		650 MB (read only)
			DVD-RAM Single Sided		
			DVD-RAM Double Sided		

1. Compressed values assume a 2:1 compression. Actual results may vary depending on the type and volume of data.

LPAR Support and CD-ROM / DVD-RAM

For information pertaining to LPAR and CD-ROM / DVD-RAM feature requirements, see:
`http://www.ibm.com/eserver/iseries/lpar/`

#4425 CD-ROM

The #4425 is a feature CD-ROM device that can be mounted in the system unit of Models 830, 840, SB2, and SB3 and in the #5074/#5079 PCI Expansion Towers.

The #4425 is used for Alternate IPL (IBM distributed CD-ROM media only) and program distribution. It is a CIF.

#4430 DVD-RAM

The #4430 is an optional feature that mounts in the system unit of Models 830, 840, SB2, and SB3, and in the #5074/#5079 PCI Expansion Towers.

DVD-RAM may be selected in place of a CD-ROM drive in the minimum server configuration.

The #4430 is capable of writing and reading 4.7 GB on a single disk. The #4430 is also capable of reading 650 MB CD-ROM disks.

The #4430 can be used for Alternate IPL, program distribution, and data interchange (using ISO 9660 and UDF formats). The #4430 is not supported as an Alternate Installation Device (by “Boot Manager” in DST) with OS/400 V5R1.

Prerequisites: Disk unit controller in the CEC or tower where the device is mounted and OS/400 V4R5 with PTFs.

#4525 CD-ROM

The #4525 is a feature CD-ROM that can be mounted in the system unit of Models 270 and 820.

The #4525 can be used for Alternate IPL (IBM distributed CD-ROM media only) and program distribution. It is a CIF.

#4530 DVD-RAM

The #4530 is an optional feature that mounts in the system unit of Models 270 and 820.

DVD-RAM may be selected in place of a CD-ROM drive in the minimum server configuration.

The #4430 is capable of writing and reading 4.7 GB on a single disk. The #4430 is also capable of reading 650 MB CD-ROM disks.

The #4430 can be used for Alternate IPL, program distribution, and data interchange (using ISO 9660 and UDF formats). The #4430 is not supported as an Alternate Installation Device (by “Boot Manager” in DST) with OS/400 V5R1.

Prerequisites: Disk unit controller in the CEC where the device is mounted. OS/400 V4R5 with PTFs or later is required.

#6325 Optional CD-ROM Feature

This is available on System Unit Expansion Towers #5072 and #5073 for Models Sxx, 6xx, and 7xx.

Prerequisite: The #2624 Storage Device Controller.

Maximum one per I/O tower and Model 740 System Unit; one per Model 730 System Unit.

Limits the use of tape in the same tower to #6380 and #6390.

#6425 Optional CD-ROM Feature

Available on Models 720, 620, and S20, or in the #7130 Expansion cage on the #5064/#9364 System Expansion Unit with a #9329/#9330 PCI Integrated Expansion Unit.

Prerequisites: The #2726/#2740/#2741/#2748 PCI RAID Disk Unit Controller and the #9728 Base PCI RAID Disk Unit Controller.

Not supported together with #9331 Expansion Unit for SPD cards in the #5064/#9364 System Expansion Unit.

Removable Storage

Removable Storage

Removable Storage Media Devices

This chapter describes the removable storage media devices marketed today for iSeries servers. The first section Single External Attach Media addresses single tape units of different formats and the Externally Attached Automated Libraries section addresses automated libraries with more than one cartridge and automation.

Single External Tape Attach Media

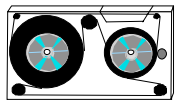
This table helps to distinguish the technical characteristics of each external tape drive.

Machine Model	7207-122	7208-342	3570-C00	3580-H11	7210-025
Description	QIC 1/4”	8mm Mammoth	C-XL format 0.31"	LTO Ultrium	DVD-RAM
Technology	Longitudinal Serpentine	Helical Scan	Longitudinal Serpentine	LTO	DVD-R/W
Native/ Compressed[1]	4 GB 8 GB	20 GB 40 GB	7 GB 21 GB	100 GB 200 GB	2.6 GB 4.7 GB
Maximum Data Rate/sec[2]	380 KB/s 760 KB/s	3 MB/s 6 MB/s	7 MB/s 15 MB/s	15 MB/s 30 MB/s	3.6MB/s CD DVD: 1.35 MB/s[3] 2.7MB/s[4]
Interface	Wide SCSI	SCSI Fast/Wide Differential	SCSI Fast/Wide Differential	HVD Ultra Wide SCSI	SCSI-2
Compression/ Compaction Method[6]	LZ1	IDRC	LZ1		
Controllers supported	#2718	#6534 #2729	#2729 #2749 #6501 #6534	#2729 #2749[5] #6501 #6534	#2718 #2768
Minimum Release	V4R2 with PTFs	V4R1	V3R1	V4R4 V4R5[5]	V5R1
Alternate IPL Device Specify	#5506	#5514	#5515	#5537	#5538

Machine Model	7207-122	7208-342	3570-C00	3580-H11	7210-025

1. The degree of compression that is achieved is highly sensitive to the characteristics of the data being compressed.
2. The actual throughput that is achieved is a function of many components, such as system processor, disk data rate, data block size, data compressibility, I/O attachments, and the system or application software used.
3. Write rate of DVD.
4. Read rate of DVD.
5. V4R5 or later is required to support the #2749.
6. Indicates whether the attachment IOP supports Hardware Data Compression (HDC) and whether the tape subsystem controller supports a compaction algorithm, either Improved Data Recording Capability (IDRC) or Lempel Ziv 1 (LZ1). These algorithms enable more data to be written to tape up to the maximum shown.

IBM 7207 Model 122 4 GB External QIC Tape Drive



The 7207 Model 122 is a stand-alone QIC ¼-inch streaming linear tape drive with the capacity of 4 GB per cartridge that incorporates Single Channel Linear Recording (SLR5) QIC technology. The 7207 Model 122 uses the QIC-4DC format.

Positioning

Some features of the low cost single tape cartridge solution for removable media are:

- Backward compatibility with previous QIC tape formats. Ideal for data interchange.
- Tape can be used as IPL source for LPAR partitioning configurations.

The Model 122 provides media capacity up to 4 GB (8 GB with a 2:1 compression ratio) data storage per cartridge. It has a sustained data transfer rate of 380 KB per second (760 KB per second with a 2:1 compression ratio). It is read and write backward compatible with QIC-120, QIC-525, QIC-1000 and QIC-2GB, QIC-2DC and QIC-4GB tape data formats. It is fully compatible with cartridges used by the iSeries 4 GB Internal Tape Unit. See “4 GB ¼-Inch Internal Cartridge Tape Unit Technology” on page 332 for more information.

It attaches to the iSeries using:

- #2768 PCI Magnetic Media Controller
- #2718 PCI Magnetic Media Controller

For a description of the #2768 and #2718, see “I/O Adapters and Controllers” on page 283.

There is also a tape Auto Loader Library that supports QIC media. See “IBM 7329 Model 308 SLR100 Tape Autoloader” on page 351 for more information.

Prerequisites

The minimum OS/400 release required is V4R2 with PTFs as stated in Informational APAR II11671.

Features

SCSI cable should be specified with any order to attach the tape drive to its controller card. For the SCSI cable, only feature #9224 or #5224 (2.4 m) is available. The maximum cable length is 3 m.

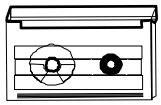
A media feature must also be ordered, either #9501 consisting of one 4 GB cartridge, one cleaning cartridge, and one test cartridge for the 7207 Model 122, or #7501, which includes an additional four 4 GB cartridges over the #9501 package.

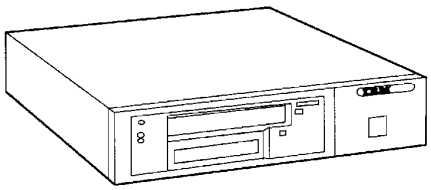
Additional cartridges (#2503) and cleaning cartridges (#2504) can be ordered by MES.

The 7207 Model 122 is available in black only.

IBM 7208 External 8mm Tape Drive Model 342

The 7208 Model 342 is a stand-alone SCSI 8mm streaming tape drive with a capacity of a 20 GB per cartridge. It supports the 170-meter advanced metal-evaporated (AME) data cartridge.





Positioning

The 7208-342 External 8mm Tape Drive is an excellent solution for users of 8mm tape. Some features are:

- Exchange earlier 8mm tape solutions. Read compatible with earlier 012, 222, 232, or 234 models.
- Fast single cartridge tape backup

The Model 342 can be used for save/restore or archiving. It can provide a media capacity of up to 40 GB of data storage per cartridge using the Improved Data Recording Capability (IDRC) algorithm for compression. It has a sustained data rate of 3 M per second (6 M per second with a 2:1 compression ratio). This gives four times the capacity and six times the date rate of the 7208 Model 012.

The Model 342 has the ability to read (but not write) earlier 7 GB, 5 GB, and 2.3 GB 8 mm metal particle tape formats.

The Model 342 attaches to the iSeries or AS/400e server in these ways:

- #6534 Magnetic Media Controller
- #2729 PCI Magnetic Media Controller
- #2749 PCI Ultra Magnetic Media Controller

For a description of the #6534, #2729 and #2749, see “I/O Adapters and Controllers” on page 283.

Prerequisites

The minimum OS/400 release required is V4R1. At least V4R5 is required to attach via the #2749.

Features

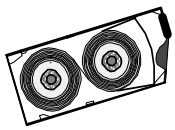
A SCSI cable must be specified with any order to attach the tape drive to the controller card. Options are the #9245 (4.5m/15ft), the # 9212 (12m/39ft), and the #9218 (18m/59ft).

A media feature must also be ordered, either #9019 consisting of one 8mm AME cartridge, one cleaning cartridge, and one test cartridge for the 7208 Model 342, or the #7019 which includes an additional four 8 mm AME cartridges over the #9019 package.

Additional cartridges (#2019) and cleaning cartridges (#2016) can be ordered by MES.

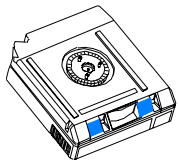
The 7208 Model 342 is available in black only.

IBM 3570 Model C00 Magstar MP Tape Drive



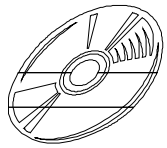
The 3570 C00 is a single cartridge version of the 3570 Magstar Tape Library. It offers the same features and connectivity as the library with the exception of that no library functions are supported. For details on the 3570, please see “IBM Magstar MP 3570 Tape Cassette Subsystem” on page 354.

IBM 3580 Model H11 Ultrium Tape Drive



The IBM 3580 Ultrium Tape Drive is a stand-alone, high-capacity tape drive. It uses the IBM Ultrium tape cartridges to provide 100 GB native (uncompressed) capacity and up to 200 GB with 2:1 hardware controlled data compression. The 3580 offers the many of the same capabilities as the library versions described later in the document. See “IBM 358x Ultrium Tape Solutions with Linear Tape Open (LTO) Technology” on page 359 for a complete description of the Ultrium Family of devices.

IBM 7210 Model 025 External DVD-RAM



DVD-RAM is a new optical technology that advances the capabilities that CD-ROM brings to the iSeries. You can use DVD-RAM on iSeries servers to help lower costs associated with:

- Software distribution
- Data and software backup
- System backup
- Data interchange (ISO 9660 and UDF formats)

Positioning

The capacity of the DVD media is over seven times larger than CD-ROM. Software that may have been distributed on multiple CDs may now need only one DVD-RAM cartridge, reducing the cost of media. The media capacity for a DVD-RAM cartridge is 4.7 GB per side versus 650 MB on CD-ROM. Its highest capacity can be as much as 9.4 GB per side. The drive reads CD-ROM, CD-R, CD-RW, DVD-ROM, and DVD-RAM media. It can write only DVD-RAM media.

The speed at which it transfers data from the media is roughly equivalent to a 24X speed CD-ROM, or about 3.6 MB/sec sustained on the average. When the data is compressed in a 3:1 compression ratio (which is average for iSeries servers), a single DVD-RAM cartridge can save about 13 GB of data in an unattended save mode. This can be ideal for backing up the smaller iSeries servers such as a Model 270. For saving software of sizes 13 GB or less in size, a tape drive may no longer be needed on the iSeries.

The 7210-025 attaches to the iSeries server via the #2718 PCI Magnetic Media Controller or to the #2768 PCI Magnetic Media Controller.

The 7210-025 may be share the #2718 and #2768 with one of these devices:

- 7207-122 External 4GB QIC Tape Drive
- 7208-345 External 8mm Tape Drive
- 7210-020 External CD-ROM Drive (withdrawn from IBM marketing 29 June 2001)

Up to two 7210-025s are allowed per #2718/#2768. When sharing the #2718/#2768 with a tape device, the 7210-025 must be physically attached after the other device. When sharing the #2718/#2768 with a 7210-020, the 7210-025 must be attached directly to the #2718/#2768 with the 7210-020 daisy-chained from the 7210-025.

For a full description of the #2718 and #2768 capabilities, see “I/O Adapters and Controllers” on page 283.

Prerequisites

The minimum OS/400 release required is V5R1.

Features

A SCSI cable must be specified with any order to attach the 7210-025 to the controller card. Options are the #9751 (.7m/2.2ft) and the # 9212 (2.5m/8.1ft). Additional #5301 (.7m/2.2ft), #5302 (2.5m/8.1ft), or #5303 (.5m/1.6ft) cables may be purchased.

Media may be purchased when a 7210-025 is ordered or at a later date. The media options are:

- #5801 5-Pack 2.6 GB Single-Sided DVD-RAM Media
- #5802 5-Pack 4.7 GB Single-Sided DVD-RAM Media
- #5803 5-Pack 5.2 GB Double-Sided DVD-RAM Media
- #5804 5-Pack 9.4 GB Double-Sided DVD-RAM Media

There is a Rack Mounting Kit (#8723) available that provides an 18-inch by 26-inch metal platform and mounting hardware for installing the 7210 in a rack.

Externally Attached Automated Libraries

Refer to the table to distinguish technical characteristics of each automated tape drive.

Machine Model	**7329-308**	**Desktop 3490E-F10** **Rack 3490E-F11** **Library 3490-F1A**	**Desktop 3570-C01** **3570-C02** **Rack 3570-C11** **3570-C12**	**3575-L06** **3575-L12** **3575-L18** **3575-L24** **3575-L32**	**Tower 3581-H17** **Rack 3583-L18** **3583-L36** **3583-L72** **Modular 3584-D32** **3584-L32**	**3590-B1A** **3590-B11** **3590-E1A** **3590E11**	**3494-L12** **3494-D12** **3494-L10** **3494-D10** **3494-HA1**
Description	QIC ¼ inch AutoLoader	½ inch tape	C-XL format 0.31"	C-XL format 0.31"	LTO	½ inch tape Magstar	Library for 3490-x1A and 3590-x1A
Technology	Longitudinal Serpentine	Longitudinal Serpentine	Longitudinal Serpentine	Longitudinal Serpentine	Longitudinal Serpentine	Longitudinal Serpentine	n/a
Native/ Compressed[1]	50 GB 100 GB	800 MB 2.4 GB	7 GB 21 GB	7 GB 21 GB	100 GB 200 GB	40 GB 120 GB	Depends on installed drives
Maximum Number of Cartridges/ Library	8	10	20	**L06:** 60 **L12:** 120 **L18:** 180 **L24:** 240 **L32:** 324	**H17:** 7 **L18:** 18 **L36:** 32 **L72:** 72 **L32 +D32:** 227-1980	B1A: 1 B11: 10 E1A: 1 E11: 10	6240
Maximum Total Capacity	800 GB	24 GB	420 GB	**L06:** 1.2 TB **L12:** 2.5 TB **L18:** 3.78 TB **L24:** 5.04 TB **L32:** 6.8 TB	**H17:** 1.4 TB **L18:** 3.6 TB **L36:** 7.2 TB **L72:** 14.4 TB **L32+D32** 56.2-441.4 TB	B1A: 120 GB B11: 1.2 TB E1A: 120 GB E11: 1.2 TB	748 TB
Maximum Data Rate/sec[2]	5 MB/s 10 MB/s	3 MB/s 9 MB/s	7MB/s 15 MB/s	7MB/s 15 MB/s	15 MB/s 30 MB/s	B11: 7MB/s 15 MB/s E11 14 MB/s 30 MB/s	Depends on installed drives
Time to load		81 sec	19 sec	20 sec	3494/3590 30 sec	56 sec	30 sec
Interface	Ultra SCSI-2 SE interface	SCSI-2 Fast/Wide Differential	SCSI-2 Fast/Wide Differential	SCSI-2 Fast/Wide Differential	SCSI-2 HVD	SCSI-2	RS232 Async or LAN for robotics
Compression/ Compaction Method[6]		HDC IDRC	LZ1	LZ1		IDRC LZ1	Depends on installed drives

Machine Model	7329-308	Desktop 3490E-F10 Rack 3490E-F11 Library 3490-F1A	Desktop 3570-C01 3570-C02 Rack 3570-C11 3570-C12	3575-L06 3575-L12 3575-L18 3575-L24 3575-L32	Tower 3581-H17 Rack 3583-L18 3583-L36 3583-L72 Modular 3584-D32 3584-L32	3590-B1A 3590-B11 3590-E1A 3590E11	3494-L12 3494-D12 3494-L10 3494-D10 3494-HA1
Controllers supported	#2718 #2768	#2729 #2749[3] #6501 #6534	#2729 #2749[3] #6501 #6534	#2729 #2749[3] #6501 #6534	#2729 #2749[3] #6501 #6534 #2765[4,5]	#2729 #2749[3] #6501 #6534 #2765[4,6]	Depends on installed drives
Minimum OS/400 Release	V4R5	V4R1	V3R1	V4R1	V4R4	B1A/B11: V3R1 E1A/E11: V4R1	V2R3
Alternate IPL Device Specify	#5536	#5504	#5515	#5515	#5537	#5519	Depends on Tape Devices Installed

1. The actual degree of compression achieved is highly sensitive to the characteristics of the data being compressed.
2. This entry illustrates the best possible performance, other components of the system may limit the actual performance achieved. The best source of information about performance is the *AS/400 Performance Capabilities Reference*, SC41-0607, at*:*
   `http://publib.boulder.ibm.com/pubs/html/as400/online/chgfrm.htm`
3. The #2749 attachment requires V4R5.
4. The #2765 attachment requires V5R1.
5. The #2765 supports attachment to the 3583 with #8005, and 3584 only.
6. The #2765 supports attachment to the 3590-E11 and 3590-E1A only.

Basic Concepts

To help you understand the meaning of some of the functional characteristics of each tape drive, refer to these descriptions:

Random mode A mode where the library can retrieve and load cartridges at random based on user demand.

Auto mode A mode where the library sequentially load cartridges to perform save/retrieve of data and automatically advance to the next cartridge once a cartridge is filled/restored sequentially.

Base mode All drives see all tapes. Must be attached to one system.

Split mode The tape unit is split into two groups. The library can be shared between systems, but the cartridges can be used only by the tape drive dedicated to them.

Multi-control path architecture
Allows each tape unit in a library access to the robot arm as if it was the only drive in the library.

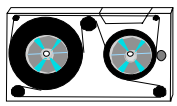
Multiple Partitions
The tape library can be split into partitions. Each drive has assigned cassettes it can use.

Tape pooling Tape devices can be attached to separate controllers, but the system software recognizes resources with equal capabilities in a common library device. At vary on, all equal resources are displayed under the common library device description. This allows BRMS to assign jobs for a specific resource to a pool of tapes that are available under this resource. Available on OS/400 V4R5 or later.

Performance The actual throughput you may achieve is a function of many components, such as system processor, disk data rate, data block size, data compressibility, I/O attachments, and the system or application software used. The numbers stated here are the maximum throughput attainable by the tape unit. The best source of information about performance is the *AS/400 Performance Capabilities Reference*, SC41-0607, at*:*
`http://publib.boulder.ibm.com/pubs/html/as400/online/chgfrm.htm`

As a general rule, it is important to note that SCSI bus technology used by the iSeries runs at 20 or 40 MB/sec. High-end tape drives can attain transfer speeds in the 30 to 45 GB/sec range, which means the throughput is that of the entire SCSI bus. Even though most tape drives allow more tape drives connected to the same bus, this is not recommended since you will never attain full utilization of these drives due to SCSI transfer limitations.

IBM 7329 Model 308 SLR100 Tape Autoloader



The IBM 7329 Model 308 SLR100 Tape Autoloader is a stand-alone automated tape backup system for use on iSeries servers. It provides media capacity of 400 GB (800 GB assuming 2:1 compression), automated data storage at a rate of 5 MB per second (10 Mb per second with 2:1 compression). This data rate is twice the rate of previous ¼-inch tape backup used on the iSeries.

In addition to reading and writing on new SLR100 50 GB or 5 GB data cartridges, the 7329 Model 308 provides backward write and read compatibility with MLR3 (SLR50) and backward read compatibility with MLR1 (DC 5010) tape formats. Attachment to the iSeries is via a SCSI interface adapter.

The media and tape formats supported by the 7329 Model 308 Tape Autoloader are fully compatible with the media and tape formats supported by iSeries #4487 and #4587 feature 50 GB ¼-Inch Cartridge Tape.

Positioning

- Can read and write on previous 25 GB tape formats. Read only on previous 4 GB, 8 GB, 13 GB, and 16 GB ¼-inch tape formats
- One removable 8-cartridge tape magazine for media cartridges or cleaning cartridges
- Selectable automatic drive cleaning
- Two operating modes: manual or sequential
- External stand-alone desktop model
- Standard bar code reader to provide tape cartridge identification and inventory as well as cleaning cartridge identification
- Over 40 hours of unattended operation at 36 GB/hour (assumes a 2:1 compression)
- Optional Rack Mount Shelf
- Supports auto mode
- Supports random mode

It attaches to the iSeries or AS/400e server in these ways:

- #2718 PCI Magnetic Media Controller
- #2768 PCI Magnetic Media Controller

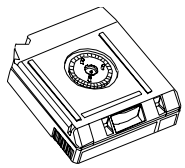
The minimum OS/400 supported software release is V4R5.

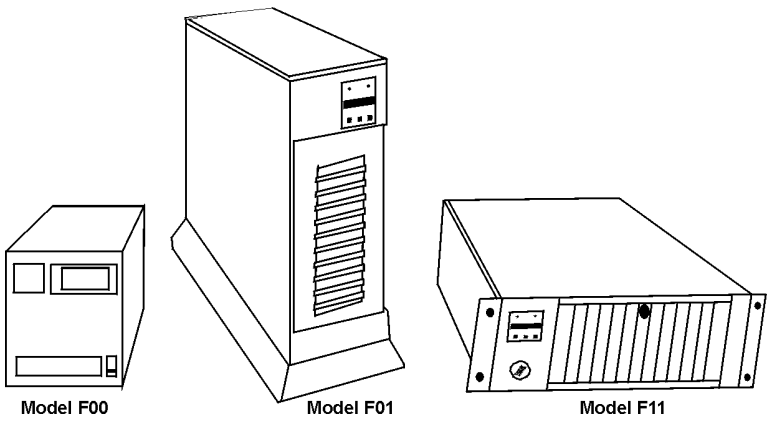
One cable feature #9224 ships with each autoloader ordered from the plant. Attaching more than one autoloader per PCI Magnetic Controller is not recommended. A SCSI terminator is also included with each autoloader ordered from the plant.

Can be used as an Alternate IPL device.

IBM 3490E Magnetic Tape Subsystem Enhanced Capability Models F00, F01, F11, and Library Model F1A

The IBM 3490E Magnetic Tape Subsystem Enhanced Capability Models F00, F01, and F11 are reduced size single-drive tabletop, desk-side, or rack-mounted versions of the 3490E family of tape drives. They are compatible with the 3490 E01, E11, C10, C11, and C22 models. They can be used as the Alternate IPL device.





The Model F00 is the tabletop version. The Model F01 is a desk-side version. The Model F11 is a rack-mountable version. Each uses ½-inch tape cartridges as the storage media. The F1A is the model used in the 3494 Tape Library.

The F01 and F11 models include a ten-cartridge Cartridge Stack Loader. All three models offer a 16-bit Fast/Wide SCSI differential interface, a 3490E tape transport, and an integrated control unit. All 3490E Fxxs have a sustained data transfer rate of up to 3 MB/sec. With the Improved Data Recording Capability (IDRC) enabled, sustained data transfer rates of up to 6.8 M/sec can be achieved. The actual throughput is a function of many factors and can vary.

The F01 and F11 models provide an automated, unattended backup capacity of up to 24G compressed. The standard capacity is up to eight GB.

Positioning

Models F00, F01, and F11 are intended for iSeries or AS/400e servers where:

- Compatibility with the 3490E format is required for off-site data storage for disaster recovery, and for data interchange with other systems
- Supports random mode
- Supports auto mode
- Unattended backup. The Models F01 and F11 automatically load and unload cartridges as they are filled. This improves efficiency by reducing the need for operator handling.

In addition to reading and writing 36-track tape, Models F00, F01, and F11 can also read the older 18-track, ½-inch cartridge tape.

The 3490E Models F00, F01, and F11 attach to all models of iSeries or AS/400e servers and to legacy (CISC) 9404/6 Models D, E, or F.

The 3490E Models F00, F01, F11, and library mode F1A can attach to these controllers:

- #6501 Tape/Disk Controller (SPD) requires the #2895 Interposer
- #6534 Magnetic Media Controller (SPD)
- #2729 PCI External Tape Controller
- #2749 PCI Ultra Magnetic Media Controller

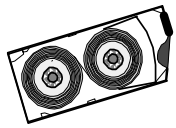
These 3490E Models cannot be *shared* between iSeries and AS/400e servers.

For more information, see “I/O Adapters and Controllers” on page 283.

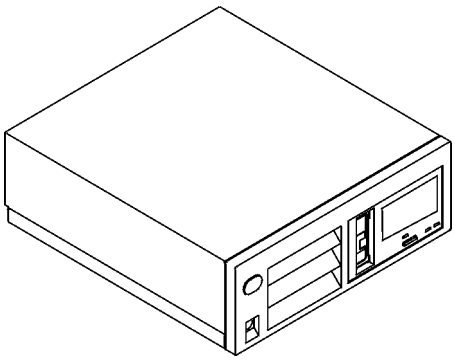
Write support for the 18-track cartridge tape is provided at OS/400 V4R2 or later when the 3490 is configured in F-mode. This also allows the *random mode* to be selected for the ACL and use of the USEOPTBLK performance parameter on CL commands.

The 3490 F1A is the tape component of the 3494 library can be installed in any new 3494-L10 or in any new or existing 3494-D10. The 3490 F1A can be upgraded to or from the 3490 F11. The Model F1A cannot be intermixed with a Model CxA within a single frame of a 3494. There is no 18-track write support or USEOPTBLK support on the Model F1A.

IBM Magstar MP 3570 Tape Cassette Subsystem



The 3570 uses a unique, robust, heavy usage tape cassette that is approximately half the size of the IBM 3490/3590 cartridge tapes. The tape cassette capacity is 7 GB uncompressed and up to 21 GB per cassette with LZ1 data compaction. This tape cassette provides fast access to data by having two tape spools with the load point in the middle of the tape. The tape never leaves the cassette and maintains a self-enclosed tape path. This unique path eliminates tape thread time and ensures higher reliability.



The 3570 Tape Subsystem is based on the same technology as the IBM 3590 High Performance Tape Subsystem (but media is not interchangeable).

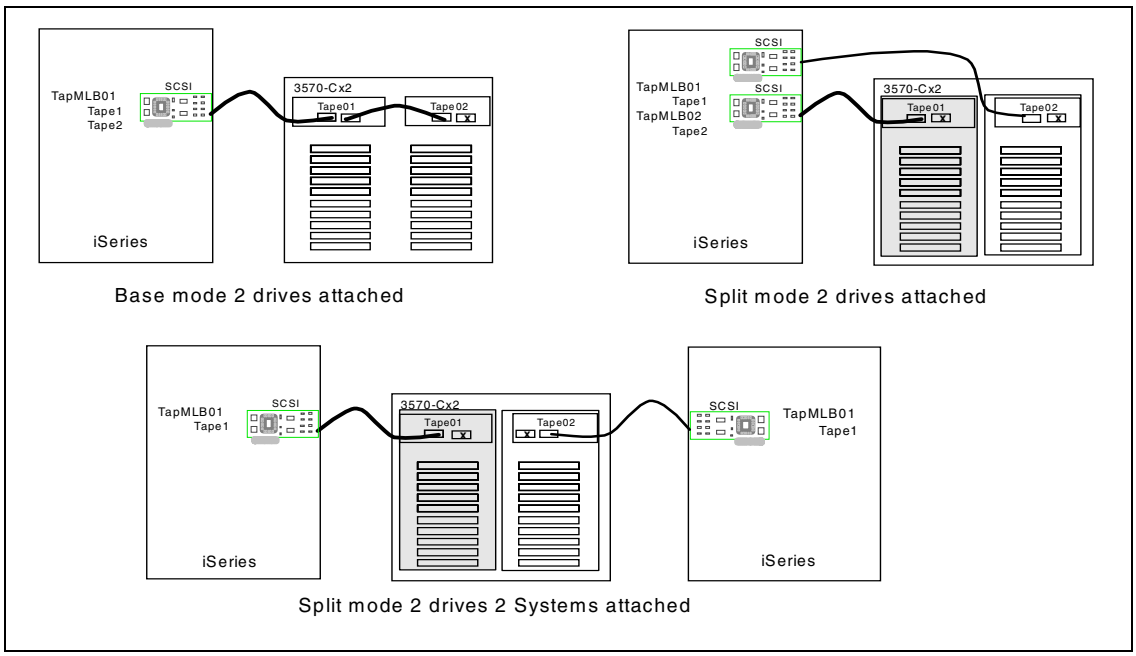
Positioning

The advantages of 3570 tape libraries are:

- Fast access to data is required such as storage management, network serving, mixed digital libraries, and image processing
- High I/O-intensive operations with multi-user access is required
- Automated backup and restore or automated archive storage and retrieval are required

- Faster data access than other tape technologies with a drive time to read/write data of eight seconds from cassette insertion
- High-speed search function
- Security key lock, which physically locks the cassettes in the library
- Supports random mode
- Supports auto mode

The 3570 C02 and C12 support two drives and can function in base mode and split mode configurations, as illustrated in the following diagram.



The 3570 supports two 10-cassette magazines providing from 140 GB (uncompressed) to 420 GB (compressed) of data on 20 cassettes using the new C format tape.

The 3570 Multipurpose Tape Subsystem attaches to all iSeries and AS/400e servers (except the D02, E02, F02, and the 9401) using these features:

- #6501 Tape/Disk Controller (SPD): Requires interposer #2895 for each SCSI cable
- #6534 Magnetic Media Controller (SPD)
- #2729 PCI External Tape Controller
- #2749 PCI Ultra Magnetic Media Controller

See “I/O Adapters and Controllers” on page 283 for a description of these controllers.

The 3570 rack-mounted Models C11 and C12 require an AS/400 9309 Rack Enclosure. Multiple systems may be attached to the 3570. The 3570 Cx2 models may be varied online to two systems at a time, with each drive allocated to one system.

Each #6501 can support up to two 3570 models and requires a #2895 AS/400 interposer feature for each SCSI cable. Each #6534, #2729, or #2749 supports one 3570 and does not require an interposer. See “I/O Adapters and Controllers” on page 283 for a description of these controllers.

Content Manager OnDemand (5722-RD1) is an application that stores and retrieves data on disk, optical, or tape media. It supports the 3570 to provide record level access to data.

In addition, the IBM 3570 offers connectivity to other systems through the support of storage management offerings such as the IBM Tivoli Storage Manager (TSM) for iSeries Version 3.7 and IBM Backup Recovery and Media Services (BRMS), and third-party products.

3570 Cxx Models

The 3570-Cxx is available in five models, which are shown in the following table. Refer to “IBM 3570 Model C00 Magstar MP Tape Drive” on page 346 for the C00 models.

Model	Description	No. of Drives	Cassette Slots
C00	Table-Top Unit	1	1
C01	Stand-alone Library	1	20
C02	Stand-alone Library	2	20
C11	Rack-Mounted Library	1	20
C12	Rack-Mounted Library	2	20

The Cxx models can read/write both B-format and C-format cartridges. The drive data transfer rate is 7 MB/sec (uncompressed) with up to 15 MB/sec (compressed) using C-format cartridges. For B-format cartridges, the rates are 3.5 MB/sec and 10.5 MB/sec. Actual throughput achieved is a function of many factors and can vary.

Prerequisites

The minimum OS/400 release required is V3R1. PTFs may also be required. At least V4R5 is required to attach via a #2749.

Features

A SCSI cable must be specified with any order to attach the tape drive to the controller card. Options are the #5205 (0.5m/1.6ft), the # 5212 (12m/39ft), the #5218 (18m/59ft), the #5225 (25m/81ft), and the #5245 (4.5m/15ft). When attaching to a #6501, an Interposer (#2895) must be ordered for each SCSI cable that will be attached.

A Power Cord must be selected.

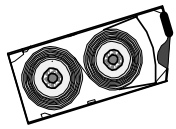
A media feature may also be ordered. The options are:

- #8705 10 C-format Data Cartridges
- #8708 10 Fast Access Linear Tape C-Format XL Data Cartridges

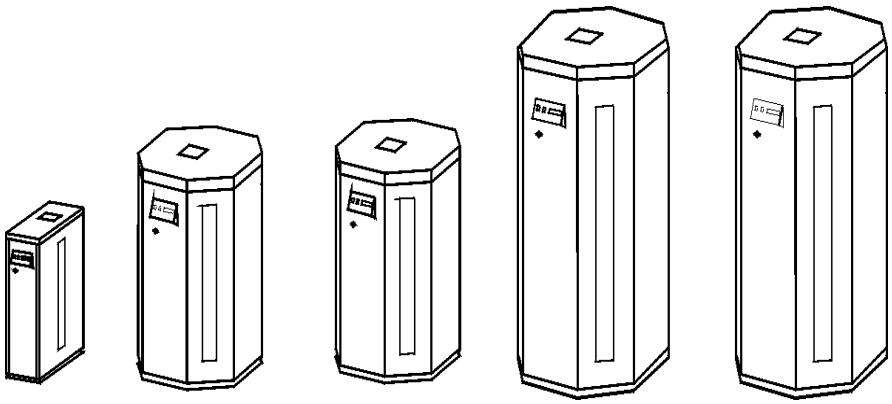
Cartridge Magazines (#8753) and Cleaning Cartridges (#8750) can also ordered.

The 3579-C00 is available in black only.

Magstar MP (Multipurpose) 3575 Tape Library Dataserver



The IBM Magstar MP 3575 Tape Library Dataserver is a family of automated tape storage solutions designed for the growing unattended storage requirements of today's midrange systems and network servers. These compact, integrated tape storage libraries expand the capability of tape processing by optimizing both read- and write-intensive operations. A dual-gripper picker can provide fast cartridge exchange times between the library slots and the Magstar MP tape drives in the library.



The Magstar MP 3575 tape library attaches to the iSeries or AS/400e, pSeries or RS/6000, HP, Windows NT, Sun, and other SCSI-attached open systems in a single or multihost configurations.

Positioning

- Magstar MP tape drives provide fast data access for current and emerging applications such as save/restore, network storage management, data warehousing, and digital libraries
- Applications that previously required disk or optical technology can now benefit from the high capacities and fast data access characteristics of the Magstar MP 3575 tape library. These applications include:
  - Automated save/restore
  - Automated migrate/recall

  - Backup/archive
  - Large sequential files
  - Records management
  - Multimedia applications
- New level of reliability and data integrity to the midrange environment and specifically designed for:
  - Repeated tape load/unloads
  - Higher tape drive duty cycles
  - Increased overall mechanical reliability
  - Increased overall media reliability
- Increases the amount of data that can be accessed with near-online performance for up to 4.8 TB of storage capacity (with a 3:1 compression ratio)
- Delivers an aggregate sustained data rate of 50 to 300 GB/hour with a maximum compression on Model C tape drives
- Provides a rich multihost attachment for library sharing, up to six iSeries or AS/400e hosts or any three heterogeneous hosts by partitioning the tape library into thirds (1/3 + 1/3 + 1/3 or 1/3 + 2/3)
- Supports industry-leading storage management offerings to provide enterprise-wide backup/restore and archive/retrieval
- Average cartridge move times in the Magstar MP 3575 tape library are less than 4.0 seconds, which complements the fast load/search time of the Magstar MP drive
- Magstar MP 3575 tape library is ideal for time-sensitive applications that require fast access to data, highly I/O-intensive operations by multiple users, and traditional save/restore operations
- Multicontrol path architecture
- Supports random mode

There are five models of the Magstar MP 3575 tape library, ranging in size from 420 GB to 4.8 TB of compressed online storage capacity and from one to six tape drives.

Model	Description	No. of Drives	Cassette Slots	Capacity uncompressed	Capacity with 3:1 compression
L06	Stand-alone Tape Library	1-2	60	420 GB	1.2 TB
L12	Midrange Tape Library	1-4	120	840 GB	2.52 TB
L18	Midrange Tape Library	1-6	180	1.26 TB	3.78 TB
L24	High capacity Tape Library	1	240	1.68 TB	5.04 TB
C32	High capacity Tape Library	2		2.26 TB	6.28 TB

Magstar MP technology is an industry leader in retrieval performance. Sustained data rates of 7 M/sec (native) and 15 M/sec (maximum compression) per Model C tape drive make the 3570 an excellent choice for customers with small to medium range backup requirements. In addition, a barcode reader enables rapid inventory management by optically scanning the barcodes on the cartridges.

The 3570 Multipurpose Tape Subsystem attaches to all iSeries and AS/400e servers (except the D02, E02, F02, and the 9401) using features:

- #6501 Tape/Disk Controller (SPD and needs interposer #2895 for each SCSI cable)
- #6534 Magnetic Media Controller (SPD)
- #2729 PCI External Tape Controller
- #2749 PCI Ultra Magnetic Media Controller

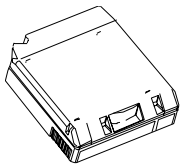
Two drives can be connected on a Single SCSI bus. See “I/O Adapters and Controllers” on page 283 for a description of these controllers.

The Magstar MP 3575 tape library uses Magstar MP Fast Access Linear Tape Cartridges, which are designed to provide several enhancements over previous tape technologies. The cartridges are specially designed for repeated handling and used in automated libraries. The tape media is contained in a self-enclosed tape path within a rugged cartridge case, remaining protected at all times from outside environmental factors. The media itself is an advanced metal particle tape developed for high durability and capacity.

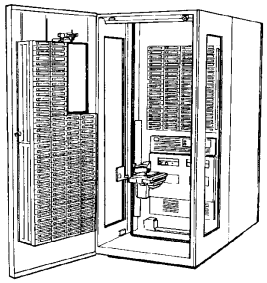
Software Considerations

The minimum OS/400 release required for CISC systems is OS/400 V3R2 and V4R1 for RISC-bases iSeries and AS/400e servers and systems. Device drivers are available from IBM for AIX, HP-UX, NT, and Sun. Supported software for the Magstar MP 3575 tape library includes Tivoli Storage Manager (TSM) Version 3.7, BRMS/400, and NetTAPE, as well as products from Cheyenne, Legato, Spectra Logic, SCH Technologies, and Veritas.

IBM 358x Ultrium Tape Solutions with Linear Tape Open (LTO) Technology



The 358x Ultrium tape family of devices supports the latest industry standard Linear Tape Open (LTO) technology. LTO technology enhances data compression capacity, performance, and reliability. A powerful open tape architecture, Ultrium sets the stage for a new generation of tape storage products expected to surpass current tape capacity and performance benchmarks while maintaining the highest data integrity.



Ultrium technology offers a high-capacity, single-reel that offers up to 200 GB (with 2:1 compression) and 100 GB native (uncompressed) when using the new ULTRIUM1 media and density. The actual degree of compression achieved is highly sensitive to the characteristics of the data being compressed.

Positioning

The 358x family uses Small Computer Systems Interface (SCSI) for attachment to the iSeries, AS/400e, pSeries, RS/6000 SP, and xSeries servers. The 358x is connected to the iSeries and AS/400e servers by a High-Voltage Differential (HVD) Ultra SCSI fast/wide adapters. OS/400, Windows 2000, Windows NT, and open systems operating systems are supported.

Some advantages of the Ultrium family include:

- Latest Open Standard technology and a strategic IBM platform
- Very cost effective solution for high capacity and fast tape storage
- 3583 and 3584 are modular and expandable solutions with practically unlimited capacity
- Enables larger-capacity or higher-performance tape backup
- Better alternative product to other externally attached Digital Linear Tape, ¼-inch, 4-mm, or 8-mm tape
- Supports random and auto modes on library models

There are four models of the 358x supported on the iSeries and AS/400e servers as shown in this table.

Models	Description	Number Drives	Number of Cartridges	Capacity Uncompressed	Capacity with 2:1 Compression*
3580	Ultrium Tape Drive	1	1	100 GB	200
3581	Ultrium Tape Autoloader	1	7	700 GB	1.4 TB
3583	Ultrium Scalable Tape Library	1-6	18 to 72	1.8 - 7.2 TB	3.6-14.4
3584	3584 Ultrascalable Tape Library	1-72	227+1980	220.7 TB	441.4 TB
* Actual performance tests done on the iSeries server show that 3:1 compression on average can be achieved.					

Installing more than one Ultrium drive on a SCSI bus may impact system performance. For optimal performance, IBM recommends that no more than two IBM Ultrium drives be attached to an individual SCSI bus.

There is a limit of one drive per IOP. However, according to Informational APAR II12621, you can plan according to the projections in this table.

IOP or IOA	Transfer Rate/User Mix of Data
#2729 IOA PCI Magnetic Media Controller HVD, HD68	Up to 13 MB/s (47 GB/hr) Aggregate sustained data rates up to 108 GB/hour
#6501 Magnetic Media Subsystem Controller IOP (SPD) HVD: Requires #2895 interposer. Further limitations may apply. See announcement for details.	Up to 17 MB/s (60 GB/hr) Aggregate sustained data rates up to 108 GB/hour
#6534 Magnetic Media Controller (SPD) HVD, HD68	Up to 17 MB/s (60 GB/hr) Aggregate sustained data rates up to 108 GB/hour
#2749 IOA PCI Ultra Magnetic Media Controller HVD, HD68 OS/400 V4R5	Up to 38 MB/s Aggregate sustained data rates up to 108 GB/hour
#2765 PCI Fiber Channel Tape Controller (3584/3584 only)	Up to 100 MB/s

The 3580 has a data transfer rate of 15 MB per second uncompressed, with up to 30 MB per second with a 2:1 compression. This media is not compatible with 3480, 3490, 3570, or 3590 drives.

Additional information about performance can be found in the *AS/400 Performance Capabilities Reference*, SC41-0607, at:
`http://publib.boulder.ibm.com/pubs/html/as400/online/chgfrm.htm`

IBM 3580 Ultrium Tape Drive Model H11

The IBM 3580 Ultrium Tape Drive is a stand-alone, high-capacity tape drive. It uses the IBM Ultrium tape cartridges to provide 100 GB native (uncompressed) capacity and up to 200 GB with 2:1 hardware controlled data compression.

IBM 3581 Ultrium Tape Autoloader H17

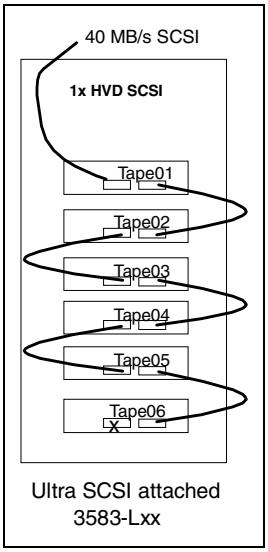
The IBM 3581 Ultrium Tape Autoloader is a stand-alone or rack-mounted autoloader that incorporates the IBM Ultrium Tape Drives. The 3581 is designed for easy, unattended operation and can be operated in sequential mode as a single device or random-access mode as two devices. Switching between single and random-access mode requires an IOP reset be done to access the new configuration.

IBM 3583 Ultrium Scalable Tape Library

The IBM 3583 Ultrium Scalable Tape Library is a stand-alone unit designed for desktop operation. A barcode reader, which allows for positive tape cartridge identification and inventory, and an operator display are included. The IBM 3583 Ultrium Scalable Tape Library can be configured with one to six LTO Ultrium Tape Drives.

With the iSeries and AS/400e, the 3583 is a single host and single drive configuration. The 3583 does not support multi-host attach when SCSI attached. The 3583 with a #8005 supports fibre channel attach to the iSeries through a #2765 adapter.

Note that SCSI and fibre attach 3583s are illustrated in the diagram.



With an optional feature, the 3583 can be mounted in an industry-standard EIA-310-D 19-inch rack with 14 EIA units of space. The IBM 3583 Ultrium Scalable Tape Library uses IBM Ultrium tape cartridges to provide typical storage capacities of 3.6 TB, 7.2 TB, and 14.4 TB (with 2:1 compression) for Models L18, L36, and L72 respectively.

Each IBM Ultrium 3583 Scalable Tape Library has operator control panel. An LCD display is on the front of the machine to provide status information and menu options. From this panel, the operator can initiate actions such as moving and loading tape cartridges or invoking diagnostics. A key lock provides front-door locking.

All drives installed at the plant are Ultrium tape drives and are installed sequentially beginning at position one. All attach to the same SCSI bus. This may impact performance of those devices.

For customers requiring extra redundancy in their storage operations, an additional DC power supply option is available.

Note: For OS/400 V4R5, PTF MF25386 is required. Without this PTF, IPL the iSeries only when the 3583 drive is powered up and online.

IBM 3584 UltraScalable Tape Library

The IBM 3584 UltraScalable Tape Library provides a mid-range, open systems, and network server tape storage solution combining reliable, automated tape handling, and storage with reliable, high-performance IBM LTO Ultrium tape drives. The 3584 offers outstanding retrieval performance with typical cartridge move times of less than 3.0 seconds for a single-frame library.

Customers can tailor the library to match their system capacity and performance needs from 14 TB to 248.1 TB (28 TB to 496.2 TB with 2:1 compression), using up to 72 IBM LTO Ultrium tape drives. A single AS/400 can address up to 32 tape devices per library.

The highlights include:

- Multi-path architecture

  The patented Multi-path architecture, first introduced by IBM in 1998, supports sharing by homogeneous and heterogeneous open systems servers. The 3584 can be partitioned into two to seventy-two logical libraries.

- Scalable capacity

  The library frame and robotics is based on field-proven IBM Tape Library technology, with scalability from one to six frames, providing a broad range of drive and storage capacities allowing high granularity in library configurations.

- Designed for automated tape handling

  The IBM 3584 UltraScalable Tape Library is part of a new family of tape library storage solutions designed for the large, unattended storage requirements from today's mid-range systems up to high-end network servers. Each aspect of the subsystem is designed to optimize access to data and reliability. IBM LTO Ultrium tape drives are compact storage devices that support the highly intensive read and write operations required by today's network servers.

- High performance

  Cartridge move time within the 3584 UltraScalable Tape Library is typically less than 3.0 seconds. A dual-gripper accessor can retrieve the next cartridge to be mounted, unload the current cartridge, and load the next cartridge. This enables these benefits:

  – Saves complete the move operations
  – Overall library performance is improved
  – Higher reliability
  – Increased redundancy

  The average drive search time to first byte of data is 60 seconds.

- Supports tape pooling up to 32 devices per pool
- Supports multi-host attach (1 to 72 hosts, minimum one drive per host and one cartridge slot)
- Supports partitioning
- Supports Fiber Channel Attach

Features

- **Model L32 (base frame)**

  The base library, the Model L32, has 141 to 281 cartridge slots. It supports up to twelve IBM LTO Ultrium tape drives with an incremental reduction of storage slots for more than four drives. Data capacity for the Model L32 is up to 14 TB native and up to 28 TB using LTO Data Compression (LTO-DC) (2:1) compression.

  Each Model L32 library has a standard 10-slot cartridge input/output station for importing or exporting cartridges from the library without requiring a re-inventory. For bulk-loading of IBM LTO Ultrium tape cartridges, the library door can be opened. Each time the library door is closed, a barcode reader mounted on the auto changer scans the cartridge labels enabling a re-inventory of the cartridges in the library frame in less than 60 seconds. A door lock is included to restrict physical access to cartridges in the library. Customers can expand the library capacity and number of drives to meet their changing needs.

- **Model D32 (expansion frame)**

  Five expansion frames (Model D32) may be added to the base frame (Model L32) to add storage or drive capacity. Each 3584 Model D32 frame supports up to 440 storage slots and up to twelve drives, with incremental reduction of storage slots for each set of four drives installed.

  A fully configured 3584 with one Model L32 frame and five Model D32 frames supports up to 72 drives.

- **Multi-path support for heterogeneous server platforms with up to seventy-two logical libraries**

  The heterogeneous sharing provided by the Multi-Path feature of the 3584 UltraScalable Tape Library is a sharing of the library robotics. This is accomplished by partitioning the library into multiple logical SCSI libraries, up to the number of drives installed. Each logical library has its own separate and distinct drives, storage slots, and control paths. I/O slots are shared on a first-come, first-served basis. This type of partitioning allows heterogeneous applications to share the library robotics independent of each other. An example of heterogeneous sharing is a Microsoft Windows NT application using the drive and storage slots of one logical library, while a UNIX application uses the drive and slots of another logical library.

  Cartridges under library control are not shared between logical libraries, nor are they allowed to be moved between logical libraries. Logical libraries can also be used for scalable application performance.

  The 3584 UltraScalable Tape Library can also be configured to support multiple SCSI control paths to a common logical library, up to the number of drives installed. Multiple control paths allow maximum flexibility in multi-server support and control path redundancy.

- **High-performance tape cartridge**

  The IBM LTO Ultrium tape cartridge has been designed to provide several enhancements over previous tape technologies. The case is specially designed for use in automated libraries and repeated, unattended, trouble-free handling. The tape itself is an advanced metal particle tape developed for durability and capacity.

Hardware requirements

The 3584 UltraScalable Tape Library has Raven Black covers.

One #9003 Drive Frame Attachment feature must be added to the 3584 Model L32 for each Model D32 frame that is attached. This is to assure that the proper cables are shipped and configuration records are correct.

The capacity of the base Model L32 can be expanded by enabling an additional four columns in that frame with the addition of the #1603 Capacity Expansion feature. This feature is also required to enable the use of IBM LTO Ultrium drives and storage elements in the optional Model D32 Expansion Frame.

The 3584 UltraScalable Tape Library contains a maximum of 12 LTO Ultrium Tape Drives per frame. Each drive may be attached to the iSeries using Fibre Channel Arbitrated Loop or Ultra/Wide SCSI High Voltage Differential (HVD). A minimum of one drive attachment must be ordered on the Model L32. If a drive attachment is not ordered on a Model D32, the #9001 (driveless frame) feature must be specified on that Model D32.

Fibre Channel Arbitrated Loop (FC-AL)

OS/400 V5R1 supports 3684 attachment to iSeries 270, 8xx, and SBx servers through the #2765 Fibre Channel Tape Controller.

One #1462 Fibre Channel Patch Panel is required per library to interface between the drives and the host systems. The #1456 LTO Ultrium FC-AL Drive Sled is required when using a Fibre Channel Arbitrated Loop to connect a 3584 Library to an AS/400 or iSeries. A 2.0m Fibre Channel drive-to-patch panel cable is included with each feature #1456.

Fibre Channel cables should be ordered for attachment from the #1462 Patch Panel to a server. A power cord feature number, if applicable, should also be specified.

Fibre attachment is either directly to a 3584 (point-to-point) or via a 3435-1RU Fibre Channel Managed Hub. Switches are not supported. However, the 2109 SAN Fibre Channel Switch Models S08 and S16 can be used in QuickLoop mode to attach iSeries to the 3584.

Ultra/Wide SCSI High Voltage Differential (HVD)

The #1455 LTO Ultrium HVD Drive Sled is required when using an Ultra/Wide SCSI High Voltage Differential (HVD) attachment to connect a 3584 Library to an AS/400 or iSeries. The library supports LVD SCSI attach, however, the iSeries supports the HVD interface only.

A terminator is included with each tape drive. SCSI cables and appropriate interposers, as required, should be ordered for attachment to a server. A power cord feature number, if applicable, should also be specified.

Software requirements

Support for the 3584 UltraScalable Tape Library is planned for these products:

- Backup Recovery and Media Management for AS/400 (BRMS)
- Computer Associates ARCserveIT
- Legato Systems NetWorker
- Sterling Alexandria
- SCH Technologies REELlibrarian and REELbackup
- Veritas NetBackup and Backup Exec
- Help/Systems

IBM intends to work together with the ISV product manufacturers listed above to support the 3584 UltraScalable Tape Library. Individual application vendors should be contacted for specific information and availability dates.

Note: The list represents our best knowledge at the time of publication and does not imply completeness.

Additional software support is available through library management software products. The software to manage the 3584 UltraScalable Tape Library is not provided with the libraries. Supporting software and applications must be obtained separately from IBM, IBM Business Partners, or independent software providers. A list of compatible software is available from your IBM representative or at: `http://www.ibm.com/storage/techsup/tapetech/tapetech.html`

Limitations

Installing more than one IBM LTO Ultrium drive on a SCSI bus may impact system performance. Intermixing other SCSI devices on the same SCSI bus as the 3584 UltraScalable Tape Library may impact performance of those devices.

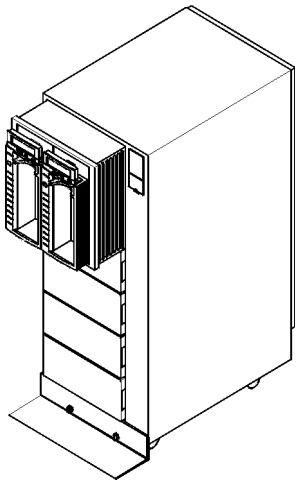
Product Preview

Future features and capabilities of the IBM 3584 UltraScalable Tape Library that provide additional attachment and expansion capabilities will include:

- Expanded Input/Output Station
- Support for Digital Linear Tape technology

Refer to this Web site for more detail on LTO technology:
`http://www.storage.ibm.com/hardsoft/tape/lto/prod_data/ultrium.html`

IBM 3590 High Performance Tape Subsystem Models B1A and B11



The 3590 High Performance Tape Subsystem Model B11 is a rack-mountable unit using high performance ½-inch tape cartridges as the storage media. The figure on the left shows two 3590 Model B11s side-by-side in a 9309 rack.

The new cartridge provides a capacity of 10 GB or with the extra length cartridges 20 GB. With the enhanced LZ1 compaction technique of the 3590, this capacity can be increased up to 30 or 60 GB per cartridge respectively.

The tape cartridges used by the 3590 are the same physical size as those used in the 3480 and 3490E but cannot be interchanged between the tape subsystems. Only the high performance and extended length ½-inch tape cartridges are supported in the 3590.

For greater reliability and data integrity, the 3590 has improved Error Correction Code (ECC) combined with servo tracks on each tape cartridge. A portion of each tape cartridge is reserved for error history, which is updated after each use to aid early identification of potential media problems.

The 3590 Model B11 provides one tape drive and includes an integrated control unit with two SCSI ports. The 3590s shipped prior to 29 January 1999 support a 16-bit fast and wide SCSI-2 interface on the SCSI ports. Systems shipped after this date have an Ultra SCSI interface.

Attachment to the iSeries or AS/400e server is through one of these controllers:

- #6501 Tape/Disk Device Controller (requires #9410 Interposer for AS/400)
- #6534 Magnetic Media Controller (SPD)
- #2729 Magnetic Media Controller
- #2749 PCI Ultra Magnetic Media Controller

The 3590 has an instantaneous data transfer rate of 9 M/sec when attached using fast and wide SCSI-2. Performance is further enhanced by a 4M buffer. When the 3590 is attached using its Ultra SCSI interface to a #6501 or #6534, the instantaneous data transfer rate is 17 MB/sec. When attached using Ultra SCSI interface to a #2729 or #2749, the

instantaneous data transfer rate is 13 MB/sec. The actual throughput achieved is a function of many components and can vary.

A maximum of two 3590s may be attached per #6501, but if run concurrently, the 3590's performance may be reduced. The #6534, #2729, and #2749 PCI Ultra Magnetic Media Controller can support a maximum of one 3590 Model B11. For more information on these controllers, see "I/O Adapters and Controllers" on page 283.

The 3590 Model B11 includes the Advanced Cartridge Function (ACF), which has the same operational function of an Automatic Cartridge Loader (ACL), but also allows random access of cartridge tapes. The ACF supports the 10-cartridge magazine that has ten slots for the high-performance ½-inch cartridge tapes and a spare slot for a cleaning cartridge. Each 3590 Model B11 is shipped with the ACF, a high performance cartridge tape, a cleaning tape, and a 10-cartridge magazine. Additional 3590 cartridge magazines can be ordered using RPQ 8B3184.

The 3590 Model B11 is supported on all iSeries and AS/400e models as an Alternate IPL device.

The 3590 is also supported in the 3494 Tape Library Dataserver as the Model B1A. The 3590 Model B11 can be field upgraded to a Model B1A.

IBM 3590 High Performance Tape Subsystem Models E1A and E11

The IBM Magstar 3590 High Performance Subsystem Model E11 tape drive is a rack-mountable model using high performance ½-inch tape cartridges. The 3590 E Models can read or write twice as much data as the B1X Models on the 3590 High Performance Cartridge Tape. With the E1X Models, the cartridge can contain up to 20 GB or with the extended length cartridge up to 40 GB of native/uncompressed data per cartridge (60 GB or 120 GB with a 3:1 compression ratio respectively).

Positioning

- High performance solution for backup/retrieval and archive
- Proven performance, reliability, and capacity for data storage needs
- Large investment in Magstar 3590 tapes
- Can install up to four drives in a space saving rack configuration
- Leading industry standard tape solution

Fully written tapes are positioned back at the load point, virtually eliminating the rewind operation as with 3490E tape drives. The "locate" function has been enhanced to position the drive on the proper track and location without having to sequentially search the entire recorded tape.

The Model E11 includes a ten-cartridge Automatic Cartridge Facility (ACF) with a cartridge magazine. This magazine has a random mode operation feature that allows random access to any cartridge in the ACF. Status indicators on each cell of the ACF alert the operator to conditions that may need to be addressed. The 10-cartridge ACF, coupled with increased capacity of the 3590 cartridge, reduces the frequency for operator interaction with the tape subsystem.

The increased capacity of the 3590 cartridges allows the ACF to typically contain from 200 GB or 400 GB native to 600 GB or 1.2 TB with a 3:1 compression ratio of data using appropriate media. Other standard features include a 16 MB dynamic data buffer, an improved data compression, auto-blocking of small records, and one-pass-read-after write. Drive reliability includes the use of an enhanced error correction code and the use of servo tracks for read and write.

The IBM 3590 Exx models have a 14 MB/s device data rate, which is 50% faster than IBM 3590 Model B11/B1A Tape Drives. With compression, the 3590 drive on the iSeries or AS/400e server may achieve a sustained data rate of up to 17 MB/sec with compression or 60 GB per hour for large files. The actual throughput achieved in a system environment is a function of many components, such as system processor, disk data rate, data block size, data compressibility, I/O attachments, and the system or application software used.

Up to four Model E11s can be installed in a rack, which, therefore, reduces the floor space required. Each drive has an operator panel with a display and menu control switches for use by the operator. The Magstar 3590 Model E11 Tape Drive can be attached to all iSeries or AS/400e servers capable of supporting these attachments:

- #6501 AS/400 Magnetic Media Subsystem Controller (interposer (#9410) is required)
- #6534 AS/400 Magnetic Media Controller
- #2749 PCI Ultra Magnetic Media Controller (V4R5)
- #2765 PCI Fibre Channel Tape Controller (V5R1)

Each AS/400 Magnetic Media Subsystem Controller (#6501) has two SCSI ports that support one tape subsystem per SCSI port. Tape and DASD cannot be attached to the same feature #6501. iSeries and AS/400e servers do not support two or more systems connected to the same SCSI path.

Each Magstar 3590 tape drive has two ports, so each port can be connected to a different iSeries or AS/400e server and the 3590 can be shared between two systems. The default configuration of a 3590 is a two port SCSI differential interface which can attach to the AS/400 and iSeries servers using #6501, #6534, or #2749.

The 3590 can be connected to the iSeries 270, 8xx, or SBx servers via a Fibre Channel beginning with OS/400 V5R1. Feature #9510 Fibre Channel Attachment Plant Install replaces the SCSI ports with two Fibre Channel ports on a new drive. An existing 3590 can be converted from SCSI to Fibre Channel by ordering feature #3510 Fibre Channel Attachment

Field Install. Fibre attachment is either directly to a 3590 (point-to-point) or via a Fibre Channel Arbitrated Loop (FC-AL) using a 3435-1RU Fibre Channel Managed Hub. Switches are not supported. However, the 2109 SAN Fibre Channel Switch Models S08 and S16 can be used in QuickLoop mode to attach iSeries to the 3590.

One cable feature should be specified for each 3590 drive port attached to an iSeries or AS/400e system adapter. Each AS/400 Magnetic Media Subsystem Controller (#6501) requires one Interposer for AS/400 (feature #9410 on the 3590) for the cables to connect correctly. The maximum SCSI cable length is 25 meters. For more information, see the *Introduction and Planning Guide,* GA32-0329.

The required software includes:

- Device support of the IBM 3590 Model E11 and E1A Tape Drives, including support for the ACF in random mode, is provided by OS/400 V4R1 or later.
- PTFs are required to attach the 3590 Model E11 or E1A Tape Drive to iSeries or AS/400e servers. Refer to Informational APAR II11472 for the required PTFs.

  Support is also provided under these products:

  – Backup Recovery and Media Services for OS/400 (BRMS)
  – Tivoli Storage Manager Version 3.7
  – IBM Content Manager OnDemand (5769-RD1)

One cartridge magazine is shipped with each Model E11. A cartridge magazine must be in the E11 for the ACF to be operated. It is suggested that an empty spare magazine be ordered and kept on hand in case the original magazine is misplaced or accidentally damaged.

IBM 3590 Model B11 and B1A Tape Drives (B Models) can be field upgraded to the new E Models, for investment protection.

The new models will write on existing cartridges. Data written on cartridges with current 3590 Tape Drives can be read by the new models.

The 3590 E11/E1A models look identical to the B11/B1A Models from an external view. It is really only the inside that is different (for example, a different tape head, takeup reel, and electronic card packs).

Model Abstract 3590-E1A

The Magstar 3590 Model E1A Tape Drive comes without the ACF and is designed to go into the Magstar IBM 3494 Tape Library.

IBM 3590 Model E11 Tape Drive can be field upgraded to Model E1A.

3590 Extended High Performance Cartridge

The IBM Magstar 3590 Tape Drive supports the 3590 Extended High Performance Cartridge Tape (Extended Length Cartridge). This tape has a native capacity of 40 GB on the 3590 Model E11 and E1A tape drives and 20 GB on the 3590 Model B11 and B1A tape drives. All 3590 B and E Models shipped on or after 04 February 2000 support the Extended Length Cartridge. The 3590 Extended Media Support is also available as an MES upgrade feature for installed 3590 B and E Model tape drives.

All models of the Magstar 3590 Tape Drive continue to support the 3590 High Performance Cartridge Tape Cartridge (Standard Length Cartridge).

Performance Statistics for the 3590-E and iSeries 8xx

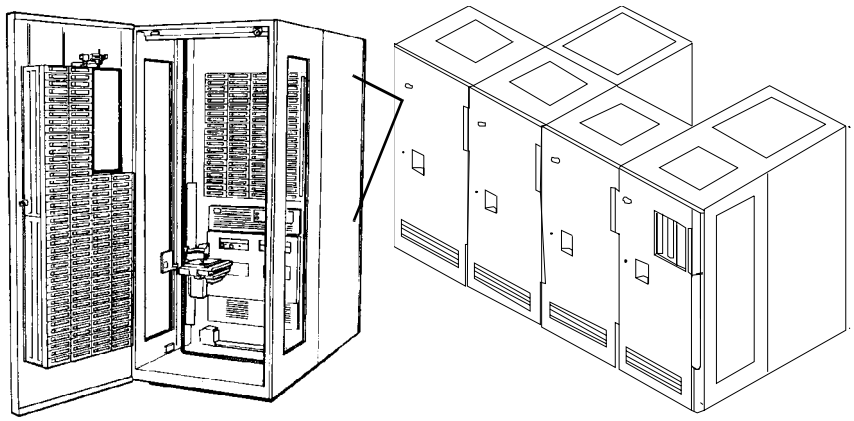
As you can see in the following table, the 3590 Ultra SCSI data rates, when attached to the iSeries 8xx, are unleashed and provide up to double the tape operation performance than was possible on the AS/400e Models 6xx and 7xx. In addition, the system maximum throughput (concurrent tape device operations) is increased by up to 700% (as measured, not the limit). Also, there is no longer any limitations on the bus placement concerning the number of tape devices or the configurations with DASD.

	User Mix of Data*	2 GB File*	Maximum System Save Rates
3590 B or E on AS/400 7xx or iSeries with #2729 IOA	Up to 13 GB/hr	Up to 47 GB/hr	Not benchmarked
3590 B or E on AS/400 7xx or iSeries with #6501/#6534 IOP	Up to 28 GB/hr	Up to 60 GB/hr	345 GB/hr
3590 B-Ultra on iSeries 8xx with #2749 IOA	Up to 35 GB/hr	Up to 74 GB/hr	2700 GB/hr (as measured, not the limit)
3590 E on iSeries 8xx with #2749 IOA	Up to 72 GB/hr	Up to 115 GB/hr	2700 GB/hr (as measured, not the limit)
3590 E on iSeries 8xx with #2765 IOA	Up to 78 Gb/hr	Up to 120 GB/hr (4 GB files)	2700 GB/hr (not measured)

Notes:

- Tape drive data rates represent 2.4:1 compressible data. The performance data contained here was obtained in a controlled environment based on the use of specific data. Actual results that may be obtained in other operating environments may vary significantly. These values do not constitute a guarantee of performance.
- All information being released represents the current intent of IBM, is subject to change, and represents goals or objectives only.

IBM 3494 Tape Library Dataserver Model



The 3494 Tape Library Dataserver is a stand-alone automated tape storage subsystem for ½-inch cartridges available for attachment to the iSeries or AS/400e server. It provides an automated tape solution for automating tape operations such as save and restore, migration of data between disk and tape, and other mass data applications.

It is comprised of a base unit called the Library Control Unit, which is available in two models. The Model L10 has space for a 3490-C1A, 3490-C2A drive, or a 3490-F1A. The Model L12 has space for two 3590-B1A or 3590-E1A drives. Both models contain the accessor (robotic arm that accesses the tape cartridges), the Library Manager, and storage cells for the ½-inch tape cartridges. The storage cell capacity is 240 cartridges. If the #5210 Convenience I/O Station is installed (allows the operator to add or remove up to 10 cartridges without interrupting normal operations), the storage cell capacity is reduced to 210 cartridges. If the 30-cartridge Convenience I/O Station, #5230, is installed, the storage cell capacity is reduced to 160 cartridges. Currently installed 3490-C10, C11, and C22 Tape Subsystems can be field upgraded to a 3490-C1A or C2A. The 3490-E11 can be field upgraded to a 3590-E1A. The 3490-F11 can be field upgraded to 3490 F1A. The 3590 Model B11 may also be field upgraded to a Model B1A for attachment in the 3494 Tape Library.

The storage capacity and the number of tape drives can be increased on the 3494 Tape Library by adding either drive units or storage units. There are two drive unit models available. The 3494 Model D10 Drive Unit provides space for either a 3490-C1A, 3490-C2A, or a 3490-F1A Drive Unit and space for up to 300 ½-inch cartridges. The 3494 Model D12 Drive Unit provides space for up to six 3590-B1A drives and 250 ½-inch cartridges. If no tape drives are installed in the D10 or D12, they can hold up to 400 ½-inch cartridges. The Model D10 or D12 Drive Units attach to either a Model L10 or Model L12 Library Control Unit. The 3494 Model S10 is the only storage unit model that can contain up to 400 ½-inch cartridges. The 3494 Model S10 has no support for tape drives.

Previously available storage units and drive units were denoted by feature number #5400 and #5300 respectively, and then later denoted by model types 3494-S10 and D10. The #5300

Drive Unit can be field upgraded to a 3494-D12, which can support 3590-B1A tape drives by specifying #5302. Both the #5400 and #5300 units are supported on the 3494-L10 and L12 Library Control Units.

Additional frames can be attached to the 3494 Model L10 or L12 in any combination of drive units and storage units, as long as the maximum of seven additional frames is not exceeded. This provides storage capacity for up to 3,040 ½-inch cartridges (7.3T if 3490E cartridges or 91.2T with 3590-B1A cartridges), and support for up to 32 3490-CxA tape drives, or up to 32 3590-B1A tape drives. Both 3490 and 3590 tape drives can be used in the same 3494 Tape Library Dataserver.

The 3494 Tape Library Dataserver Models L10 and L12 attach to the iSeries or AS/400e server using an RS 232 Host Attachment (#5211 for a 50-foot attachment or #5213 for a 400-foot attachment) or using a LAN attachment (#5219 for Token Ring or #5220 for Ethernet). Each system attached to a 3494 Tape Library Dataserver must have an RS232 Host Attachment specified to obtain the licensed code for the Media Library Device Driver (MLDD). The 3494 Tape Library Dataserver can also attach to the IBM RISC System/6000, the IBM ES/9000, Power parallel SP2, and Sun processors.

An Expansion Attachment Card (#5229) is required to support the fifth to eighth RS232 connections or the fifth to eighth tape control unit. The number of tape control units that can be attached to the 3494 Model L10 or L12 has been doubled to support up to 32 tape control units.

The 3494 Model HA1 is supported by the iSeries or AS/400e server beginning at OS/400 V4R4. The 3494 Model HA1 includes a second library manager and accessor, two service bays, and required hardware, and is designed for concurrent maintenance. The Model HA1 operates in standby mode to provide a redundant library manager and accessor or improved availability. With the Dual Active Accessor (DAA) feature active on the 3494 Models L10, L12, or L14, both accessors can operate simultaneously to increase mount performance of the library. With two library managers and dual accessors, and each containing two disk drives for duplication of the library databases, maintenance can now be performed in most situations on the failing library control unit component while the 3494 is still available for customer production. The Model HA1 contains no storage cells for tape cartridges. The 3494-HA1 can be installed on 3, 4, 6, 8, 10, 12, and 16 frame configurations

To expand the number of tape control units that can be attached to the Library Manager, the Tape Control Unit Expansion feature, the #5228, should be specified. One feature can convert four RS232 host processor connections into four tape control unit connections in either the Library Manager or the Expansion Attachment Card (#5229). When combined with other interface features, up to 32 tape control units can be connected to the Library Manager. If all RS232 host processor connections are converted to tape control unit connections, a LAN adapter card is required to provide the host processor connection as shown in the following table.

No. of #5228 Features	Available RS232 Ports (for Direct Host Attach)	Available Tape Control Unit Connections	Additional Features Required
0	4	4	None
0	8	8	#5229
1	0	8	#5219 or #5220
1	4	12	#5229
2	0	32	#5229 and #5219 or #5220

This allows up to 32 systems to attach to the 3494 using the 3590 High Performance tape drives. A Remote Console Feature (#5226) is required when attaching the 3494 using a LAN that provides the capability of controlling and monitoring the status of up to eight 3494 Tape Library Dataservers from a remote location. The console can be password protected.

The #6501, #6534, #2729, and #2749 PCI Ultra Magnetic Media Controllers support 3490 Models C1A or C2A with a SCSI attachment (3490 feature #5040) installed in:

- Tape Library Control Unit 3494 Model L10 or Model L12
- Tape Library Drive Unit 3494 Model D10 or Model D12

Each of these controllers allow the data transmission and tape commands to pass to the tape subsystems.

The #6534, #2729, and #2749 PCI Ultra Magnetic Media Controllers also support attachment of the 3494 Tape Library Dataserver.

See “I/O Adapters and Controllers” on page 283 for descriptions of these controllers.

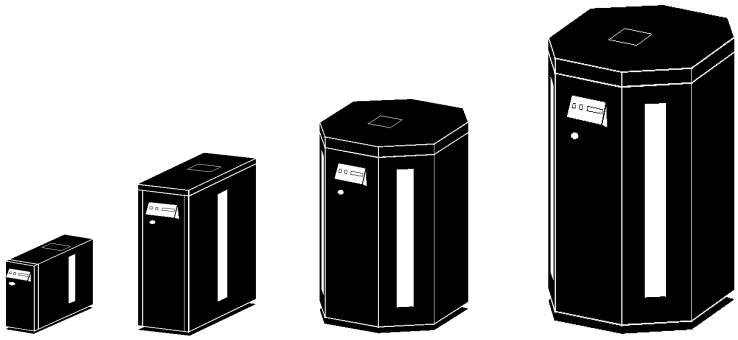
The *Backup Recovery and Media Services for AS/400* program (5769-BR1 or 5716-BR1) product supports the 3494. It provides a common directory for multiple iSeries or AS/400e servers. It also provides management for archive, backup, and recovery facilities, based on customer policies; scheduled unattended system backup capability; and archival facilities to control the movement of seldom-used data from disk to tape.

The cartridges on the 3494 must have human- and machine-readable external labels. These are read by the accessor, which travels on a linear rail (extended when additional units are added). The accessor uses a barcode reader. Its movement is horizontal, vertical, and 180 degree pivot.

Other optional features of the 3494 Tape Library Dataserver include a second Library Manager Disk Drive (#5214), which allows mirroring of the Library Manager (basically a PC) database. It also provides the capability to recover the Library Manager database in the event

of a failure on the primary disk drive. The Dual Gripper option (#5215) provides the accessor with a second tape cartridge gripper for better performance in the Library.

IBM 3995 Optical Library C-Models



3995 Optical Library Models C40, C42, C46, and C48

The IBM 3995 Optical Library C-Models feature high capacity 5.2G or Extended Multifunction optical drives, known as 8X technology. It is eight times the capacity of the first generation optical technology.

The drives use industry standard 5.25-inch optical cartridges, supporting these optical technologies:

- Magneto-Optical (MO) rewritable, which allows data on the cartridge
- Permanent Write-Once-Read-Many (WORM), which provides a permanent and unalterable copy of the data by physically ablating (burning) holes into the recording layer
- Continuous Composite Worm (CCW), which provides an unalterable copy of data through a software implementation of WORM, using rewritable media

Rewritable, permanent (ablative) WORM and CCW optical cartridges can be mixed within the same library.

The 5.2G (8X) optical drives in the C models can read and write to 5.2G (8X) and 2.6G (4X) optical cartridges and read only 1.3G (2X) and 650M (1X) optical cartridges. The 2.6G (4X) optical drives in the C models can read and write to 2.6G (4X) and 1.3G (2X) optical cartridges and read only 650M (1X) optical cartridges.

Each library has an auto changer, which is used to move the optical cartridges between the optical drives, the cartridge storage cells, and the entry/exit slot located on the top of the libraries. Certain models feature a dual-gripper cartridge picker on this auto changer for improved performance. All models have a viewing window through which the auto changer can be seen.

The following table summarizes the 3995 C-Models supported on the iSeries or AS/400e server.

3995 Model	Capacity		Number of Drives	Attachment	Number of Auto Changer Grippers
	G	Disks			
C40	104	20	1-2	Direct	1
C42	270	52	2	Direct	2
C44	540	104	2 or 4	Direct	2
C46	811	156	4 or 6	Direct	2
C48	1341	258	4 or 6	Direct	2
C20	104	20	1-2	LAN	1
C22	270	52	2	LAN	2
C24	540	104	2 or 4	LAN	2
C26	811	156	4 or 6	LAN	2
C28	1341	258	4 or 6	LAN	2

Only two model upgrades are supported. These are for the 3995 Model C24 to Model C26 and for the Model C44 to Model C46.

The iSeries and AS/400e direct attach 3995 C-Models (C40, C42, C44, C46, and C48) can attach using these features:

- #2621 Removable Media Device Attachment support on OS/400 V3R2 only with a maximum of four internal drives or less (for example, does not support the optional six drive configurations available for the model C46 and the model C48).

  Note: #2621 cannot be used to attach the 3995 on OS/400 V5R1.
- #6534 Magnetic Media Controller (SPD) when using OS/400 V4R2 or later
- #2729 PCI Magnetic Media Controller when using OS/400 V4R2 or later
- #2749 PCI Ultra Magnetic Media Controller when using OS/400 V4R5 or later

See “I/O Adapters and Controllers” on page 283 for a description of these controllers.

This OS/400 software is required to support 3995-C4x 8X optical drives:

- OS/400 V4R4 or V4R5
- OS/400 V4R3 with Group PTF SF99089 for 8X Support
- OS/400 V4R2 with Group PTF SF99088 for 8X Support
- OS/400 V3R2 with 5755-AS3 #1979 and PRPQ 5799-XBW #3520 with Group PTF SF99079 for 8X Support

The iSeries and AS/400e Integrated File System provides UNIX-type access to optical files through commands and APIs. It also provides workstation-to-iSeries and iSeries-to-iSeries access to optical byte-stream files.

The LAN-attached 3995 C-Models (C20, C22, C24, C26, and C28) require either an IBM Token-Ring LAN or an Ethernet LAN conforming to IEEE 802-3 protocol. Ethernet is available with an Ethernet 10/100 Mbps adapter. The LAN models include a desktop controller that provides command processing, auto changer control, and optical drive controls for the library. An operator keyboard, display, and mouse are also included.

The IBM High Performance Optical File System (HPOFS) is also included in the controller, which provides additional data protection in the event of power interruptions.

The IBM 5.2G Optical Disk Cartridges can be ordered in packs of 10 or 52 as a feature of the 3995 cartridge and are available in rewritable, WORM, and CCW technology. See the announcement letter dated 01 September 1998 (198-202 in the United States) for details.

With the support of save and restore to optical storage in OS/400 V3R7 and Version 4, the 3995 models can be used to archive and restore libraries and objects. Applications can also be used to archive and retrieve records and objects to optical storage by using many applications, including the IBM Content Manager OnDemand (5769-RD1).

The maximum number of LAN-attached 3995 Optical Libraries supported on a single LAN is 24. The maximum number of iSeries or AS/400e direct-attached 3995 Optical Libraries supported on a system depends on the system model. Refer to “iSeries and AS/400e Servers” on page 65 for these numbers.

External Disk Storage

External Disk Storage

2105 Enterprise and Versatile Storage Servers

2105 Enterprise Storage Server

The Enterprise Storage Server (ESS) (commonly referred to as *Shark*) is a leading IBM Storage Area Network (SAN) storage solution. ESS supports critical requirements for strategic business initiatives, such as e-business, enterprise resource planning, business intelligence, service consolidation, and other mission-critical applications. The ESS deploys the IBM Seascape principles as a powerful storage server with snap-in building blocks and with universal data access.

ESS builds on the rich legacy of IBM storage system solutions across the major operating system platforms. Heterogeneous attachment is provided to all major server platforms, including the iSeries and AS/400e servers, S/390, Windows NT, and many varieties of Unix.

The Enterprise Storage Server incorporates the capabilities of the Versatile Storage Server (VSS), such as:

- Supports a wide variety of Unix and Windows NT servers, as well as iSeries, AS/400e, and Novell NetWare
- Secure intranet connection for remote disk, configuration, performance, asset, and capacity management incorporating StorWatch usability and ESS Expert

At V5R1, the ESS supports fiber-channel attachment. Capacity ranges from 400 GB to over 11 TB to provide excellent scalability. Sixteen standard configurations are offered to meet your capacity and performance needs. Performance can be optimized to meet heterogeneous environment needs, such as the bandwidth required by advanced transaction processing capabilities for both online and batch applications. Resource contention is reduced and performance is improved by the parallel access of volumes and I/O priority queuing.

The ESS architecture supports high availability requirements with redundant components. Data replication services extend access to data, while using a concurrent copy of data. Rapid data duplication provides extensive capabilities to exploit, manage, and protect your information in a 7-by-24 (7x24) environment. Availability is maximized through redundancy and non-disruptive service with a design to virtually eliminate single points-of-failure or repair.

ESS is the storage of choice for users that are planning for comprehensive enterprise disk storage consolidation and data sharing on multiple, heterogeneous servers, where combined platform storage requirements exceed 400 GB. It provides high-performance RAID-5, read and write cache, or the flexibility of common storage for multiple servers with differing channel attachments.

There are two adapters available to attach the ESS to an iSeries server – SCSI and fiber:

- SCSI attachment is supported using a #6501 (SPD) adapter. In this configuration, the ESS emulates a 9337-5xx drive, based on the size of the disk unit installed. OS/400 V3R1 supports 4 GB and 8 GB LUNs and V4R2 supports 4 GB, 8 GB, 17 GB, and 36 GB LUNs.

  Sixteen disk drives (LUNs) are supported per #6501, with up to a maximum of 16 #6501s for 32 ports on the ESS.

- Models F10 and F20 attach to iSeries 270 and 8xx servers using the #2766 Fibre Channel DASD Controller with OS/400 V5R1. Each #2766 supports 32 LUNs. A LUN can be 8.58 GB, 17.54 GB, 35.16 GB, 36.00 GB, or 70.56 GB.

  Fibre attachment is either directly to the ESS (point-to-point) or via a 3435-1RU Fibre Channel Managed Hub using Fibre Channel Arbitrated Loop (FC-AL) connectivity. Switches are not supported. However, the 2109 SAN Fibre Channel Switch Models S08 and S16 can be used in QuickLoop mode to attach iSeries to the ESS.

  Up to five iSeries servers can be on a single loop. Performance considerations apply. Refer to the Redpiece *iSeries in Storage Area Networks: A Guide to Implementing FC Disk and Tape with iSeries*, SG24-6220, available at: `http://www.redbooks.ibm.com`

Note: Prior to ordering the #2766 Fibre Channel Disk Controller, read and understand the no-charge RPQ 847126 - iSeries Fibre Channel Adapter for Enterprise Storage Server. RPQ 847126 must be ordered for the #2766 to ship with the system. Configuration and installation considerations are discussed in the documentation shipped with the RPQ.

You can find more information about the Enterprise Storage Server on the Storage Systems Division home page at: `http://www.storage.ibm.com/`

2105 Versatile Storage Server

The IBM 2105 Versatile Storage Server (VSS) is designed to provide a flexible approach to storage centralization in support of server consolidation. By using the IBM 7133 Serial Disk Subsystem as its storage building block, VSS provides investment protection for customers in a heterogeneous processing environment. With the IBM VSS, disk storage can be consolidated into a single, powerful system to offer many levels of advanced function. Examples include remote Web-based management, true data sharing for like servers, and dynamic capacity allocation.

The Versatile Storage Server supports 7133 Models 010 and 020 and the D40 Serial Disk Subsystem containing 4.5 GB, 9.1 GB, and 18.2 GB disk drives. Disk units are grouped in similar groups of four or eight. The drives emulate the 9337 Model 580 or 590 respectively. The VSS attaches to the iSeries server using the #6501 Tape/Disk Device Controller. The

maximum capacity on the iSeries is 536.3 GB, when using the 4.5 GB Disk Units, and 1099.5 GB, when using the 9.1 GB Disk Units.

For more information about the Versatile Storage Server and 7133 Serial Storage Subsystem, see the Storage Systems Division home page at: `http://www.storage.ibm.com/`

Peripherals

Peripherals

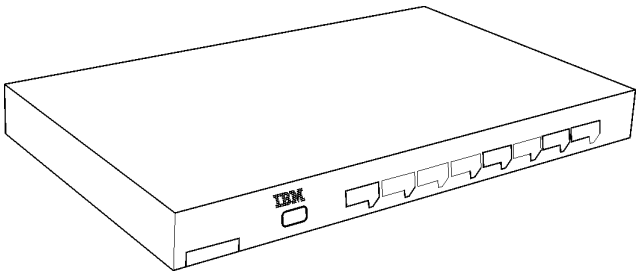
Peripherals

Storage Area Network Components

Storage Area Networks (SAN) connect SAN storage (usually tape, disk) together with servers into a network called a *fabric*. Today's industry standard for interconnecting components of a SAN is Fiber Channel. The iSeries supports connection of disk and tape using fiber channel. The advantage of SAN are greater distances to devices (500 m using short wave and up to 10 Km using longwave fiber) and the ability to share resources on a SAN.

The components supported by the iSeries Fiber Channel adapters #2765 and #2766 are the Enterprise Storage Server, Magstar 3590 and the Ultrium 3584 Tape library. For further flexibility the IBM SAN Fiber Channel Managed Hub (3534-1R2) is supported and can be used to interconnect systems and components. Switches are not supported. However, the IBM SAN Fiber Channel Switch (2108-S09 and 2109-S16) can be used when the QuickLoop RPQ (8S0521) is installed.

IBM SAN Fibre Channel Managed Hub 3534-1RU



The IBM SAN Fibre Channel Managed Hub provides industry standard Fibre Channel Arbitrated Loop (FC-AL) connectivity of an entry-level homogeneous cluster of host servers and storage systems. The Managed Hub has eight FC-AL ports. Seven ports support fixed short wave optical media for connecting devices on multimode fiber up to 500 meters. The eighth port is a Gigabit Interface Converter (GBIC) slot that can be configured for either short wave optical (order part number 03K9308), or long wave optical (part number 03K9307) media. A long wave singlemode fiber can be up to 10 kilometers.

Positioning

The Managed Hub enables customers making initial investments in Fibre Channel connectivity to begin with small work group clusters of host servers and storage systems. The Managed Hub implements the industry standard Fibre Channel Arbitrated Loop protocol. It provides high-speed simultaneous data transfers between all ports, fault isolation at the port level, and a StorWatch Specialist for configuration and management.

The Managed Hub is beneficial for you if you are beginning to implement Fibre Channel connectivity between your host servers and storage systems in a homogeneous server environment.

3534 Channel Managed Hub Features

The IBM SAN Fibre Channel Managed Hub offers:

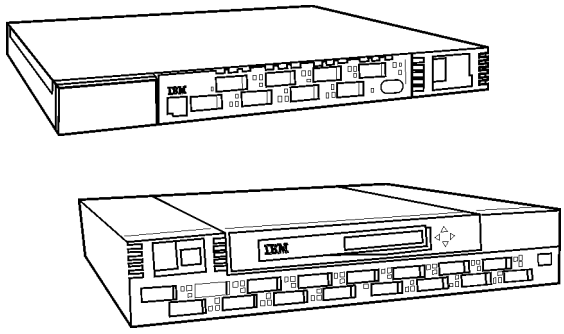
- Industry standard Fibre Channel attachment
- High-speed performance using nonblocking switch-based technology
- Simultaneous 100 MB/second full duplex data transfers across all ports
- Eight ports, one that is configured with either a short wave or long wave optical GBIC (see the details below)
- StorWatch FC Managed Hub Specialist, a Web browser interface for configuration, management, and service
- Support of industry standard MIBs enabling standard SNMP management
- IBM SystemXtra support services and financing

The Managed Hub is designed for implementing multinode server clusters and storage systems for high-availability and disaster recovery solutions. Seven ports incorporate fixed short-wave laser optical media for device interconnection at a maximum distance of 500 meters. A single GBIC slot accommodates an optional GBIC, which supports either short-wave or long-wave laser fibre optic cabling with a maximum distance of 10 kilometers.

The Managed Hub is an integrated rack mountable component that is serviced as a single replaceable unit. Included with the Managed Hub is a rack mounting kit, product documentation, and a power cord for connecting to the Power Distribution Unit (PDU) in the rack. The Managed Hub installs in an industry standard 19-inch rack. A stand-alone configuration is an option. In rack-mounted configurations, 1U space and one outlet on the rack PDU are required. For stand-alone configurations, you must order the country- unique power cord.

Attachment to host servers and storage systems requires fiber optical cables. The short wave ports require multimode optical cables, either 50.0/125 micron optical cables for distances up to 500 meters, or 62.5/125 micron fiber optical cables for distances up to 175 meters. If a long wave GBIC is used, the required fiber optical cable is a singlemode, 9.0/125 micron cable for distances up to ten kilometers.

IBM SAN Fiber Channel Switch 2109-S08 or 2109-S16



The IBM SAN Fibre Channel Switch is an 8-, or 16-port Fibre Channel switch (2109-S08 and 2109-S16 respectively) used to interconnect multiple host servers with storage servers and devices, creating a Storage Area Network (SAN). The switch allows you to build a wide range of scalable SAN solutions with high-speed, full-fabric support, and modular components. By creating an intelligent connectivity infrastructure, or fabric, that supports connections across a wide range of host and storage types, the IBM SAN Fibre Channel Switch enables storage resources to be shared efficiently and to scale rapidly, meeting the increasing demands by users for highly available, heterogeneous access to expanding storage pools.

2109 Fiber Channel Switch Features

- High Performance with low latency. The Switch's non-blocking architecture provides multiple simultaneous connections, each capable of up to 100 MB/s, with maximum latency of two microseconds.
- Ports designed to support F, FL, and E-port modes of operation.
- Easy setup and configuration. Internal power-on self test and a Web browser interface usable from any Java-enabled browser on the Internet or intranet provide configuration monitoring and diagnostics.
- Scalable SAN solutions. Cascading switches enable flexibility in configurations to accommodate many different needs, and assure high availability, and optimum performance.
- StorWatch Specialist, which allows you to control which host systems are logically connected to various storage systems and devices, providing security and access control.
- Automatic fabric discovery. The Switch allows external host and storage systems to discover other SAN-enabled systems that are connected to the connectivity infrastructure (fabric). This information is maintained within an internal name server database.
- Extended distance. The Switch can be configured with either shortwave or longwave Gigabit Interface Convertors, for distances up to 10 kilometers between connections.

For use on the iSeries, the QuickLoop RPQ (8S0521) provides the firmware that enables devices connected to ports of the switch to be handled as private loop devices. QuickLoop

creates a unique fibre channel topology that allows host bus adapters (such as the #2765 and #2766) that use fibre channel arbitrated loop (FC-AL) without knowledge of SAN fabric, commonly to communicate with fibre channel arbitrated loop storage devices through IBM 2109 Fibre Channel Switches. QuickLoop allows individual switch ports to be designated as arbitrated loop ports, allowing a private host initiator to communicate with arbitrated loop storage devices as though they were all contained in one logical loop. These QuickLoop switch ports can be located on one switch, or on two switches either directly connected to each other or connected within a SAN fabric. A SAN fabric can contain many independent Quickloops but only one or two switches can be designated to build a single logical arbitrated loop in which private loop initiators can communicate.

IBM NetVista Thin Clients

IBM NetVista Thin Clients are easy to connect, with their advanced network, wireless, and Internet technologies. They feature a range of solutions and designs to complement and enhance your iSeries environment, IBM NetVista Thin Clients are easier to manage, because they employ industry standard manageability and leading security for trusted communications.

The NetVista name unifies two key elements of optimized computing. NetVista is network optimized for intranet, extranet, or Internet use to help users get their work done faster and with greater ease and security. Plus, NetVista opens new avenues to users by helping them realize their visions through technology.

NetVista is built upon the IBM Edge of Network (EoN) initiative. It is designed to help you take advantage of e-business solutions and as complementary tools that are easy to use.

All models of the IBM NetVista Thin Clients use an operating system program kernel, which is downloaded from the boot server over a TCP/IP LAN. The kernel and other thin client programs are loaded using the IBM Network Station Manager residing on the boot server. The thin client operates without disk storage. When powered on, it performs initial diagnostics and then contacts the boot server requesting the Network Station Manager to download the kernel. The boot server must run one of these operating systems:

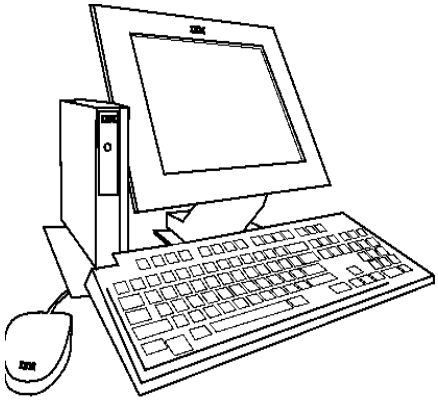
- OS/400 (V4R2 or later)
- Windows NT 4.0 TSE
- AIX (4.3 or 4.2.1)

The appropriate level of IBM Network Station Manager software is required on the boot server. See “IBM NetVista Thin Client Manager, Version 2 Release 1 (5638-C07, C08)” on page 647 for more information.

Suggested Reading

For further information on NetVista, see: `http://www.pc.ibm.com/ww/netvista/index.html`

IBM NetVista N2200 Thin Client



The NetVista N2200 Thin Client addresses customer environments where space, ease-of-use, reliability, and cost are serious concerns. The NetVista N2200 connects and boots via a LAN attachment to an OS/400, AIX, and Windows NT server. It can run applications from those servers or from an S/390 that is network-connected to a boot server.

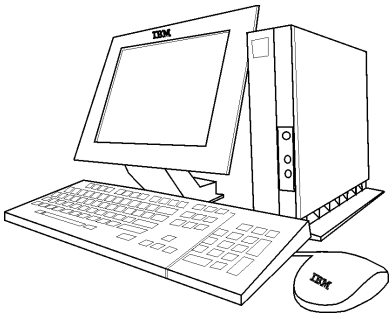
NetVista N2200 is a low priced, full-featured thin client and an excellent solution for such applications as:

- Front counter applications (such as POS systems linked to back-office and production applications)
- Walk-up or kiosk environments (such as warehouses or lobbies)
- Replace aging or under-used PCs and outdated terminals
- Low-cost, secure access for e-mail and Internet access
- Low-cost, secure access for 5250 and 3270 applications

The NetVista N2200 allows access to Windows applications, plus concurrent access to multiple terminal sessions. Run small Java applications and take advantage of the emerging class of applications that use a thin Java GUI to transform existing character-based applications into easy-to-use graphical ones. Direct attachment of USB devices and attachment via a cable adapter for devices that require serial or parallel ports are supported.

Refer to “NetVista N2200 Features and Requirements” on page 791 for a list of the requirements to use a NetVista 2200 with the iSeries server.

IBM NetVista N2800 Thin Client



The combination of NetVista N2800 Thin Client hardware and Network Station Manager V2R1 software provides the versatility of a single, powerful, thin client desktop with access to a full range of applications in Java, the Internet, and server-based environments. NetVista N2800 provides outstanding performance across network-oriented business computing tasks whether the user is:

- Using Windows applications through the network
- Gathering Web-based information
- Accessing database information across a variety of servers

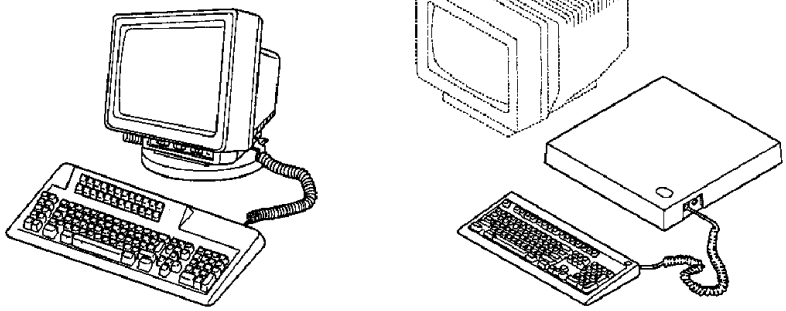
NetVista N2800 offers flexible expansion through multiple I/O attachment options and memory capacity. It also provides high quality audio and color video support for robust multimedia applications and online training programs. Support for centralized configuration and task management provides for fast application deployment and outstanding reliability for:

- Data processing
- Storage
- Backup

Refer to “NetVista N2800 Features and Requirements” on page 791 for a list of the requirements to use a NetVista 2800 with the iSeries server.

IBM InfoWindow II Displays

InfoWindow Model 3489



The InfoWindow Model 3489 provides a graphical user interface (GUI)-like capability. It incorporates a variable split screen, calculator, and expansion cartridge to enable future IBM product enhancements or unique customer requirements to be added to the display. A mouse port and printer port as standard.

The 3489 is modular in design with a 122-key or enhanced keyboard and Modular Logic Unit. It supports the attachment of most IBM monitors. It supports up to four host display sessions with a 6,000 keystroke record, play, and pause facility, a 262,000 color palette, and extended foreground and background colors. Lightpen is supported.

The 3489 supports the Image/Fax-View and print facility and one PC/TV attachment, which allows end users to control audio and motion video using a cable, antenna, or external video source in a sizable pop-up window. The 348*n* displays connect to the iSeries server using twinaxial attachment.

InfoWindow II 3153

The InfoWindow II 3153 is a family of displays that has an ASCII attachment to the system, and also to the pSeries (RS/6000) server, a PC, or the ES/9000 using a 3174 controller. The 3153 emulates a variety of the most widely used ASCII displays. It has two RS232 ports and

a parallel printer port. Different models of the 3153 offer green, amber, or white monitors. The 3153 meets recognized international standards and guidelines on ergonomics, emissions, safety, and power consumption.

IBM 7852 Model 400 Modem

The 7852 Model 400 is an externally attached data/fax modem capable of full duplex transmission speeds of up to 33.6 Kbps. It operates in either synchronous or asynchronous mode and supports electronic mode switching using V.25bis AT commands. Connections can be made on Public Switched Telephone Networks (PSTNs) and point-to-point two-wire leased telephone type circuits.

Other features include enhanced V.34 standards, callback security, remote configuration, and automatic rate negotiation between modems. The modem is factory set for Electronic Customer Support communications for the iSeries. Custom application settings are available through the use of dip switches.

ITU V.42 error correction and V.42bis data compression provide 100% error-free data transmission. It offers interactive automatic dialing, as well as a command mode option configuration. Store up to ten command line or telephone numbers of up to 60 characters each in the non-volatile memory. The modem recognizes dial tones and busy signals for reliable call-progress detection. The modem can detect AT&T calling card tones. It is FCC-Registered for connection to telephone networks without any Data Access Arrangements (DAAs).

The features of the modem include:

- Callback security

  To protect networks from unauthorized use and to help manage phone line costs. By using the modem's phone number and password directory, a host site can, upon receipt of a call, call back to a remote site at a predetermined number.

- Remote configuration

  Provides support for users at remote sites, saving the time and trouble of site visits and preventing misinterpretation of configuration instructions.

The 7852-400 includes dial back-up with automatic lease line restore, adaptive protocol enhancing used in typical UNIX batch file transfers, and support for the iSeries environment.

IBM iSeries Printers

IBM iSeries printers are designed, built, tested, and supported as an integrated component of the system. Printer options are scalable from desktop to production, impact to laser, with 375 characters per second up to 1002 impressions per minute.

This printer section is divided into three sections depending on typical usage:

- Workgroup printers
- Departmental and production printers
- Industrial printers

iSeries print application information is found on the iSeries printing Web site at:
`http://www.ibm.com/printers/iSeries`

IBM iSeries Workgroup Printers

IBM Infoprint and IBM Network Printers form a family of high-performance laser printers designed for iSeries, AS/400e, and network printing environments. As a group, these IBM iSeries workgroup printers provide high fidelity (600 dots-per-inch (dpi) or 1200 dpi), multiple concurrent connections, support for multiple print datastreams (AFP/IPDS, PostScript, PCL), and a wide range of paper handling options. Five new Infoprint 1000 workgroup printers complete the family of cost-effective business printers. In addition, the Infoprint Color 8 provides high-fidelity, full-color printing for iSeries and workgroup applications.

Key features shared by these IBM Infoprint and Network Printers (except the Infoprint 12 and Infoprint Color 8) include:

- Connections to multiple client and server systems
  - iSeries and LAN connectivity, including token-ring, Ethernet, twinax, and parallel
  - Concurrent handling of iSeries, network, and client print applications
- Automatic switching and automatic print data stream sensing to enable maximum productivity.
  - Integrated Network Interface Card (NIC) eliminates the need for a separate network attachment box
- Complete integrated IPDS printer featuring:
  - Native, system-managed printing with page-level error recovery
  - Edge-to-edge printing
  - Full range of AFP fonts: iSeries and AS/400e-resident and printer-resident, raster, and outline formats

- IPDS connection over TCP/IP provides the same level of application and print management support as twinax-connected iSeries and AS/400e printers
- One-stop support from IBM, the experts in iSeries printing

The iSeries workgroup printer duty cycle ratings are represented in this table.

Machine Type	Description	Maximum Print Speed (pages per minute)	Maximum Monthly Usage (pages)
4308	Infoprint Color 8	8	35,000
4912	Infoprint 12	12	20,000
4317	Network Printer 17	17	65,000
4320	Infoprint 20	20	75,000
4332	Infoprint 32	32	150,000
4340	Infoprint 40	40	200,000
4520	Infoprint 1120	20	100,000
4525	Infoprint 1125	25	120,000
4530	Infoprint 1130	30	150,000
4540	Infoprint 1140	40	200,000
4545	Infoprint 1145	45	250,000

IBM Infoprint Color 8

IBM Infoprint 8 is a high fidelity, high-performance full-color network printer. Designed for reliability and speed, it features a straight single-path through four consecutive color printing stations. This design expands the range of media (transparencies, card stock, labels) that can be used. IBM Infoprint Color 8 is integrated as a PCL printer on the iSeries server, enabling line-of-business applications. The features of Infoprint Color 8 include:

- Superb 600-by-600 dpi print quality in color or monochrome at up to eight pages per minute
- Industry-standard color-matching support
- Ready for the e-output environment, with remote printer management and printer access via the Internet
- Easily network integrated with Ethernet, token-ring, and serial/parallel attachments

IBM Infoprint 12

The IBM Infoprint 12 is designed for those who demand high-speed, high-resolution, and reliable printing for a desktop or small workgroup environment. Infoprint 12 is great for printing professional reports, proposals, letters, spreadsheets, and transparencies. The ideal printer for small workgroups and individual desktop use, this latest addition to the Infoprint line of printers offers:

- Up to 12 ppm
- 1,200 dpi print quality
- 250-sheet tray and a 100-sheet auxiliary tray standard
- Reduced power (Powersaver mode)
- Supports both Windows and Macintosh platforms
- 66 MHz, 32-bit processor with up to 68 MB of memory
- Ability to switch between print languages and interfaces
- Two US letter/A4/legal paper trays
- Manual Duplex printing capability via the auxiliary tray
- Fast Ethernet 10/100BaseTX network adapter

IBM Network Printer 17

IBM Network Printer 17 is a 17-pages per minute (ppm) printer designed for small to medium workgroups. It offers these features:

- Superb 600-by-600 dpi print quality with TrueRes image enhancement
- HP PCL 5e standard, with optional IPDS and true Adobe PostScript Level 3
- Toner Saving technology to reduce toner usage and expense
- Network interface cards standardized across the entire IBM network printer line
- Duplex as a standard feature
- Optional secure mailbox feature for Network Printer 17

IBM Infoprint 20

IBM Infoprint 20 is a high performance network laser printer for iSeries and network applications. It provides large-format printing and high-capacity paper input/output at a low cost. Ideal for medium-to-large workgroups, Infoprint 20 provides standard support for PostScript 3 and PCL, 5e, speeds up to 20 pages-per-minute. It is designed for monthly volumes of to 75,000 impressions.

Infoprint 20 is a full-function IPDS printer that gives the system complete print management capabilities with full error recovery to the page level. When Infoprint 20 is placed in a TCP/IP network, its true IBM IPDS delivers the same level of application function and print management as direct-attach iSeries printers.

Infoprint 20 delivers these features:

- 13-inch by 20-inch support for full-bleed printing on 11-inch by 17-inch paper
- 650-sheet dual-tray input standard, with maximum input capacity of 3,150 sheets
- TonerMiser to reduce supply costs
- Edge-to-edge printing
- Network interface cards standardized across the entire IBM network printer line, including Fast Ethernet 10/100 Base Tx

IBM Infoprint 21

IBM Infoprint 21 is a monochrome iSeries laser printer designed to deliver the best in printing capabilities for iSeries and network environments. The focus is on system integration and “e-output”. As with all iSeries servers, Infoprint 21 is designed, built, tested, and supported as an integral part of the system. This includes full-function AFP and IPDS capabilities, as well as integration with the new SNMP network print drivers. E-output support includes an embedded Web server that provides for Web-based printer management and support of Internet Print Protocol (IPP). The key design elements of the iSeries server, including integration, reliability, scalability, ease of use, and designed for e-business, are reflected in IBM Infoprint 21.

The features of Infoprint 21 include:

- Print speeds up to 21 pages per minute
- IBM high-performance controller supports the rich menu of system integration and network functionality
- IBM controller also ensures high-performance rendering of complex applications and complete integration and compatibility with the system on a release-by-release basis
- True 1200-by-1200 dpi resolution
- The iSeries print kit provides Ethernet and IPDS as a highly-affordable package
- On-board Web server includes an internal Web site for remote set up, configuration, printer status, and direct IPP-based print job submission
- Rich data stream support includes IBM AFP/IPDS, PCL 5e/6, and PostScript 3
- Flexible paper handling that combines standard input/output capacities for a network printer with special support for labels, card stock, and custom size forms
- One-stop technical support from IBM Service, the experts in iSeries printing

IBM Infoprint 32

High-speed, large volume, network printing solution for mission critical applications where document delivery, control, and printing management are essential. Infoprint 32 is a high-function iSeries printer that delivers printing speeds up to 32 ppm and monthly volumes of 150,000 impressions.

The crisp 600-by-600 dpi output with edge smoothing rivals 1200 dpi quality, while a 300 dpi mode provides the highest performance on complex jobs.

Infoprint 32 fully supports network environments with simultaneous server and workstation connections and complete print datastream support (IPDS, Adobe PostScript, PCL 5e).

Additional specifications include:

- True Adobe PostScript 3 and PCL 5e datastream support are standard, and AFP/IPDS and SCS datastream support are available.
- Maximum input capacity of 3,550 sheets, plus 100 envelopes
- An optional finisher feature provides offset jogging, stapling, and collating
- RePro increases productivity by sending a job over the network and printing multiple copies
- Full application and print management functionality of system-integrated AFP/IPDS
- Fast Ethernet 10/100 Base Tx

IBM Infoprint 40

High-speed, large volume, network printing solution for mission-critical applications where document delivery, control, and printing management are essential. The newest member of the IBM Infoprint family of iSeries printers, Infoprint 40 delivers printing speeds up to 40 pages per minute with monthly volumes up to 200,000 impressions. Output is printed at 600-by-600 dpi with edge smoothing, plus a high quality image mode that approaches 1200 dpi.

Additional specifications include:

- True Adobe PostScript Level 3 and PCL 5e datastream support are standard, and AFP/IPDS and SCS datastream support are available
- Optional large input feeder that increases total input capacity to 3,550 sheets from six input sources
- Optional 100 envelope feeder
- Optional high-capacity finisher that provides 2000-sheet stacking to three bins and program control for job offset jogging and stapling functions
- Prints on multiple paper sizes, including 11-inch by 17-inch or A3 for large format documents

IBM Infoprint 1000 Workgroup Printer Family

The IBM Infoprint 1000 series is a completely new line of cost-effective printers designed to deliver the output for pursuing success in the e-business world. This full line of workgroup printers offers exceptional value with unique features, broad expansion options, and

seamless connectivity. The printers can be introduced into your business to smoothly and reliably handle iSeries server applications in the network computing environment.

Five new models comprise this new line, ranging from 20 pages per minute to 45 pages per minute.

IBM Infoprint 1120 Workgroup Laser Printer

A reliable, economical printer with excellent resolution and print speeds to 20 ppm.

- Up to 20 pages per minute throughput with fast time to first page
- 1200 x 1200 dpi resolution
- iSeries and AS/400e integration and support
- Rich print data stream support includes IBM AFP/IPDS (option), PCL, and PostScript

IBM Infoprint 1125 Workgroup Laser Printer

The IBM Infoprint 1125 is a powerful, Internet-enabled laster printer that delivers exceptional performance and value.

- Up to 25 pages per minute throughput with fast time to first page
- 1200 x 1200 dpi resolution
- iSeries and AS/400e integration and support
- Rich print data stream support includes IBM AFP/IPDS (option), PCL, and PostScript
- Expands easily with a high capacity input option, bringing the input maximum to 3,850 sheets

IBM Infoprint 1130 Workgroup Laser Printer

A small footprint 30 page per minute workgroup laser printer with multiple finishing capabilities.

- Up to 30 pages per minute throughput with fast time to first page
- 1200 x 1200 dpi resolution
- iSeries and AS/400e integration and support
- Rich print data stream support includes IBM AFP/IPDS (option), PCL, and PostScript
- Advanced finishing including expanded output, sorting, stapling to automate large print jobs

IBM Infoprint 1140 Workgroup Laser Printer

Very fast and highly reliable, geared to increase your productivity not your total cost of printing.

- Up to 40 pages per minute throughput with fast time to first page
- 1200 x 1200 dpi resolution
- iSeries and AS/400e integration and support

- Rich print data stream support includes IBM AFP/IPDS (option), PCL, and PostScript
- Superior finishing with collate, staple, and offset jog

IBM Infoprint 1145 Workgroup Laser Printer

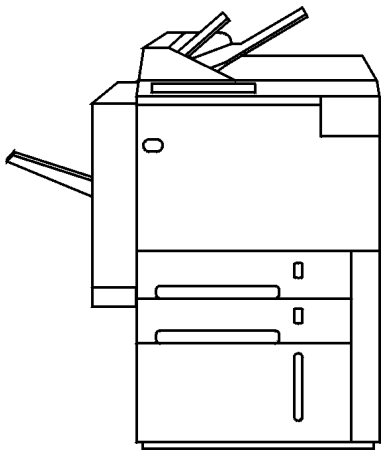
IBM's fastest workgroup printer offers robust finishing and connectivity functions.

- Up to 45 pages per minute throughput with fast time to first page
- Optional finisher provides stacking, stapling, and hole punching
- iSeries and AS/400e integration and support
- Rich print data stream support includes IBM AFP/IPDS (option), PCL, and PostScript
- Supports a variety of media sizes including large format (A3)

IBM iSeries Departmental and Production Printers

In the same manner that the iSeries server scales up in performance, IBM system printers provide a wide range of choices at departmental and production printing speeds (generally 60 pages per minute and up). These include both cut sheet and continuous form options, currently topping out at 1,002 impressions per minute (with IBM Infoprint 4000). All of the departmental and production printers feature the Advanced Function Common Control Unit (AFCCU), a high-performance controller using the same processor technology as the iSeries servers. Printers in this class include the IBM Infoprint 60, IBM Infoprint 62, IBM Infoprint 3000, and IBM Infoprint 4000 printer systems.

IBM Infoprint 60 and 3160 Advanced Function Printers



The Infoprint 60 Advanced Function Printer and 3160 Advanced Function Printer provides duplex production printing at up to 60 impressions per minute. Infoprint 60 (3160 Model 2) provides a 600 dpi resolution. The 3160 provides a 240 dpi resolution. These printers are designed for high-speed printing in host, host distributed, and LAN printing environments. iSeries attachment is supported by SNA, TCP/IP, token-ring, or Ethernet.

The key features include:

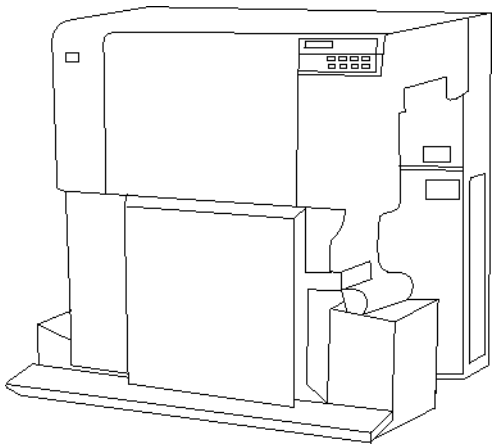
- Monthly duty cycle of 750,000 pages
- Driven by the IBM Advanced Function Common Control Unit (AFCCU), which provides high-speed processing of complex documents and comprehensive connectivity
- Paper handling capabilities include up to 5,000 pages from four input bins up to 3,500 pages in output stackers

- Optional high-capacity finisher provides for finishing operations such as stapling, insertion, and z-fold, all under iSeries program control
- Paper sizes include letter, legal, ledger, A3, A4, B4, and B5 (up to 11 inches by 17 inches)
- IPDS integration with iSeries delivers “industrial strength” print management with full page-level error recovery over SNA and TCP/IP connections
- Support for PCL (Infoprint 60)

IBM Infoprint 60 Advanced Function Finisher

Optional Infoprint 60 Finisher is fully integrated into the Infoprint 60 printer and fully supported by the iSeries servers. The finisher provides the capability to completely finish jobs, including stapling, z-folding, inserting, and booklet operations, all in production mode.

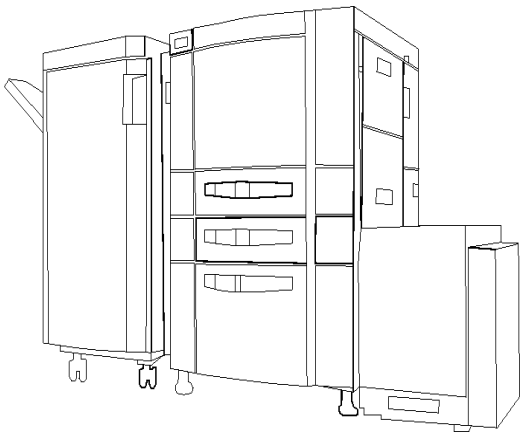
IBM Infoprint 62 Continuous Forms Printer



IBM Infoprint 62 is a high-performance production printer with the versatility to print special forms and labels. It offers high-volume, cost-effective, continuous-forms printing while providing exceptional reliability and excellent print quality on a wide range of media types, sizes, and weights. Driven by the IBM Advanced Function Common Control Unit (AFCCU), which provides high-speed processing of complex documents, complete AFP/IPDS function, and comprehensive connectivity, Infoprint 62 attaches to the system by token-ring or Ethernet. Its features include:

- Speeds up to 62 ppm
- Designed for both general purpose and special forms printing
- Full-function AFP printer handles complex AFP applications with electronic forms, image, fonts, barcode, graphics, and multi-up printing
- Straight paper path and unique flash fusing technology for printing on a wide variety of paper types and sizes, including difficult-to-print forms
- Unique cutting design eliminates paper waste

IBM Infoprint 70

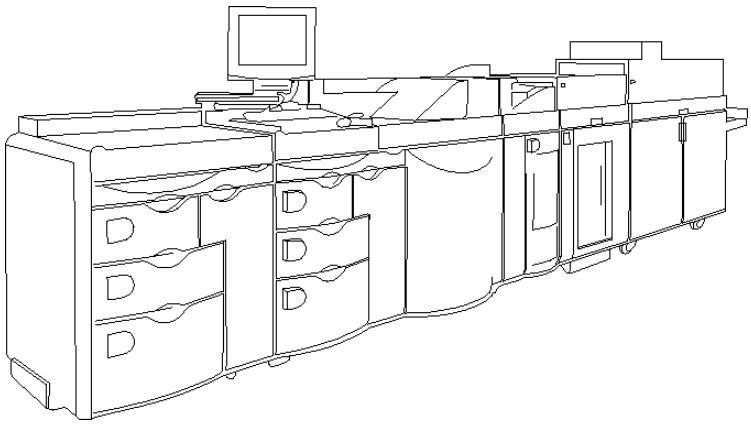


Today's e-business applications require a fast, reliable, high-quality output solution that is accessible from virtually any location at any time. IBM Infoprint 70, when combined with Infoprint Manager, provides Internet-ready output capabilities that allow you to keep pace in an e-business world. IBM Infoprint 70 offers a high-quality, high-volume cut-sheet printer with a compact footprint. With advanced IBM controller and imaging technology, Infoprint 70 supports:

- Up to 70 impressions per minute with excellent 600 dpi print quality.
- Automated conversion of 240, 300 or 600 dpi AFP/IPDS applications
- 10/100 BaseTX Ethernet or token-ring attachment
- Built-in AFP/IPDS and optional PCL, PostScript, and PDF support
- Flexible finishing capabilities
- Input capacity up to 6,150 sheets

With Infoprint 70, you can produce up to 400,000 impressions per month. Even complex jobs can run at or near the rated speed of 70 impressions per minute. Advanced controller technology ensures native support for IBM Advanced Function Printing (AFP) and Intelligent Printer Data Stream (IPDS). Page level error detection and recovery capabilities help prevent job resends and minimize human intervention and streamline printing. Software support is provided with PSF/400 and AFP Utilities for AS/400.

IBM Infoprint 2000



Infoprint 2000 printers bring cut-sheet printer capabilities to address the output needs of an e-business. This high-speed cut-sheet printer combines advanced hardware and software technologies to provide exceptional performance, flexibility, and control. The integration with Infoprint Manager brings Infoprint 2000 into heterogeneous environments, converting PostScript and PCL jobs to AFP/IPDS. The software creates a central point for managing all print jobs through the enterprise and provides workload balancing to help ensure printers are always printing.

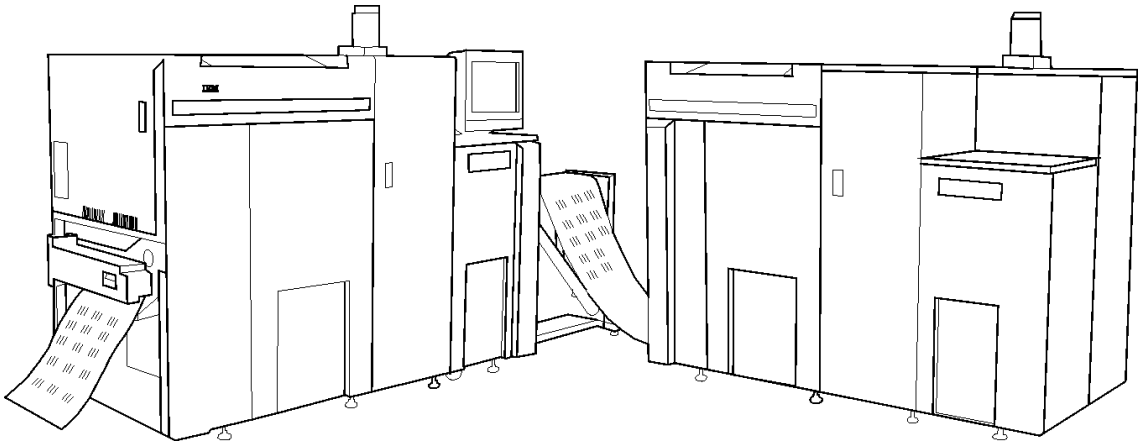
Inherent with this solution, Infoprint 2000 supports Internet Printing Protocol (IPP) and is ready for e-business. IPP provides mobile users the means to address a printer from anywhere, allows companies to provide their clients with direct access to their printer, and provides notifications to communicate printer status.

Powered by an advanced imaging technology, Infoprint 2000 is designed to monitor and self-adjust print quality as needed. Establishing new AFP/IPDS benchmark print quality, Infoprint 2000 produces fine lines and offset-like halftones. To ensure user-friendly paper support and reliability, the system has a straight paper path, as well as three standard and three optional vacuum fed paper drawers for preventing paper mis-feeds. In addition, IBM Infoprint 2000 with AFCCU offers:

- Support for native AFP/IPDS printing
- Support for resident and downloadable raster fonts and resident outline fonts
- Up to 110 pages-per-minute print speed at 600 dpi resolution
- Supports 240, 300, 600 dpi and automatic conversion
- Customized high-volume production solution
- Up to 8,000 sheets on board, six input bins
- User friendly Java console with keyboard and mouse support

Software support is provided by PSF/400.

IBM Infoprint 3000 Advanced Function Printing System



IBM Infoprint 3000 is a high-speed, high-resolution, continuous-form production printing system designed and integrated for high-volume iSeries printing. The IBM Infoprint 3000 Advanced Function Printing System is an intermediate production printing family that fits between iSeries midrange printers (Infoprint 60 and Infoprint 62) and the high-end production printing systems (Infoprint 4000). IBM Infoprint 3000 printers deliver print speeds from 112 to 344 impressions per minute, with the ability to perform two-up printing (8.5 by 11 inch pages) using the new 17-inch print-head technology. Monthly print volumes can go up to 4.4 million impressions.

This new printing system not only prints at high speeds, but also prints high quality. Print fidelity is at 480 dpi or 600 dpi, and the print resolution is switchable. Existing iSeries applications developed at 240 dpi or 300 dpi are automatically enhanced to either 480 dpi or 600 dpi.

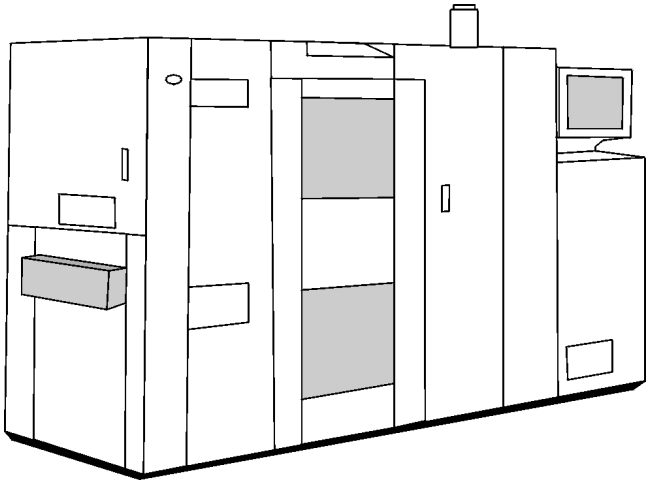
The IBM Infoprint 3000 is directly attached to the iSeries (using Ethernet or token-ring) and is fully supported by Print Services Facility/400, the full-function print management subsystem of OS/400. Full application enablement includes system printer file function, DDS, Infoprint Designer for iSeries, AFP Utilities, Advanced Print Utility (APU), Page Printer Formatting Aid (PPFA/400), AFP Toolbox, and many other IBM and third-party document composition products.

With high-volume applications such as reports, statements, documents, and direct mail, continuous-forms printing ensures high reliability. They also ensure the attachment of a wide variety of pre- and post-processing devices (paper roll input, cutters, inserters, and so on) for a smooth end-to-end process. This is an intelligent process that starts with blank paper and can end up a complete package ready for mailing.

Additional features include:

- Simplex and duplex configurations. Duplex configurations (two Infoprint 3000 printers in tandem) can also be run in dual simplex mode when required.
- RISC-based Advanced Function Controller provides comprehensive print and document functionality, as well as high performance for even the most complex jobs.
- Smallest footprint (up to 25% smaller) in its class.

IBM Infoprint 4000 Advanced Function Printing System



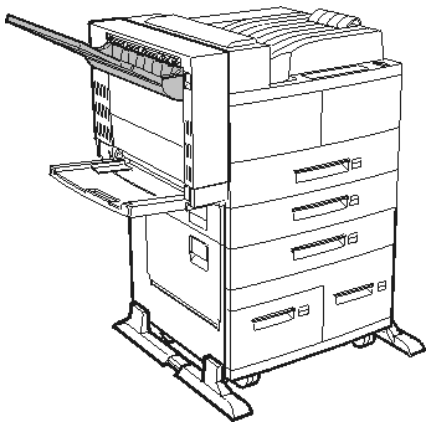
Infoprint 4000 is the top-of-the-line high-speed, continuous-form production printer family for iSeries. Speeds range up to 1002 impressions (8.5 by 11 inches) per minute. Models include simplex, wide, and duplex with resolutions of 240, 480, and 600 dpi.

Infoprint architecture provides higher resolutions and support for PostScript data streams to meet far more wide-ranging organizational document requirements, including the replacement of applications that traditionally went to offset printing. Infoprint 4000 attaches to the iSeries servers over a token-ring or Ethernet network.

The key features include:

- Maximum usage of up to 17.4 million impressions per month
- Driven by IBM Advanced Function Common Control Unit (AFCCU), which provides high-speed processing of complex documents, full IPDS function, and comprehensive connectivity
- Wide models provide 17-inch wide platen for two-up printing of 8.5 by 11-inch output
- Designed for production print environments with appropriate intelligent preprocessing (such as roll paper input) and postprocessing (for example, cutters and collators) equipment
- Optional pinless drive replaces traditional tractor-fed paper
- Optional Infoprint Hi-lite Color post processor enables variable data in color, up to three colors per page

IBM Infoprint 4000 Hi-Lite Color Printing System and IBM Infoprint 4005 Hi-Lite Color Printer



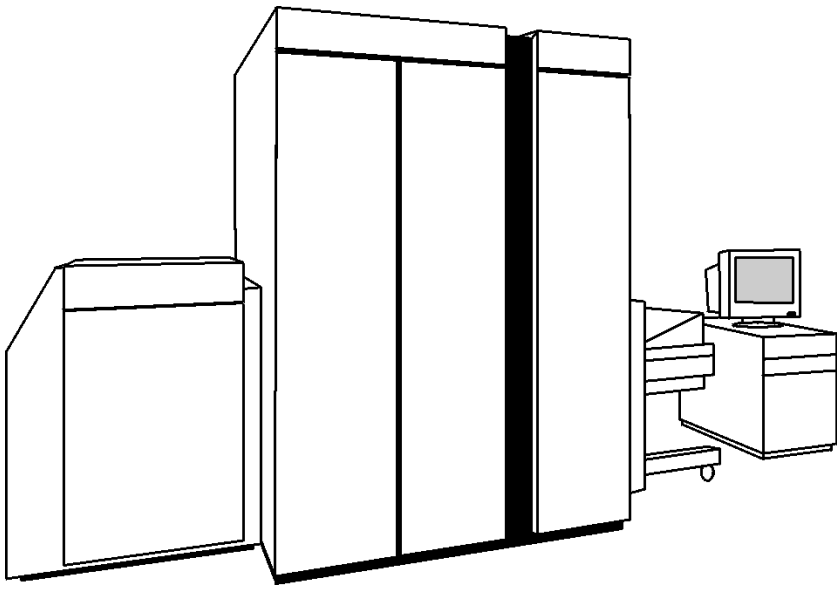
Infoprint 4000 offers a high-speed, high-quality color post-processor to complement IBM 3900 and IBM Infoprint 4000 production printing systems. You can highlight variable or constant information, up to three colors anywhere on the page at speeds from 150 to 480 impressions per minute. It also offers integrated print management with Print Services Facility/400 (PSF/400) and direct color support with DDS and other iSeries document application enablers. See “IBM Licensed Programs: Printing and Document Handling Products” on page 713 for supporting software.

The IBM Infoprint Hi-Lite Color Printer communicates with the IBM host printer using the IBM exclusive Advanced Function Post-Processing Interface. This ensures accurate color printing in the precise location specified. In addition, the Advanced Function Presentation (AFP) software, together with the lead printer's Advanced Function Common Control Unit (AFCCU), enables rapid error recovery and ensures data integrity through the entire printing process.

The model available is HC1. The specifications include:

- Both fixed and variable data can be printed in color (up to three highlight colors per page)
- Speeds up to 480 two-up impressions per minute
- Application selection of color with printer file DDS, Advanced Print Utility, iSeries page and form definitions, AFP Toolbox, and third-party products

IBM InfoColor 70 Full-Color Digital Printer



The IBM 3170 Full-Color Digital Printer is a 70 impressions-per minute, high-quality color printer that provides an on-demand alternative to offset printing. It is designed for any organization that prints color brochures, personalized mailings, documentation, reports, directories, books, and newsletters now as an efficient way to print short runs and customize the text, images, and customer data on each document. It is designed as a standalone printing system, which accepts variable data from the iSeries servers to customize each document.

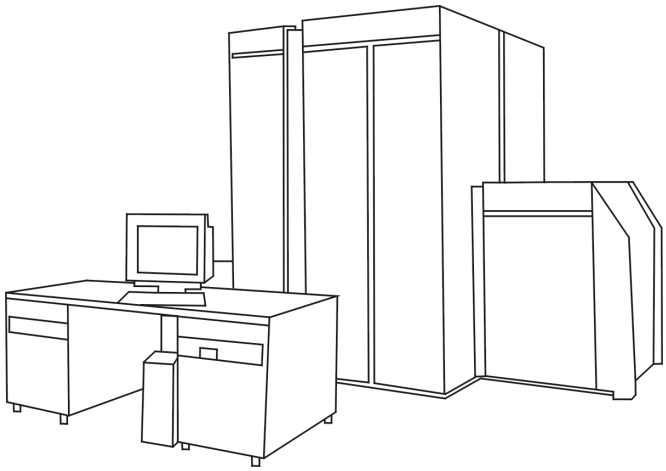
The highlights of the IBM 3170 Full-Color Digital Printer include:

- Monthly duty cycle of 700,000 impressions
- 600 dpi, with variable gray levels per dot, per color sensing technology ensures color match prior to production runs
- PowerPC-based controller ensures print quality, ease of operations, and performance
- True Adobe PostScript Level 2
- Requires IBM Infoprint Manager

Infoprint Color 100 Full-Color Digital Printer

High-quality, wide-format process-color for enhanced print-on-demand applications and variable content publishing.

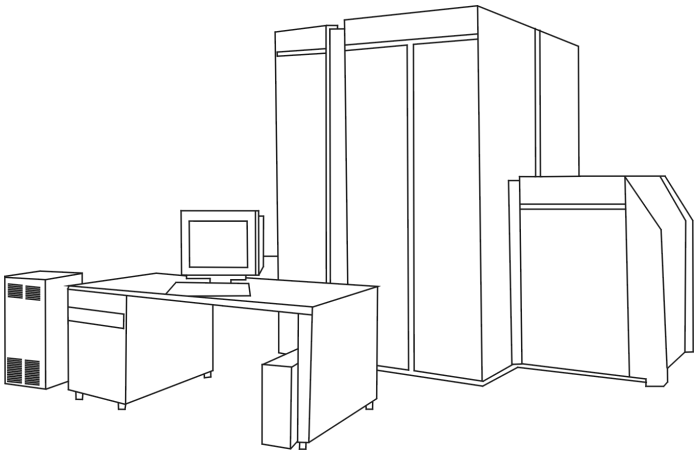
Features



- Up to 105 full-color impressions-per-minute (ideal for duplex printing)
- New, dual 400 MHz Intel Pentium II processors increase RIP speed
- Extensive variable data capabilities
- Enhanced cross-web registration and paper conditioning for optimal print quality
- Large 18.7" image area on a 20" paper width
- Automated registration and density control for greater ease-of-use
- Requires IBM Infoprint Manager

IBM Color 130 and Color 130 Plus Full-Color Digital Printers

This high-speed, full-color printer helps transform e-business intelligence into effective, highly personalized full-color marketing collateral. The Color 130 Plus adds IBM Advanced Function Common Control Unit (AFCCU) technology, enabling the benefits of AFP – variable data and production control. Requires IBM Infoprint Manager.



Features – Color 130

- New, state-of-the-art printing system designed for complex, variable-content full-color printing of PostScript application
- Up to 138 full-color impressions per minute with 4 bits per spot for superior output quality

- Powerful RIP server with two 800 MHz Intel Pentium III processors
- High-performance press server with two 600 MHz Intel Pentium III processors
- Press server software provides page impositions and variable data merging
- New XML-based book ticket file to manage print jobs

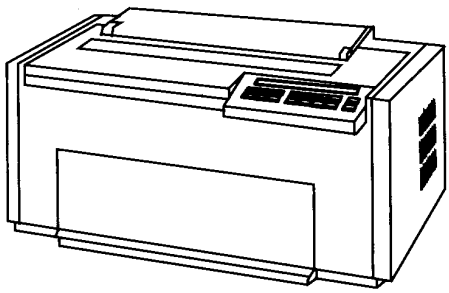
Features – Color 130 Plus

- Designed for complex, variable content, full-color printing
- Production workflow is automated – no operator involvement in ripping
- System can be automatically restarted or redirected from last page printed – no need to rerun the entire job
- Prints applications using AFP, Adobe PostScript 3, and PDF 1.3
- 450 MHz processor with 4 GB of high speed memory and 72 GB of high speed storage in the printer controller

IBM iSeries Industrial Printers

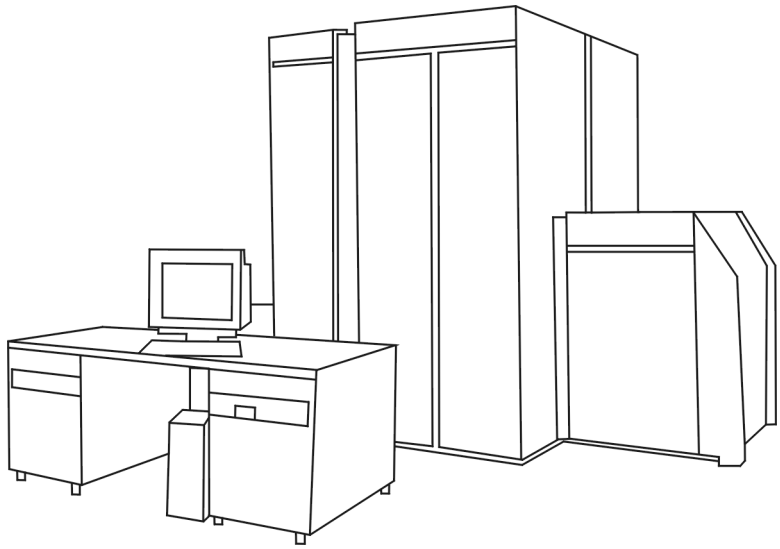
Central to today's supply chain environments, IBM iSeries industrial printers are designed for harsh environments and multi-part form applications. The printer technology is either dot matrix or line matrix. Intelligent Printer Data Stream (IPDS) is supported throughout, both for complete print management and graphics function (for example, barcodes). This category includes the IBM 4230, IBM 4232, IBM 4247, and IBM 6400 printer families.

IBM 4230 Impact Matrix Printer



The 4230 range of printers provides heavy-duty, impact matrix printing. The six models of 4230, the 101, 1S2, 4S3, 1I1, 102, and 4I3 can all be twinaxial attached to an iSeries server using the twinax workstation controller. The Model 4S3 and 4I3 also offer serial and parallel attach.

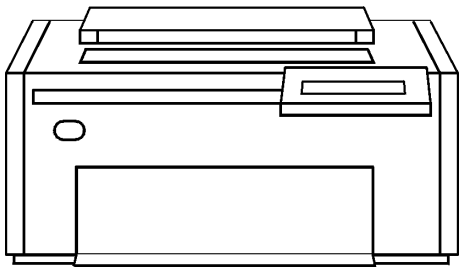
All 4230s have an LCD display providing prompts and menu selections in a choice of eight languages. They also have forms handling modules for continuous forms and document insertion. One of these forms modules is supplied with the initial order, as selected by the customer. The others are available as options.



Models 101 and 1S2 have 32K memory as standard and support the IBM 4214 data stream SNA Character String (SCS). Models 1I1 and 102 have 128K memory as standard and support the IBM Intelligent Printer Data Stream (IPDS). Memory on the 1I1 and 102 can be increased to 512K as an option. Models 4S3 and 4I3 have 128K memory as standard. Model 4S3 supports the SCS data stream, while Model 4I3 supports IPDS. The following table shows each model's print speeds.

Model	Mode			
	Fast Draft	DP	DP Text	NLQ
101, 1I1	375 cps	300 cps	150 cps	75 cps
1S2, 102	480 cps	400 cps	200 cps	100 cps
4S3, 4I3	600 cps	400 cps	200 cps	100 cps

IBM 4232 Impact Dot Matrix Printer

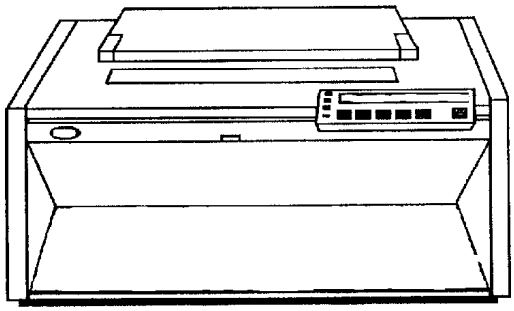


The 4232 is a heavy-duty, unattended impact dot matrix printer, capable of printing 600 characters per second (cps). It is designed for workstation printing or shared printer applications using an ASCII datastream.

The 4232 Model 302 can be used for printing data processing, office, and business documents, as well as barcode labels and multipart forms.

The 4232 has an LCD display that provides prompts and menu selections in a choice of eight languages. It also has forms handling modules for continuous forms and document insertion.

IBM 4247 MultiForm Matrix Printer



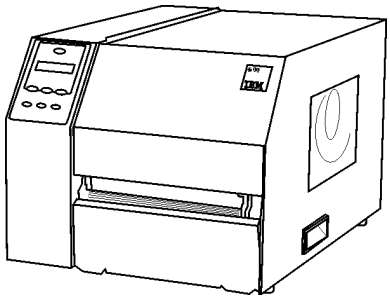
The 4247 range of printers are desktop model impact printers. They are capable of printing up to 700 cps in its fastest data processing (DP) mode. They include two continuous paper paths and a standard manual cut-sheet input.

The 4727 can be used as a directly attached workstation printer, as a system printer, remote or distributed, or for departmental printing. Supported applications include word processing and spreadsheets, business graphics such as pie charts, barcode printing, line drawings from CAD/CAM applications, and special forms for checks, labels, and mailers.

The 4247 models have a duty cycle of up to 20 million characters-per-month and print qualities include DP, DP Text, and Near Letter Quality (NLQ).

- Attachment to the system can be Twinax, Serial/Parallel, Ethernet, and token-ring. Coax and attachment to LAN using ASCII interface are also available.
- IPDS support for the full range of electronic printing capabilities (barcode, electronic forms, image, graphics, and variable fonts), as well as full printing error recovery

IBM 4400 Thermal Label Printers



The IBM 4400 Thermal Label printers provide high-performance, high-quality thermal printing geared to the iSeries, network, and Supply Chain industrial environments in which they must operate. This is an environment where iSeries application integration, reliable output management, and network deployment and administration are essential.

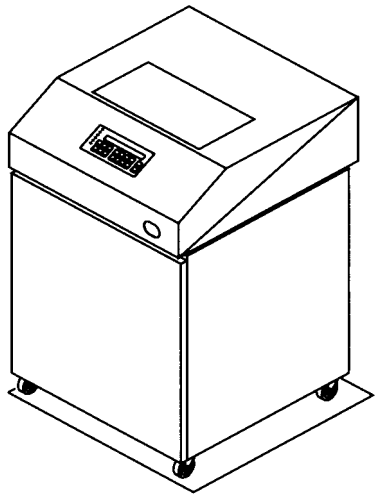
The key design elements of the system – integration, reliability, scalability, ease of use, and designed for e-business – are reflected in the IBM 4400 Thermal Laser printers. Support for Intelligent Printer Data Stream (IPDS) means that any Advanced Function Presentation (AFP) application interface can be used. IPDS also means industrial-strength printing management, even when the printer is deployed in a TCP/IP network. Support for additional thermal data streams ensures compatibility with existing applications.

Features of the IBM 4400 series include:

- Print resolution up to 300 dots per inch, print speeds up to 10 inches per second, and media widths of 6.8 inches or 8.75 inches

- Ideal for barcode and graphics applications; compatible with IBM 6400 Line Matrix Printer label applications; supports existing Code V and IGP applications
- Supported by IBM Printer Management Utility for remote administration
- Rugged footprint and construction designed for tough industrial environments

IBM 6400 Line Matrix Printers



The dependable IBM 6400 line matrix printer family is designed for heavy-duty, continuous use in both system and network environments. Extensive datastream support (SCS, IPDS, ASCII, Code V, IGP) ensures application compatibility. Speeds range from a low-cost 500 line-per-minute pedestal model to models supporting print speeds up to 1,500 lines per minute (1125 lpm in data processing mode and 600 lpm in near-letter-quality mode). The new, integrated Ethernet IPDS enables the IBM 6400 to be placed in an IP network, yet retain all the application function and print management control of a direct-attached iSeries printer.

The 6400 family of line matrix printers provides heavy-duty, continuous-form impact line printing with low total cost of operation. A variety of emulations, options, and speeds address just about any print requirements. IPDS is available (as well as IGP and Code V) to support graphical print applications (for example, barcoding or image).

There are five models of the 6400 family as shown in this table.

Model	Speed (Lines per Minute)	Package
6400-005	500	Cabinet
6400-05P	500	Pedestal
6400-010	1,000	Cabinet
6400-10P	1,000	Pedestal
6400-015	1,500	Cabinet

Connection options include direct attachment to the system using twinax or serial/parallel cabling, ASCII LAN attachment using the Network Print Server (NPS) feature or integrated Ethernet feature, or IPDS LAN attachment using the 7913 LAN attachment.

This family of printers also offers standard data stream support for IBM Proprinter III XL, Epson FX 1050, Printronix P-series, Printronix P-series XQ Variant, and Printronix Serial Matrix emulations.

An optional feature for Intelligent Printer Data Stream (IPDS) support enables full graphical applications with electronic forms, barcodes, graphics, scalable fonts, and optical character recognition. Optional features are also available for Code V and IGP emulations.

Web access to operator panel enables remote control of network-connected 6400 models.

Customer Install Features

Customer Install Features

Customer Install Features (CIF)

Many iSeries models are designated as Customer Setup (CSU). Many features for the current product line are Customer Install Features (CIF). CIF/CSU designations provide the customer with flexibility in installing new iSeries servers and adding new features to installed systems. Customers can schedule installations to minimize the disturbance to their business operations.

Miscellaneous Equipment Specification (MES) is an IBM term for IBM-supplied changes to an installed or on-order system. On MES orders that include a mixture of IBM install and CIF features, the customer may choose to have the IBM service representative install all the features (including those designated as CIF). On MES orders where all features are CIF, the customer can install all the features.

The customer is responsible for the installation of external cables, displays, printers, and modems. IBM service personnel can perform these activities for a charge.

IBM installation for CSU and CIF units is available for a charge under normal service contracts.

V5R1 and V4R5 Features

The following table lists commonly ordered OS/400 feature codes and identifies which features are CIF features. This table is to be used as a guide to identify common customer install features but does not represent a complete list.

The columns in the following table contain:

- The feature code
- The 28 character priced feature description.
- If the feature is a “Customer Install Feature” (Y) or a “Installed by IBM Feature” (N).
- The various models and how the features are supported in the Price File using the letters that are defined as follows:
  - **B**: Plant or MES installation
  - **M**: MES install only (this feature is available for field installation only)
  - **P**: Plant install only (this feature is available on new system orders only)
  - **PU**: Plant install and, for model upgrades only, MES install
  - **S**: Supported only. This feature may be migrated as part of a model upgrade, but additional quantities cannot be ordered
- Announce Release: The OS/400 version/release in which the feature code was announced.

Feat Code	Description	CIF	Model						Minimum Supporting Release
			270	820	830	840	SB2	SB3	
0090	External xServer Attach	-	B	B	B	B			V5R1
0010	5101/5111 in base Specify	Y							V4R5
0120	7210-020 Attachment	-	B	B	B	B	B	B	V4R5
0121	270 Lower Unit in Rack	-	P	-	-	-	-	-	V4R5
0122	270 Upper Unit in Rack	-	P	-	-	-	-	-	V4R5
0123	#5074 Lower Unit in Rack	-		B	B	B			V5R1
0125	#9079 Lower Unit in Rack	-		B	B	B			V5R1
0127	270 Field Install in Rack	N	B						V4R5
0223	100 Mbps Token-Ring Specify	-	B	B	B	B	B	B	V4R5
0224	100/10 Mbps Ethernet Specify	-	B	B	B	B	B	B	V4R5
0141	HSL OptiConnect Specify	-	B	B	B	B			V5R1
0142	Linux Partition Specify	-	B	B	B	B			V5R1
0150	Model 820 Base processor	N		B					V5R1
0151	Model 820 Base processor	N		B					V5R1
0152	Model 820 Base processor	N		B					V5R1
0162	Extended Single Ended Attach	-	B	B	B	B	B	B	V5R1
0163	Fibre Channel Attach	-	B	B	B	B	B	B	V5R1
0225	1 Gbps Ethernet Speciyf	-	B	B	B	B	B	B	V5R1
0369	100m Optical SPCN cable	Y			B	B			V5R1
0371	LC-SC Adapter Kit (50um)	Y	B	B	B	B			V5R1
0372	LC-SC Adapter Kit (62.5um)	Y	B	B	B	B			V5R1
0550	830 Rack	N	-	-	PU	-	-	-	V4R5
0551	270 Rack	Y	P	-	-	-	-	-	V4R5
0574	#5074 Equivalent Specify	-		B	B	B			V4R5
0578	PCI Expansion Unit in Rack	N		B	B	B			V5R1
0601	Linux Direct Attach - 2743	Y	B	B	B	B			V5R1
0602	Linux Direct Attach - 2760	Y	B	B	B	B			V5R1

Feat Code	Description	CIF	Model						Minimum Supporting Release
			270	820	830	840	SB2	SB3	
0603	Linux Direct Attach - 2744	Y	B	B	B	B			V5R1
0604	Linux Direct Attach - 2763	Y		B					V5R1
0605	Linux Direct Attach - 4748	Y		B	B	B			V5R1
0606	Linux Direct Attach - 4778	Y		B	B	B			V5R1
0607	Linux Direct Attach - 4838	Y	B	B	B	B			V5R1
0826	#4314 Load Source Specify	-	B	B	B	B	B	B	V4R5
0827	#4324 Load Source Specify	-	B	B	B	B	B	B	V4R5
0828	#4317 Load Source Specify	-	B	B	B	B	B	B	V4R5
0829	#4318 Load Source Specify	-	B	B	B	B	B	B	V4R5
1010	Modem Cable-Austria	Y	B	B	B	B	B	B	V4R5
1011	Modem Cable-Belgium	Y	B	B	B	B	B	B	V4R5
1012	Modem Cable-Africa	Y	B	B	B	B	B	B	V4R5
1013	Modem Cable-Israel	Y	B	B	B	B	B	B	V4R5
1014	Modem Cable-Italy	Y	B	B	B	B	B	B	V4R5
1015	Modem Cable-France	Y	B	B	B	B	B	B	V4R5
1016	Modem Cable-Germany	Y	B	B	B	B	B	B	V4R5
1017	Modem Cable-UK	Y	B	B	B	B	B	B	V4R5
1018	Modem Cable-Iceland/Sweden	Y	B	B	B	B	B	B	V4R5
1019	Modem Cable-Australia	Y	B	B	B	B	B	B	V4R5
1020	Modem Cable-HK/NZ	Y	B	B	B	B	B	B	V4R5
1021	Modem Cable-Fin/Nor	Y	B	B	B	B	B	B	V4R5
1022	Modem Cable-Netherlands	Y	B	B	B	B	B	B	V4R5
1023	Modem Cable-Swiss	Y	B	B	B	B	B	B	V4R5
1024	Modem Cable-Denmark	Y	B	B	B	B	B	B	V4R5
1025	Modem Cable-US/Canada	Y	B	B	B	B	B	B	V4R5
1408	4.3m 200V/16A Pwr Cd Italy	Y		B	B	B	B		V4R5
1409	4.3m 200V/16A Pwr Cd AU/NZ	Y		B	B	B	B		V4R5

Feat Code	Description	CIF	Model						Minimum Supporting Release
			270	820	830	840	SB2	SB3	
1410	200V 6-ft Line Cord	Y	B	B	B	B	B	B	V4R5
1411	200V 14-ft Line Cord	Y	B	B	B	B	B	B	V4R5
1412	125V 6-ft Line Cord	Y	B	B					V4R5
1413	125V 14-ft Line Cord	Y	B	B	M				V4R5
1414	200V 6-ft Locking Line Cord	Y	B	B	B	B	B	B	V4R5
1415	200V 6-ft Wtrtght Line Cord	Y	B	B	B	B	B	B	V4R5
1416	200V 14-ft Locking Line Cord	Y	B	B	B	B	B	B	V4R5
1417	200V 14-ft Wtrtght Line Cord	Y	B	B	B	B	B	B	V4R5
1418	4.3m 200V/16A Pwr Cd S Afric	Y		B	B	B	B		V4R5
1419	4.3m 200V/16A Pwr Cd Israel	Y		B	B	B	B		V4R5
1420	4.3m 200V/16A Pwr Cd EU/Asia	Y		B	B	B	B		V4R5
1421	4.3m 200V/16A Pwr Cd CH/DK	Y		B	B	B	B		V4R5
1422	3m IEC 320 C13/14 PDU Cord	Y	B	B					V5R1
1423	200V 6-ft Upper Line Cord	Y		M	M	M			V4R5
1424	200V 6-ft Locking Line Cord	Y				B		B	V4R5
1425	200V 6-ft Wtrtght Line Cord	Y				B		B	V4R5
1426	200V 14-ft Locking Line Cord	Y				B		B	V4R5
1427	200V 14-ft Wtrtght Line Cord	Y				B		B	V4R5
1428	200V 6-ft Upper Locking Cord	Y		M	M	M			V4R5
1429	200V 6-ft Upper Wtrtght Cord	Y		M	M	M			V4R5
1438	4.3m 200V/10A Pwr Cd AU/NZ	Y	B	B	M				V4R5
1439	4.3m 200V/10A Pwr Cd EU/Asia	Y	B	B	M				V4R5
1440	4.3m 200V/10A Pwr Cd Denmark	Y	B	B	B				V4R5
1441	4.3m 200V/10A Pwr Cd S Afric	Y	B	B	B				V4R5
1442	4.3m 200V/10A Pwr Cd Swiss	Y	B	B	B				V4R5
1443	4.3m 200V/10A Pwr Cd UK	Y	B	B	B				V4R5
1444	4.3m 200V/10A Pwr Cd Italy	Y	B	B	B				V4R5

Feat Code	Description	CIF	Model						Minimum Supporting Release
			270	820	830	840	SB2	SB3	
1445	4.3m 200V/10A Pwr Cd Israel	Y	B	B	B				V4R5
1446	4.3m 200V/30A Pwr Cd Korea	Y				B		B	V4R5
1447	4.3m 200V/24A Pwr Cd AU	Y				B		B	V4R5
1448	4.3m 200V/10A Pwr Cd NZ	Y				B		B	V4R5
1449	4.3m 200V/32A Pwr Cd EU 1-PH	Y				B		B	V4R5
1450	4.3m 200V/16A Pwr Cd EU 2-PH	Y				B		B	V4R5
1451	200V 6-ft Line Cord	Y		B	B	B	B		V4R5
1452	200V 14-ft Line Cord	Y		B	B	B	B		V4R5
1453	200V 6-ft Locking Line Cord	Y		B	B	B	B		V4R5
1454	200V 14-ft Locking Line Cord	Y		B	B	B	B		V4R5
1455	200V 6-ft Wtrtght Line Cord	Y		B	B	B	B		V4R5
1456	200V 14-ft Wtrtght Line Cord	Y		B	B	B	B		V4R5
1457	200V 6-ft Upper Line Cord	Y		B	B	B			V4R5
1458	200V 6-ft Upper Locking Cord	Y		B	B	B			V4R5
1459	200V 6-ft Upper Wtrthgt Cord	Y		B	B	B			V4R5
1460	3m HSL Cable	Y	B	B	B	B	B	B	V4R5
1461	6m HSL Cable	Y	B	B	B	B	B	B	V4R5
1462	15m HSL Cable	Y		B	B	B	B	B	V4R5
1463	2m SPCN Cable	Y	B	B	B	B	B	B	V4R5
1464	6m SPCN Cable	Y	B	B	B	B	B	B	V4R5
1465	15m SPCN Cable	Y	B	B	B	B	B	B	V4R5
1466	30m SPCN Cable	Y	B	B	B	B	B	B	V4R5
1468	250m Optical SPCN Cable	Y			B	B			V5R1
1469	4.3m/200V/25A/ HD Wired EMEA	Y							V5R1
1470	6m HSL Optical Cable	Y			B	B			V5R1
1471	30m HSL Optical Cable	Y			B	B			V5R1
1472	100m HSL Optical Cable	Y			B	B			V5R1

Feat Code	Description	CIF	Model						Minimum Supporting Release
			270	820	830	840	SB2	SB3	
1473	250m HSL Optical Cable	Y			B	B			V5R1
1476	4.3m 250V/12A Pwr Cd UK	Y		B	B	B	B		V4R5
1548	Interactive Capacity card	N				B			V5R1
1604	840 POD Activation	Y	-	-	-	M	-	-	V4R5
1605	830 POD Activation	Y			M				V5R1
2416	Model 840 8/12-Way POD	N	-	-	-	P	-	-	V4R5
2417	Model 840 12/18-Way POD	N	-	-	-	P	-	-	V4R5
2419	Model 840 18/24-Way POD	N	-	-	-	P	-	-	V4R5
2351	Model 830 1/8-way POD	N			P				V5R1
2352	Model 840 8/12-way POD	N				P			V5R1
2353	Model 840 12/18-way POD	N				B			V5R1
2354	Model 840 18/24-way POD	N				B			V5R1
2427	Dedicated Domino 4 Way Proc	N		B					V4R5
2431	Model 270 Processor	N	B						V5R1
2432	Model 270 Processor	N	B						V5R1
2434	Model 270 2-way Processor	N	B						V5R1
2435	Model 820 Processor	N		B					V5R1
2436	Model 820 Processor	N		B					V5R1
2437	Model 820 2-way Processor	N		B					V5R1
2438	Model 820 4-way Processor	N		B					V5R1
2452	Dedicated Domino Processor	N	B						V5R1
2454	Dedicated Domino 2-Way Proc	N	B						V5R1
2456	Dedicated Domino Processor	N		B					V5R1
2457	Dedicated Domino 2-way Proc	N		B					V5R1
2458	Dedicated Domino 4-way Proc	N		B					V5R1
2461	Model 840 12-way Processor	N				B			V5R1
2739	Optical Bus Adapter	N			M	M			V5R1

Feat Code	Description	CIF	Model						Minimum Supporting Release
			270	820	830	840	SB2	SB3	
2743	PCI 1 Gbps Ethernet IOA	Y	B	B	B	B	B	B	V4R5
2744	PCI 100 Mbps Token Ring IOA	Y	B	B	B	B	B	B	V4R5
2749	PCI Ultra Mag Media Ctlr	Y	B	B	B	B	B	B	V4R5
2754	HSL Ports - 8 Copper	N			M		M		V5R1
2755	HSL Ports - 16 Copper	N				M		M	V5R1
2758	HSP Ports - 2 opt / 6 Copper	N			M				V5R1
2759	HSL Ports - 4 Opt / 12 Copper	N				M			V5R1
2760	PCI 1 Gbps Ethernet UTP IOA	Y	B	B	B	B	B	B	V5R1
2763	PCI RAID Disk Unit Ctlr	Y	B	B					V4R5
2765	PCI Fibre Channel Tape Controller	Y	B	B	B	B	B	B	V5R1
2766	PCI Fibre Channel Disk Controller	Y	B	B	B	B			V5R1
2768	PCI Magnetic Media Ctlr	Y	B	B	B	B	B	B	V4R5
2772	PCI Dual WAN/Modem IOA	Y	B	B	B	B	B	B	V5R1
2773	PCI Dual WAN/Modem IOA ANSI	Y	B	B	B	B	B	B	V5R1
2774	HSL Ports - 2 Opt/ 6 Copper	N			M				V5R1
2777	HSL Ports - 8 Copper	N			M				V5R1
2778	PCI RAID Disk Unit Controller	N		M	M	M			V5R1
2790	PCI Integ Netfinity Server	N	-	B	B	B	B	B	V4R5
2791	PCI Integ xSeries Server V4R5 and CUM C1005450	N	-	B	B	B	B	B	V4R5
2817	PCI 155 Mbps MMF ATM	Y	B	B	B	B	B	B	V5R1
2842	2842 PCI IOP	Y	B						V4R5
2843	2843 PCI IOP	Y		B	B	B	B	B	V4R5
2881	Main Storage Expansion	N			B				V4R5
2884	Main Storage Expansion	Y	B	B	-	-	-	-	V4R5
2890	PCI Integ Netfinity Server	Y	B	-	-	-	-	-	V4R5
2891	PCI Integ xSeries Server V4R5 and CUM C1005450	Y	B	-	-	-	-	-	V4R5

Feat Code	Description	CIF	Model						Minimum Supporting Release
			270	820	830	840	SB2	SB3	
2895	128 MB Netfinity IOP Memory	Y	B						V4R5
2896	256 MB Netfinity IOP Memory	Y	B						V4R5
2897	1 GB Netfinity IOP Memory	Y	B						V4R5
3000	Migrated 128 MB Main Storage	-		M	M				V4R5
3005	512 MB Main Store	Y		B					V4R5
3007	1 GB Main Storage	Y		B					V5R1
3009	128 MB Main storage	Y		B					V5R1
3022	128 MB Main Storage	Y	B						V4R5
3024	256 MB Main Storage	Y	B						V4R5
3025	512 MB Main Store	Y	B						V4R5
3026	512 MB Main Store	Y	B						V4R5
3027	1 GB Main storage	Y	B						V5R1
3029	128 MB Main Storage	Y	B						V5R1
3032	256 Mb Main Storage	Y	B						V5R1
3033	512 MB Main Storage	Y	B						V5R1
3034	1 GB Main Storage	Y	B						V5R1
3067	1 GB Main Storage	Y			B				V5R1
4430	DVD-RAM	Y		B	B	B	B	B	V5R1
4487	50 GB ¼-Inch Cartridge Tape	Y		B	B	B	B	B	V5R1
4525	CD-ROM	Y	B	B					V4R5
4530	DVD-RAM	Y	B	B					V5R1
4582	4 GB ¼-Inch Cartridge Tape	Y	B	B					V4R5
4583	16 GB ¼-Inch Cartridge Tape	Y	B	B					V4R5
4586	25 GB ¼-Inch Cartridge Tape	Y	B	B					V4R5
4587	50 GB ¼-Inch Cartridge Tape	Y	B	B					V5R1
4723	PCI 10Mbps Ethernet IOA	Y	B	B	B	B	B	B	V4R5
4745	PCI WAN IOA	Y	B	B	B	B	B	B	V4R5

Feat Code	Description	CIF	Model						Minimum Supporting Release
			270	820	830	840	SB2	SB3	
4746	PCI Twinaxial Workstn IOA	Y	B	B	B	B	B	B	V4R5
4748	PCI RAID Disk Unit Ctlr	Y	B	B	B	B			V4R5
4750	PCI ISDN BRI U IOA	Y	B	B	B	B	B	B	V4R5
4751	PCI ISDN BRI S/T IOA	Y	B	B	B	B	B	B	V4R5
4761	PCI Integrated Analog Modem	Y	B	B	B	B	B	B	V4R5
4778	PCI RAID Disk Unit Ctlr	Y	B	B	B	B			V5R1
4801	PCI Crypto Coprocessor	Y	B	B	B	B	B	B	V4R5
4802	PCI Crypto Coprocessor	N		M	M	M			V4R5
4815	PCI 155 Mbps UTP OC3 ATM	Y	B	B	B	B	B	B	V4R5
4816	PCI 155 Mbps MMF ATM	Y	B	B	B	B	B	B	V4R5
4818	PCI 155 Mbps SMF OC3 ATM	Y	B	B	B	B	B	B	V4R5
4838	PCI 100/10 Mbps Ethernet IOA	Y	B	B	B	B	B	B	V4R5
5027	Software Version V4R5	-	B	B	B	B	B	B	V4R5
5028	Software Version V5R1	-	B	B	B	B	B	B	V5R1
5033	Migration Tower I	N		M	S				V4R5
5034	Migration Tower I	N		M	M				V4R5
5035	Migration Tower I	N		M	M				V4R5
5074	PCI Expansion Tower	Y		B	B	B			V4R5
5075	PCI Expansion Tower	Y	B	B					V4R5
5077	Migration Tower II	N			B	B	B	B	V4R5
5078	PCI Expansion Unit	N		B	B	B			V5R1
5079	1.8m PCI I/O Expansion Ttower	Y		B	B	B			V4R5
5102	Dual Line Cords - 820 CEC	N		B					V5R1
5103	Dual Line Cords - 830 CEC	N			B				V5R1
5104	Dual Line Cords - 840 CEC	N				B			V5R1
5105	Dual Line Cords - I/O Tower	N		B	B	B			V5R1
5106	Dual Line Cords - 5079 Tower	N		B	B	B			V5R1

Feat Code	Description	CIF	Model						Minimum Supporting Release
			270	820	830	840	SB2	SB3	
5111	30-Disk Exp w/Dual Line Cord	N		B	B	B			V5R1
5155	Redundant Power and Cooling	Y		B					V4R5
5156	Redundant Power and Cooling	Y	B	B					V4R5
5157	Feature Power Supply	Y		B					V4R5
5160	Power Dist Unit 1 phase NEMA	N	B	B	B	B	B	B	V5R1
5161	Power Dist Unit 1 Phase IEC	N	B	B	B	B	B	B	V5R1
5162	Power Dist Unit 2 of 3 Phase	N	B	B	B	B	B	B	V5R1
5538	Alt-IPL Specify for DVD-RAM	-	B	B	B	B	B	B	V5R1
5546	Sys Console 100 Mbps TokenRing	Y	B	B	B	B	B	B	V5R1
5548	Sys Console 100 Mbps Ethernet	Y	B	B	B	B	B	B	V5R1
5599	No Save/Restore Device	-	B	B	B	B	B	B	V4R5
7002	HSL enabler	Y	B						V4R5
7104	System Unit Expansion	Y	B						V4R5
7123	DASD Expansion Unit	Y	B						V4R5
7127	DASD Expansion Unit	Y		B					V4R5
7133	DASD Concurrent Maint Cage	N	B						V4R5
7500	Quantity 150 of #4314	Y		B	B	B			V4R5
7501	Quantity 150 of #4317	Y		B	B	B			V4R5
7502	Quantity 150 of #4318	Y		B	B	B			V4R5
7503	Quantity 150 of #4324	Y		B	B	B			V4R5
8079	Opt Base 1.8m I/O Rack	N	-	-	-	PU	-	-	V4R5
9002	Dual Linecord Enabler	N		B					V5R1
9057	Storage Exp Unit	N	-	-	B	B	-	-	V4R5
9739	Base Optical Bus Adapter	Y			B	B			V5R1
9752	Base HSL Ports - 8 Copper	-			B		P		V5R1
9755	Base HSL Ports - 16 Copper	-				B		P	V5R1
9758	Base HSL Ports - 2 Opt / 6 Cop				B				V5R1

Feat Code	Description	CIF	Model						Minimum Supporting Release
			270	820	830	840	SB2	SB3	
9759	Base HSL Ports - 4 Opt / 12 Cop					B			V5R1
9771	#9771 Base PCI 2-Line WAN with Modem		B	B	B	B	B	B	V4R5
9774	Base HSL Ports 2 Opt / 6 Cop				B				V5R1
9777	Base HSL Ports - 8 Copper	-			B				V5R1
9778	Base PCI RAID Disk Unit Ctlr	-			B	B	P	P	V5R1
9943	Base PCI IOP	-		B	B	B	B	B	V4R5

OS/400

OS/400

Operating System/400 (5722-SS1)

The iSeries operating system, OS/400, is architected as a single entity. This means that such facilities such as relational database, communications and networking capabilities, online help, Web enablement technologies, easy enterprise management, and much more are fully integrated into the operating system and the machine. The user communicates with all components of OS/400 using a single command language Control Language (CL) or administers and manages the system using a GUI interface.

The computing industry is moving rapidly toward a network-centric world made up of global networks. The newest releases of OS/400 build on this to make the iSeries servers key players in this vibrant and vital area. This chapter describes the enhancements to the iSeries capabilities as a network-centric system. Associated licensed programs and enhancements are described in the following chapters.

OS/400 provides the industry's foremost application flexibility with support for iSeries, Linux, Windows 2000, Java, and UNIX applications, combining high availability with superior workload management and logical partitioning. The next generation of applications can be quickly deployed and managed in a single, partitioned server alongside current business applications.

With OS/400, a business can simply and rapidly deploy e-business applications with seamless integration of existing applications and data. With extensions to its robust security and networking options, OS/400 enables business-to-business connectivity through the supply chain and to customers.

OS/400 has an extensive graphical interface providing visualization, wizards, and integration for simplicity of advanced operations from both PCs and pervasive or mobile devices. Operating your server has never been this simple.

With dynamic and granular Logical Partitioning, OS/400 makes it easier than ever to manage multiple applications in a single server. Also, iSeries can now provide a Storage Area Network for directly attached Windows 2000 servers.

High availability options include faster, less expensive system-to-system clustering options and the ability to switch applications, data, and resources between multiple iSeries servers.

For *iSeries servers with OS/400 Version 5 or later*, the system price includes OS/400 at no additional charge. In addition to OS/400, the full function robust commercial database, Universal DB2/400, is also included at no additional cost. The operating system and the database do not have user-based charges. This provides for a much better cost of investment with no surprises for fees for additional users.

OS/400 – New with V5R1

OS/400 V5R1 should be considered for either a new installation or as an upgrade from previous versions of OS/400 to take advantage of many V5R1 software enhancements, including:

- **Linux**: An added application environment that provides the leading open source operating system. Look for new e-business applications coming to this environment that complement iSeries integration and reliability.
- **LPAR**: Server consolidation focus that allows multiple copies of OS/400, plus Linux, on a single system. Reduced or eliminated IPL requirements when changing LPAR configurations and resources.
- **Operations Navigator**: Offers two times the growth in advanced graphical user interface functionality and many new setup wizards.
- **Management Central Pervasive**: Leading-edge capability to manage multiple systems via an Internet-capable phone, Personal Digital Assistant (PDA), or Web browser.
- **Wireless capabilities**: This built-in feature enables B2B solutions and connects mobile devices to core business solutions with XML enablers built in to OS/400.
- **HSL Clustering**: HSL OptiConnect is much faster and lower cost than SPD OptiConnect. Switchable Disk with Switchable Independent ASPs offers a way to switch applications and data to a backup system to keep the data constantly available. V5R1 offers support only for IFS files.
- **OS/400 PASE**: Improved enablement for porting UNIX applications to iSeries; now provides 64-bit support for AIX Version 4.3.3.
- **TCP/IP**: e-business runs on TCP/IP. V5R1 continues to enhance its functionality, performance, and ease of use. Dynamic Domain Name System and Network Quality of Service are among the new features supported.
- **DB2 UDB for iSeries**: Additional e-business enablement, functional, and performance enhancements.
- **Java**: Support for three versions of Java, functional, and performance enhancements
- **OS/400 Directory Services**: Supports IBM SecureWay Directory Version 3.2 providing distributed functions support for products such as WebSphere, Policy Director, MQSeries, Meta-Directory, and HTTP Server.
- **Internet Printing Protocol (IPP)**: Provides Web-enabled worldwide print support.
- **Extreme Support through Personalization (ESP)**: Additional options for connecting to IBM.

Operating System Overview

Program Number	5722-SS1
Version Release Modification	V5R1
Announced	25 May 2001
Usage	Processor Based
Software Subscription	Yes
IPLA/Keyed	Yes/Yes

Version 5 Release 1 (V5R1) of IBM Operating System/400 licensed program provides system support for all RISC models of the iSeries. The single 64-bit operating system spans all RISC models. Models 270, 820, 830, 840, SB2, SB3, and several models of the Dedicated Server for Domino all are shipped with the latest release of the software. OS/400 V5R1 also runs on all iSeries servers with PowerPC processors, which includes the 9401 Model 150; the 9402 Models 400, 40S, 436, and packages based on the 400 and 40S; and 9406 Models 170, 500, 510, 530, 50S, 53S, 600, 620, 640, 650, S10, S20, S30, S40, SB1, and the 170 Dedicated Server for Domino.

Version 5 of OS/400 does not run on earlier models of the AS/400 system based on IMPI processors (CISC models). These include the Bxx, Cxx, Dxx, Exx, Fxx, 100, 135, 140, 2xx, and 3xx models. Some functions of the operating system may only be available on newer hardware.

OS/400 Version 5 is delivered on CD-ROM to speed loading and to reduce the risk of media errors. All manuals are also delivered in softcopy form on CD-ROM.

OS/400 contains the base operating system, additional optional feature components, and separate licensed programs that come at no extra charge bundled with the operating system. All these products and components are integrated together as a single integrated and tested entity. Further more, the customer can purchase additional support for advanced features and functions not included in the base group of products shipped with the operating system. The following table contains a list of all features and products that are available with OS/400.

Product Name	Product Number	Option Number	Release	Base/ Separate	Refer To	Charge/ No Charge
OS/400	5722-SS1		V5R1	B		N/C
Universal DB2 for iSeries				B		N/C
System Openness Includes		13		S		N/C
Media & Storage Extension		18	V5R1	S		C
Opti-Connect/400		22-23	V5R1	S		C
DB2 Symmetric		26	V5R1	S		C
DB2 Multisystem		27	V5R1	S		C
PASE		33	V5R1	S		C
iSeries Print Service Facilities		36, 37, 38		S		C
HA Switchable Resources		41	V5R1	S		C
Licensed Programs within OS/400						
Integration FSIOP	5769-SA2		V4R2	S		N/C
iSeries Integration for Windows Server	5722-WSV		V4R5	B		N/C
TCP/IP Connectivity Utilities for iSeries	5722-TC1		V5R1	B		N/C
WebSphere Application Server for iSeries	5733-AS3		V5R1	S	WebSph	N/C
HTTP Server for iSeries	5722-DG1		V5R1	B		N/C
HTTP Server Powered by Apache for iSeries	5722-HT1		V4R4	S		N/C
IBM Toolbox for Java	5722-JC1		V4R5	B	LPAD	N/C
iSeries Developer Kit for Java	5722-JV1		V4R5	B	LPAD	N/C
Performance Manager/400	5722-PM1		V4R5	B	LPSM	C
	5722-SM1					
iSeries Client Access Express for Windows	5722-XE1		V4R5	B	LPN	N/C

Note:
B: Base feature included with OS/400.
S: Separate feature must be specified on order.
N/C: No charge Feature
C: Charge Feature

Each of the following sections summarizes the components of the operating system named in the above table. Some products are further described in their own software sections later in this book, as shown in the previous table.

OS/400 Base

OS/400 is a 64-bit operating system running on all RISC models of the iSeries. OS/400 with its base functions provides ease of implementation, management, and operation in one totally integrated object oriented operating system. The following functions are supported:

- Single integrated operating system for all models
- Advanced GUI management
  - Easy setup of the system
  - Setup and management of the TCP/IP function
  - GUI database functions
  - User and printer job administration
  - System management
  - Software distribution
  - Performance monitoring
  - Centralized management of multiple systems
  - Plug-in GUI support for Domino, BRMS, and others
- Network computing
- Integrated file system support (including industry standard)
- Logical Partitions
  - Different versions and releases of OS/400
  - Linux
- Clustering and shared resources
- High system availability
- Client/server support
- Integrated DB2 Universal Database for iSeries
- Transaction processing
- Batch processing
- Ease of installation, use, and maintenance
- Extensive run-time application function
- Openness standards
- Systems management
- Performance Management/400
- Electronic Customer Support
- Comprehensive security for system resources
- Interfaces to system functions
- Printed output support
- Multiple operating environments

- Connectivity to remote devices, systems, and networks
- Office host services
- National language versions and multilingual support

All functions of the OS/400 follow a consistent design philosophy. This consistency is one of the cornerstones of iSeries ease-of-use. Ease-of-use translates into higher productivity for its users and easier systems management. The cornerstones are highlighted next.

OS/400 Functions

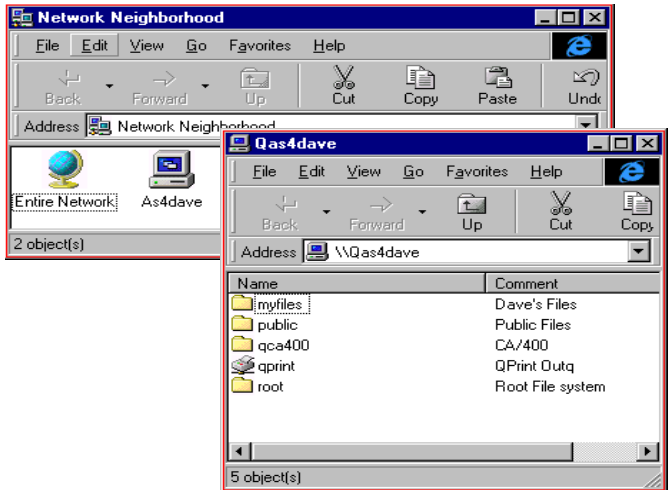
NetServer: File and Print Serving

iSeries NetServer is used to satisfy file and print serving needs for end users. NetServer unites the Integrated File System and iSeries printers into the Microsoft Network Neighborhood. User benefits include, for example, better control of user visibility to resources. The only directories or printers that can be seen by end users are those set up as “shared” by an administrator or resource owner.

NetServer brings the following additional benefits versus using built-in PC file and print serving functions, including:

- No background tasks (such as cwbuitsk, cwbnpred, cwbsvd, cwbbs), which previously used extra battery power on laptops.
- When using Network Drives to access Integrated File System information or Network Printers to use iSeries network printers, these resources are visible to all end users on the iSeries server.

NetServer allows the administrator or owner of a resource to control its visibility to end users. Creating a “share” enables viewing of that resource. If no share exists, users do not see the directories or printers.



Desktop users can fully satisfy their file and print serving needs through the iSeries NetServer function. Therefore, all the file and print serving functions currently existing in the other iSeries Client Access clients have been removed from the Express client. To use the iSeries NetServer, only the client for Microsoft Networks (shipped with Microsoft 32-bit operating systems) with file sharing enabled needs to be installed on the PC.

iSeries NetServer file and printer “shares” are easy to create, locate, and manage by using the Operations Navigator printer list and IFS list. The current file shares can be listed separately to make it easy to quickly explore the contents of a file share or map a drive to it. File shares support EBCDIC to ASCII conversion. The AFP Workbench Viewer is also provided so iSeries spooled files (AFP and SCS) or PC files (such as GIF, TIFF, and JPEG formats) can be viewed directly by a PC user. The AFP Viewer provides many end-user productivity aids such as the ability to zoom in or search for specific portions of a stored document.

NetServer – New with V5R1

- iSeries NetServer is enhanced so that the iSeries can operate as the Logon Server for Windows clients. The iSeries can be used to authenticate logging onto Windows, provide the home directory, and logon scripts to the Windows user. Additionally, Windows user profiles including Desktop, Start Menu, Favorites, and policies can be stored and retrieved from an iSeries server. A Windows NT or Windows 2000 server is no longer needed in the network to provide these functions.
- iSeries NetServer has dramatically reduced the number of times that OS/400 user profiles become disabled due to Windows programmatically attempting invalid signons to access the OS/400 without compromising security. Additionally, when users cause their user profiles to become disabled due to several attempts with different invalid passwords, iSeries NetServer provides new GUI support through a Disabled User IDs menu item off the iSeries NetServer menu of Operations Navigator to re-enable those user profiles. This support has also been made available through an API on OS/400. These changes can reduce the number of times that user profiles become disabled and improve the ease with which disabled users can be managed.
- iSeries has enhanced the allowable characters in a password and the length of a password to be more compatible with Windows. This helps customers who prefer their

Windows and iSeries passwords to match. iSeries NetServer also provides support for the NTLMV2 password hash that the Windows PCs can be configured to use to provide better password protection on the network.

- User IDs longer than 10 characters are now truncated to 10 characters instead of being rejected when checking for an iSeries user ID. Now a user ID, such as Administrator on Windows, would be the same as ADMINISTRA on the iSeries. This should help compatibility between Windows and iSeries user IDs.
- A new iSeries NetServer Setup Wizard is now part of Operations Navigator that guides you through setting up your iSeries NetServer based on the types of Client Access clients being used. This new Setup Wizard also helps the user configure logon support.
- iSeries NetServer now supports access of files larger than 2 GB in the Integrated File System.
- Through Operations Navigator and APIs, a new Session Identifier can be used to allow better management and tracking of iSeries NetServer Sessions. This is extremely important in a Windows Terminal Serving environment where many users have sessions through a single Windows system. Now sessions can be ended or properties observed on single sessions rather than all the sessions coming from a single system.
- Windows NT Background services can now access the iSeries NetServer without user intervention.
- Printer Shares can now be published in Directory Services (LDAP) for use by Windows 2000 systems using Active Directory to find printers.
- Performance and scalability features are enhanced to help customers consolidate file and print serving on an iSeries server.
- NetServer is enhanced to support Linux Clients. AS/400 NetServer support of Linux (clients) provides the same file and print sharing function as the existing AS/400 NetServer. Linux clients running with kernel Version 2.4.3 and later, and SAMBA Version 2.0.7 and 2.2, can access NetServer functions on the iSeries.

  NetServer function is planned to be available as a PTF for V5R1 during fourth quarter 2001.

  For schedules and additional information, refer to:
  `http://www.ibm.com/servers/eserver/iseries/netserver`

Note

With this version of iSeries NetServer, Windows 3.1 and Windows NT 3.51 are no longer supported. In the release following V5R1, iSeries NetServer will no longer support Windows 95.

Network Printing Support

Distributed print support provides a connection to LAN-attached ASCII printers and support for Advanced Function printers. It also facilitates the distribution of printed output throughout iSeries networks. The iSeries server provides a seamless path for customers to direct printed output through an iSeries network and to other print servers. SNA or TCP/IP protocols (LPR/LPD) can be used to transport the spool file and its attributes to the remote system.

This integrated operating system function supports printing of text, images, graphics, barcodes, electronic forms, multiple fonts, logos, signatures, and more. As a result, it provides the basis for business solutions like business reports, preprinted forms, customer statements and invoices, and letters. Double Byte Character Set (DBCS) documents that enable printing of Chinese, Korean, Japanese, or Thai characters are also supported.

OS/400 supports IBM and non-IBM printers, which vary in price, function, speed, and use.

Host Print Transform

Most printers are designed to work with a specific data stream, so OS/400 includes a function to automatically transform the program-generated data stream to that required by the printer to which it is sent. It is not necessary for the application to generate the correct data stream; the system will automatically transform it as necessary at print time. Customization objects are provided for over 125 popular IBM and non-IBM ASCII printers, such as Hewlett Packard PCL, Lexmark PPDS, and HP LaserJet TIFF Packbit. An API brings the capabilities of Host Print Transform to the iSeries application developer.

Printer Load Balancing

Local and remote output queues permit more than one active writer, allowing spooled output on one output queue to be printed on multiple printers. In addition, a limit can be placed on the size of spooled files printed during a specified time period. With these features, large print jobs can be deferred to print during non-peak hours.

Communication and Networking

Connectivity to Remote Devices, Systems and Networks

OS/400 offers many integrated capabilities and functions that enable communications with a variety of IBM and non-IBM systems, either in batch or interactive modes. This integrated connectivity function provides customer solutions by enhancing the integration of business systems. Worldwide standard TCP/IP or the traditional SNA hierarchy, as well as SNA peer networks and SAA standards, are supported and offer the user the greatest flexibility possible in network design now and in the future.

Many network protocols are supported by Operating System/400. This support provides a basis for integration of customer business systems, and thus, business solutions. The iSeries servers support protocols and networks, some of which are listed here:

- 1 Gb Ethernet
- 100/10 Mbps Fast Ethernet
- IBM Token Ring 100/16/4 Mbps Network
- ATM 155 Mbps LAN
- X.21
- X.25
- ISDN Data Link Control (IDLC)
- T1/E1/J1 and Fractional T1 Networks (high bandwidth)
- Asynchronous
- Binary Synchronous
- Synchronous Data Link Control (SDLC)

OS/400 includes the following communication facilities:

- TCP/IP Support
- Advanced Peer-to-Peer Networking (APPN)
- SNA/SNADS
- Autodial Support
- 3270 Device Emulation
- ISDN Support
- File Transfer Support
- IPX/SPX Communications

For a detailed list of Networks, communication facilities and protocols, see “Referenced Lists” on page 789.

All of these facilities are part of OS/400. Other communication facilities are available as licensed programs, such as IBM Communications Utilities for iSeries. TCP/IP Utilities is included with OS/400 (although not part of OS/400) from V3R1 onward. These TCP/IP Utilities are automatically shipped to all customers that order OS/400.

Network Computing

The network computing capabilities of the iSeries server allow electronic business to be carried out over the Internet and intranets. The following functions of the OS/400 operating system, in concert with the security and reliability of the iSeries server, help make it a market leader in network computing.

- Support for up to 30 Lotus Domino Servers for iSeries V5.01 (5722-LNT)
- Support for Lotus Enterprise Integrator for iSeries (5722-LNP)
- Java for iSeries is integrated into the microcode for performance (5722-JV1)
- HTTP Server for iSeries (5722-DG1)

- HTTP server powered by Apache for iSeries (5722-HT1)
- WebSphere for iSeries (V4R4) (5722-WA1)
- Network Security is integrated
- Lightweight Directory Access Protocol (LDAP) on the iSeries
- Virtual Private Networks

Network Management Facilities

Several communications and systems management functions are available to manage the iSeries servers. Some are integrated into Operating System/400, and some are separately-priced features. These functions help manage and control local systems and distributed systems that may operate within a network controlled by a host System/370 or by another iSeries server.

Functions available for the iSeries server are:

- Systems Management in TCP/IP Networks
- Alerts support to NetView, System/36, System/38, AS/400
- Distributed System Node Executive (DSNX)

Security

Comprehensive Security for System Resources

The many levels of security available with OS/400 ease the job of system security management. The level of security is set simply using a system value, as shown in the following table.

Security Level	Description	Use of this Level	Considerations
10	Minimal security	No passwords are used.	Any user can perform any function.
20	Password security	Passwords are used to provide access to the system.	Any user can perform any function once they are signed on.
30	Resource security	Passwords are required and object usage can be controlled.	Users can be restricted to specific functions.
40	Resource security and operating system integrity	Passwords are required and object usage can be controlled. Users can be restricted to specific functions.	Using unsupported interfaces is restricted.
50	Enhanced resource security and operating system integrity[1]	Passwords are required and object usage can be controlled. Users can be restricted to specific functions. Using unsupported interfaces is restricted.	Parameter validation into the operating system and restrictions on use of user domain objects. A security journal is provided that logs all security violations.

Security Level	Description	Use of this Level	Considerations
	Enables iSeries servers to operate at the C2 level of trust as defined by the U.S. Government. Refer to publication DOD 5200.28-STD, “Department of Defense Trusted Computer System Evaluation Criteria” (Orange Book) for details on the U.S. Government definition of C2 trust level.		

The OS/400 operating system is distributed with the security level set to 40. A reference manual is provide for implementing security *Tips and Tools for Securing Your AS/400*, SC41-5300.

Network Authentication Service

Network Authentication Service provides APIs to verify the identity of a user in a network. Application programs can use these APIs to authenticate a user and securely pass on it’s identity to other services on the network. Once a user is known, separate functions are needed to verify the user's authorization to use the network resources. Network Authentication Service is an implementation of:

- Kerberos Version 5 protocol as defined by RFC 1510
- Generic Security Service (GSS) application program interface (API) defined in RFCs 1509, 1964, and 2078

Many of the de facto standard Kerberos protocol APIs that are prevalent in the industry today. The OS/400 implementation is designed for inter operability with authentication, delegation, and data confidentiality services compliant with these RFCs such as Microsoft Windows 2000 Security Service Provider Interface (SSPI) APIs.

Security - New with V5R1

- **Digital signature and object signing**: Support for digital signatures on several OS/400 object types provides an even greater degree of integrity. Software providers, or system administrators, can add digital signatures to software. They can use those signatures to verify the source of the software and to ensure that the software has not been changed since it was signed. This added layer of protection against altered software, unintentional or malicious, is also being used by the operating system to protect itself from unauthorized changes.
- **Digital Certificate Manager (DCM) restructure and enhancements**: The user interface for DCM is redesigned to improve functionality and ease-of-use. Enhancements include support for:
  - Certificate extensions
  - Storing the certificate private keys using the IBM Cryptographic Coprocessor (#4758)
  - Certificate Revocation Lists (CRLs)
  - Digitally signing objects and verifying the signature

  - Creating certificates using a Public Key Infrastructure for X.509 (PKIX) Certificate Authority (CA)
  - Adding and removing applications that use certificates
- **Enhanced Password Protection**: Support is added to the system to enable case sensitive user profile passwords up to 128 characters in length with a larger character set. This support provides greater security for the user profile password (new system value: QPWDLVL). Before taking advantage of the longer passwords, we recommend that you review the security reference manual for a complete description of the potential compatibility arrangements when using the new support.

DB2 Universal

Integrated DB2 Universal Database for iSeries

DB2 Universal Database (UDB) for iSeries is fully integrated into the OS/400 operating system software. It is not a separate product. DB2 UDB for iSeries offers state-of-the-art database functions and open- systems, standards based technology, while providing the maturity, stability, and ease of use that has become the trademark of the iSeries server.

The iSeries server can be used for both traditional, transaction processing and decision support and data warehousing applications. Advanced parallel processing and advanced query optimization techniques support queries of large decision support databases. An integrated iSeries database offers many advantages. As an integrated part of OS/400, DB2 UDB for iSeries is installed with the system providing automatic bring up and recovery functions when the system is IPLed. Integration also allows the database commands and display interfaces to have a look and feel that is consistent with the rest of the system. For example, database objects are automatically included as part of the system-wide cross reference facilities and the basic system administration commands for save, restore, security, and object management can be used to administer the database. This allows the database to exploit new system functions and hardware for improved availability, recovery, security, concurrency, and performance as they are introduced.

Conformance to industry database standards, advanced functions, and distributed data capabilities with supporting performance allows DB2 UDB for iSeries to operate equally well with centralized database applications, or as the database server in complex heterogeneous client/server networks. DB2 UDB for iSeries unique combination of function and reliability make the iSeries the ideal database server for many customers' needs.

DB2 UDB for iSeries Open Standards-Based Interoperability

Support for client/server environments has been greatly enhanced by incorporating popular database standards and transmission protocols. DB2 UDB for iSeries provides support for:

- ANSI X3.135.1999, ISO 9075-1999, and FIPS 127-2 Structured Query Language (SQL)
- IBM's Distributed Relational Database Architecture (DRDA) Distributed Unit of Work - Application Directed
- Microsoft's Open Database Connection (ODBC)
- Apple's Data Access Language (DAL)

X/Open's Call Level Interface (CLI) Supported transmission protocols for the iSeries include:

- Transmission Control Protocol/Internet Protocol (TCP/IP)
- Advanced Program-to-Program Communication (APPC)

DB2/400 database has been integrated into the operating system since its conception. DB2/400 has been enhanced over the years to include many new and emerging standards. The integrated database is a full function database with features competitive to other widely used databases. The fact that the DB is integrated allows the operating system to control some of its management functions and makes it easier to maintain than competitive DB from other vendors reducing the need for a dedicated Database Administrator. Integrated into the operating system are its security functions, which allows a better security model than other DB where additional tools may need to be purchased to provide these functions.

The SQL Client Integration API allows providers of gateways and client/server solutions to integrate their products with DB2 UDB for iSeries. Many iSeries customers have the need for applications that not only access DB2 UDB for iSeries data, but also access data on other databases platforms such as Oracle or Sybase.

It includes all the support necessary for new and existing database applications to run on the iSeries server. Application development facilities are provided in the optional DB2 Query Manager and SQL Development Kit for iSeries, the next evolution of the SQL/400 product. This product includes Query Manager, an interactive panels and query builder for user-developed report generation, and Interactive SQL, a prompted interface for running and testing SQL queries. For the application developer, the SQL Development Kit provides SQL precompilers and tools to assist in developing custom SQL applications in languages such as C, Java, RPG, COBOL and REXX. Once created, the applications and queries can be run on any iSeries server.

Support is provided for embedded static, dynamic, and extended dynamic SQL, together with the IBM Distributed Relational Database Architecture (DRDA), Microsoft Open Database Connection (ODBC), and Apple Data Access Language (DAL). A Call Level Interface (CLI)

server mode is also provided that allows developers to write applications that perform database serving for multiple users.

Distributed Database Support

OS/400 supports distributed relational database, SQL, and a wide range of data types, including date and time. This support allows read and write access from an iSeries server to another iSeries server or to any other DB2 family member. The CPI for database is Structured Query Language (SQL). Customer investment in data is protected by this distributed support, which allows data connectivity across platforms. Interactive access to distributed database is possible using the prompted facilities of interactive SQL (ISQL). Both are available in the separate licensed program DB2 Query Manager and SQL Development Kit for iSeries (5722-ST1). Distributed file access between an iSeries server, CICS, PCs, System/36, and System/38 is also available using Distributed Data Management, included in OS/400. This support allows access to remote files by applications using file and database interfaces.

Existing DB2 UDB for iSeries SQL applications, including applications using iSeries Client Access SQL interfaces, can be easily modified with this API to perform database requests on other databases. The data is returned to the application for processing as if it had come from DB2 UDB for iSeries. With this support, the programmer's interface is the same whether Distributed Relational Database Architecture (DRDA) or the SQL Client Integration API is used.

Database SQL Portability

DB2 UDB for iSeries adds Java to the list of languages in which stored procedures can be written. Stored procedures are an efficient method of performing SQL processing across a network since one procedure can run multiple statements and logic to control statement flow with minimal network traffic. Stored procedures written in Java are methods in Java classes. Once a stored procedure is created and registered, and the Java classes are placed in the correct file location, they can be called from any language that can execute SQL statements.

This includes running from remote systems with ODBC or DRDA. DB2 UDB for iSeries performs the necessary setup to enable a Java virtual machine to run the methods, and performs the conversion between SQL types and Java objects. DB2 CLI, the call level interface for running SQL statements from ILE programming languages, is now more compatible with the ODBC standard. This makes porting applications written to the popular ODBC standard much easier.

Access Paths

Access paths may be defined for files to allow access in either keyed or arrival sequence order. Access paths are maintained when a change to the data occurs, allowing multiple

users to be immediately aware of changes in the database and to access the current information in their required sequence.

National Language Support (NLS)

Data in multiple national languages can reside in the same table and be accessed across the distributed database platforms.

NLS allows customers to interact with DB2 UDB for iSeries and store data in their preferred language, character set, and sort sequence. The ability to store double-byte graphic characters and compare data in different character sets is also provided.

Conforming with Structured Query Language (SQL) standards supplies the industry standard database access language with consistent data access across heterogeneous platforms. It also provides conformance to IBM SQL Version 1, ANSI X3.135.1992, ISO 9075-1992, and FIPS 127-2 standards. Support is provided for embedded static, dynamic, and extended dynamic SQL. ANSI-and ISO-defined SQL procedures are also supported.

Large Object Support

With the addition of large objects (LOBs), DB2 UDB for iSeries can store and manipulate data fields much larger than the current limits. An iSeries record with LOB fields can hold up to 15 MB of data. With the new LOB support, you can look to DB2 UDB for iSeries as a platform for building applications that hold new data such as very large text, image, and audio.

DATALINK Data Type

The DATALINK data type extends the types of data that can be stored in database files. The actual data stored in the column is only a pointer to the object such as an image file, a voice recording, or a text file. The method used for resolving to the object is to store a uniform resource locator (URL). This means that a row in a table can be used to contain information about the object in traditional data types, and the object itself can be referenced using the DATALINK data type. Datalinks also allow the referenced object to be “linked” to the database to prevent modification or deletion of the object while it is linked to the database file. This relationship is maintained by having the database interact with the file system.

User-defined Types

User-defined types are derived from existing predefined types such as integer and character. You can create your own types for strong typing and creating functions for different types. You can call a function for each row of a result set and return a value based on the user-defined type.

User-defined Functions

SQL now lets you define your own functions to use within SQL itself. This saves you time in reusing common building blocks that you develop yourself. User-defined functions are necessary building blocks to support the database extenders (extensions to support rich text and multimedia search and manipulation) currently supported on DB2 UDB for iSeries.

Declarative Referential Integrity

Provides SQL database integrity support intrinsic to the database, eliminating the need to code integrity constraints into each application program. This support ensures database consistency by preventing conflicting data from being entered into the database.

User-accessible Logs

Journal entries (that is, records of database changes) can be searched and viewed interactively, and may be retrieved by a user program for further processing or analysis. This can lead to improved security or database integrity and is also an important component or open access to the database.

Column-level Security

Access to individual table columns can be controlled for each user. Row-level locking individual records (such as, records) are locked from simultaneous, conflicting access as appropriate to the type of processing being done. Using commitment control, the user can define a group of records all of whose locks are held until the user application declares a multiple-change transaction complete.

Stored Procedures

Provides the ability to distribute the application workloads between clients and servers. The ability to split an application program by executing the processing logic on the server and the presentation logic on the client can provide increased performance over traditional requester access. These improvements can be dramatic for applications requiring intermediate processing of data, which can be performed at the server locally, instead of remotely at the client.

Triggers

Provides for automatic program/procedure execution, based on user specified rules, before or after database modifications.

Outer Join

The Outer Join function is another SQL standard compliant function that can improve both query performance and function. Performance is enhanced with a syntax that allows SQL

users to specify outer joins or exception joins, therefore reducing the number of queries required. A NULL field is now returned when a file query does not find records that meet the join criteria. This allows users to develop and use more efficient reports.

Alter Table

The Alter Table function enhances database administration while improving SQL standards conformance. This function allows the user to add a column, drop a column, or change a column's attributes for an existing database table. End-user productivity can be greatly enhanced with this standard conforming function for database changes and administration. Both SQL and native interfaces are provided.

X/Open Call Level Interface to SQL

Support of the X/Open standard for an SQL Call Level Interface (CLI) allows users to easily access DB2 UDB for iSeries SQL functions directly from high-level languages (HLL) without performing an SQL precompile. This standard CLI support also allows SQL access from languages such as C++ that currently do not have another SQL interface or precompiler. There is an option to enable writing applications that do database serving for multiple users (server mode).

The X/Open standard CLI is supported on several other database platforms, which makes SQL application portability to and from the DB2 UDB for iSeries platform even easier.

SQL Repeatable Read

Support of the standard compliant isolation level, Repeatable Read, enables users to ensure that, if a specific query is issued in a unit of work multiple times, the same result will be returned each time by preventing concurrent jobs from changing the queried data. This isolation level also offers increased interoperability in distributed DB2 and DRDA environments. Users can also now specify the isolation level (commitment control level) on a per statement basis for the SELECT, UPDATE, INSERT, and DELETE statements. This provides greater flexibility when executing under commitment control.

Access to Data Areas and Data Queues

DB2 UDB for iSeries includes support for transparent remote access to data areas and data queues. Applications that use data areas or data queues for inter-process communications can be distributed across multiple iSeries servers, providing new options as users move into distributed iSeries networks and multi-tiered application models. Additional data queue support is included in MQSeries for iSeries, a separately-licensed program, 5722-MQ1.

Two-phase Commit Transaction Management

Allows applications to access multiple heterogeneous databases simultaneously in complex client/server and peer-to-peer environments using APPC sync point protocols.

Data Replication

Provides automatic data replication facilities in distributed DATABASE 2 family environments. Local shadow copies of a master database are automatically updated at specified intervals.

System-wide Database Catalog

Allows applications to query information concerning all objects on a system using a single system catalog, instead of requiring separate catalog accesses for each SQL collection.

Multiple-level Concurrency Control

Provides read stability, cursor stability, uncommitted read, repeatable read, and no commit isolation levels with row-level locking to support large numbers of users in complex application scenarios.

High Performance Database Server (Centralized and Distributed Server)

The high performance iSeries Advanced Server and improvements in communication performance combine to strengthen the position of the iSeries server as a high performance database server. In addition, DB2 UDB for iSeries offers enhanced performance for both centralized and distributed client/server database access, making the iSeries the database server of choice for many computing needs. The following DB2 UDB for iSeries functions are available to enhance application performance.

- **Advanced SQL optimizer**

  Converts SQL requests into optimally efficient database access methods using proven mathematical rules as well as query specific cost estimates. Optimal performance is maintained over time by the automatic rebind feature, which redetermines access methods based upon changes to the database objects and statistics.

- **SQL Encoded Vector Indexes (EVIs)**

  This new type of index can be created through SQL and may improve query performance – especially for long-running queries against large files using many selection criteria. An EVI has several advantages over a traditional index with the same keys:

  – Precise statistics about the distribution of key values are automatically maintained and can be accessed much more quickly by the query optimizer than traditional indexes.

  – EVIs can be built much faster and take significantly less storage than traditional indexes. Less storage means less main storage is necessary to run the query.

  – The query optimizer can scan EVIs and dynamically build bit maps much more quickly than from traditional indexes.

- **Explain function**

  Examines and reports the access method used by individual SQL queries. The output can be examined to determine whether the access method generated for the query could be improved by query and/or database changes.

  Multiple isolation levels. Four record locking options are available to fine tune application performance:

  – *Read Stability (*ALL)*: Locks all rows read during transaction and maintains locks until the transaction ends.

  – *Repeatable Read (*RR)*: Locks all rows read during remote unit of work and maintains locks until the unit of work ends.

  – *Cursor Stability (*CS)*: Maintains locks on the current and previously changed rows only, which can offer increased performance for multiple applications contending for the same rows.

  – *Uncommitted Read (*CHG)*: Offers higher performance by not acquiring or examining database locks for read-only operations.

  – *No Commit (*NONE)*: Provides the highest performance of the four isolation levels, by not examining locks and disabling transaction management: the ability to either COMMIT or ROLLBACK a transaction.

- **Block INSERT and FETCH**

  Provides applications with the ability to store and retrieve arrays of data directly, instead of one row at a time.

- **Automatic record blocking**

  Improves client/server performance by returning rows to the client in blocks rather than individually. Subsequent record access of the current block can then be performed locally at the client without accessing the server. This ability is now provided for all isolation levels.

- **Parallel data access**

  Queries returning or requiring DB2 UDB for iSeries to process large amounts of data require significant I/O activity. Due to the iSeries' single-level store architecture, this data is often spread across many physical devices. The parallel data access feature now allows multiple internal DB2 UDB for iSeries tasks to be activated for each physical device, allowing DB2 UDB for iSeries to transfer data from disk to memory faster than with the previous single task I/O architecture.

- **Query Governor**

  Long-running queries can have negative performance effects for other users of a database. The governor facility allows a time limit to be set for a query, so as to avoid a single query from consuming unusually large amounts of resources, negatively affecting

the performance of other users. Before the query is started, its run time is estimated, and if the estimate exceeds the specified time limit, the query is not started.

Ease of Use and Management

The iSeries' reputation for usability and maintainability is unsurpassed in the industry. This is due in part to the tight integration of OS/400 and DB2 UDB for iSeries. Users do not have to learn separate operating system and database functions, nor are they burdened with maintaining the complex interfaces between multiple layers of software. In addition to seamless integration, a rich set of utilities continue to be provided for easy management of DB2 UDB for iSeries databases. Some of these utilities include:

- **Online backup and restore**: Allows database maintenance to be performed while users are accessing and changing the database, providing around-the-clock operation.
- **Object level recovery**: Allows restoration of a single file when necessary; it is not necessary to restore the entire database to “fix” a single file.
- **Roll forward and backward recovery**: Allows database changes made after the last backup to be reapplied after a restore, or recent changes to be backed out if the database needs to be returned to a specific state. This can be done for a specific user, time, or job.
- **Audit trail**: Maintains a record of database changes such as the user, program, and job making the change.

Integrated File System

The Integrated File System is a part of OS/400 that lets you support stream input, output, and storage management similar to personal computer and UNIX operating systems. A file system provides the support to access specific segments of storage that are organized as logical units. These logical units on the iSeries server are files, directories, libraries, and objects.

Each file system has a set of logical structures and rules for interacting with information in storage. These structures and rules may be different from one file system to another. In fact, from the perspective of structures and rules, the OS/400 support for accessing database files and various other object types through libraries can be thought of as a file system. Similarly, the OS/400 support for accessing documents (which are really stream files) through the folders structure may be thought of as a separate file system.

The Integrated File System treats the library and folders support as separate file systems. Other types of file management support that have differing capabilities are also treated as separate file systems. The file systems are:

- **NFS**: Network File System. This file system provides the user with access to data and objects that are stored on a remote NFS server. An NFS server can export a network file system that NFS clients then mount dynamically.
- **QDLS**: The document library services file system. This file system provides access to documents and folders.
- **QFileSvr.400**: This file system provides access to other file systems that reside on remote iSeries servers.
- **QLANSrv**: OS/2 Warp Server for iSeries file system. This file system provides access to the same directories and files that are accessible through the OS/2 Warp Server for iSeries licensed program. It allows users of the OS/2 Warp Server for iSeries applications to use the same data as OS/2 Warp Server for iSeries clients.
- **QNetWare**: The QNetWare file system. This file system provides access to local or remote data and objects that are stored on a server that runs Novell NetWare 4.10 or 4.11 or to stand-alone PC servers running Novell NetWare 3.12, 4.10, 4.11, or 5.0. A user can dynamically mount NetWare file systems over existing local file systems.
- **QNTC**: Windows NT Server file system. This file system provides access to data and objects that are stored on a server running Windows NT 4.0 or higher. It allows iSeries applications to use the same data as Windows NT clients. This includes access to the data on a Windows NT Server that is running on an Integrated PC Server.

  The QNTC file system can communicate with Windows NT servers. This includes a stand-alone server and any NTAP servers running in the domain. See *OS/400-iSeries Integration with Windows NT Server*, SC41-5439, for details.

  Note: The QNTC file system lets you share data with servers that can communicate using the Windows NT LM 0.12 dialect. The SMB server (iSeries support for Windows Network Neighborhood) does not use the Windows NT LM 0.12 dialect.
- **QOpenSys**: The open systems file system. This file system is compatible with UNIX-based open system standards, such as POSIX and XPG. Like the root file system, this file system takes advantage of the stream file and directory support that is provided by the Integrated File System. In addition, it supports case-sensitive object names.
- **QOPT**: The optical file system. This file system provides access to stream data that is stored on optical media.
- **QSYS.LIB**: The library file system. This file system supports the iSeries library structure. This file system provides access to database files and all of the other iSeries object types that the library support manages.
- **"root"** (/): The / file system. This file system takes full advantage of the stream file support and hierarchical directory structure of the Integrated File System. The root file

system has the characteristics of the Disk Operating System (DOS) and OS/2 file systems.

- **UDFS**: The user-defined file system. This file system resides on the auxiliary storage pool (ASP) of the user's choice. The user creates and manages this file system. Independent ASPs in V5R1 utilize the UDFS structure.

You can interact with any of the file systems through a common interface – commands, menus, displays, and APIs. This interface is optimized for the input/output of stream data, in contrast to the record input/output provided through the data management interfaces.

Note: The QNTC file system lets you share data with servers that can communicate using the Windows NT LM 0.12 dialect.

Features

- Support for storing information in stream files that can contain long continuous strings of data
- A hierarchical directory structure
- A common interface that allows users and applications to access not only the stream files, but also database files, documents, and other objects that are stored in the iSeries server
- A common view of stream files that are stored locally on the iSeries server, an Integrated Netfinity Server for iSeries, or a remote Windows NT server
- User applications can store and manipulate stream file sizes up to 256 GB in the root (/), QOpenSys, and user-defined file systems
- A set of 64-bit UNIX-type APIs and easy mapping of existing 32-bit UNIX-type APIs to 64-bit APIs.
- Threadsafe Integrated File System API interfaces to access objects in a multi-threaded job
- Text file I/O to convert between CCSIDs with characters of differing lengths
- PC created files (even read only files) can be managed through a command and API interfaces
- Copy whole sub-trees on the iSeries without using an interactive interface or user-written programming
- Pipes and First In First Out (FIFO) objects provide program to program communication through file system objects. The dev/null character special file can be written to forever, but is always empty when read. dev/null is useful for applications to discard output from sub-applications without changing the sub-application.

- Stream I/O support save files. This allows you to extract the contents of a save file through all sorts of methods, transport it through the network using stream file protocols and place it back into another save file.
- File system APIs support parameters and buffers in Teraspace for large I/Os
- Deadlock detection to help diagnose applications with conflicting lock ordering

Benefits

The Integrated File System offers the following benefits:

- Fast access to OS/400 data
- Efficient handling of stream data, including images, audio, and video
- A file system and directory base to support UNIX-based open system standards, such is POSIX and XPG
- File management through a common interface
- Consistent use of object names and associated object information across national languages

Extended Online Help and Support in OS/400

Ease of Installation, Use, and Maintenance

Operations Console

The iSeries supports a directly-attached, full-function 5250 PC console that includes a graphical control panel application. The user interface of the control panel application resembles its hardware counterpart. The console emulator application (PC5250) serves as the console “device” of the iSeries. The graphical control panel application permits remote entry of most of the functions supported by the hardware control panel mounted on the front of iSeries server units. Control panel functions such as power up/down, re-IPL, mode changes, etc. are supported.

The console and control panel applications can be used together or separately, but each requires its own direct cable attachment to an iSeries server. Each cable must be purchased separately from IBM for the iSeries model being used. Both cables are only available in a single length of 6 meters.

Operations Console: Remote Capabilities

The direct-attach Operations Console can also serve as a gateway for a remote, dial-in Operations Console. The remote Operations Console can also be configured to run the 5250 emulator application and/or the graphical control panel application. Both applications in

general make it possible to perform the majority of system operations tasks, for example back-up and recovery, with the iSeries servers and the managing staff in physically separate locations. The connection between the remote and direct-attach Operations Consoles uses Windows dial-up networking (PPP) with the direct-attach Operations Console using Windows NT Remote Access Service (RAS) for access.

See “iSeries Operations Console: Direct Attach, LAN, and Remote” on page 685 for details on Operations Console and cabling requirements.

Software Requisites

The applications are included on the iSeries Client Access for Windows 95/NT CD-ROM shipped with OS/400 V4R3 or later release. The Operations Console applications are installed and used on PCs using the Windows NT Workstation 4.0 or Windows 2000 (required for the direct-attach Operations Console when it serves as a remote console gateway) or Windows 95/98 operating systems. OS/400 V4R3 or later release is always required for direct and remote 5250 console attachment. However, the control panel application will function as a stand-alone application with any IMPI or RISC “black-box” system.

Menu Interface

System-supplied menus to most system functions provide a task- oriented approach so that a user unfamiliar with control language can set up and use Operating System/400. The menus use an object-oriented approach by providing list of objects for the user to work with. A fast path gives quick access to system functions for the more experienced users.

Online Help

The iSeries help facility provides comprehensive explanations of display functions to help users be more productive. The index search facility can be used to request help for a task that involves multiple displays. Index search includes many synonyms so that users may ask for information in their own words or in the terms used by the system. The help information provided is determined by the current location of the cursor on the display. It may be specific to a field or line on the screen, or to extended help on the use of the display as a whole.

Programming Temporary Fixes (PTFs)

PTFs (including licensed internal code changes) may be loaded and applied using a command. PTFs can be shipped to a central site, either on media or electronically, and may then be packaged and distributed to remote license sites, either on media or electronically. Starting with V4R3 AS/400 customers can download PTFs over the Internet. The client hardware needed is a PC with WIN95/NT, a TCP connection to the iSeries over a LAN, and access to the Internet. The various configurations and setup information are documented at the following Web site: `http://as400service.ibm.com`

Except for the medium of transport (Internet), the functionality and entitlement rules are the same as for the ECS method of transport.

System Detected Software Problems

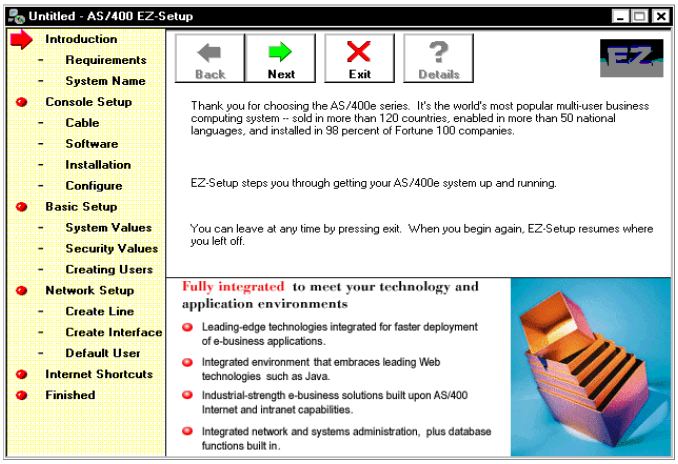
Symptom strings are automatically created by the OS/400 licensed program at the time an error occurs, thus making management of problems in the system easier and recovery quicker. The automatic generation of symptom string data improves in the rate at which customers can find appropriate fixes for problems. Problem resolution time is decreased when failure data is collected at the time of occurrence thus reducing the need for failure recreation.

GUI Setup

EZ-Setup

EZ-Setup code is delivered on a CD-ROM shipped with the iSeries server hardware. The code runs on a PC under Windows 95, Windows 98, Windows NT 4.0, or Windows 2000 and requires the Operations Console cable be connected to the host iSeries. EZ-Setup has three components:

- EZ-Setup Wizard
- Guided Setup
- The Next Step



EZ-Setup Wizard reduces both the number of decisions you need to make during setup and the amount of installation information you need to enter. The interface is all graphical. Guided Setup is a collection of HTML pages for the same tasks as those in the EZ-Setup Wizard. You read the information using a browser and enter iSeries commands to perform tasks. No green screens are presented to the user.

GUI and EZ-Setup – New with V5R1

The GUI interface delivers two times more advanced GUI function to iSeries customers than the previous release. Operations Navigator is significantly expanded in this release with industry leading integrated systems management via easy-to-use graphical interface.

Systems management function now delivered via easy to use Other ease-of-use initiatives for V5R1 include the addition of numerous GUI extensions to existing Operations Navigator functions, the creation of numerous configuration and administration wizards, and a new iSeries Information Center online documentation available on the Web or CD.

The functions of the EZ-Wizard are:

- Installs Client Access Express and components of Operations Navigator needed by EZ-Setup
- Sets the system name, date, time, and security values
- Creates security officer and system operator profiles
- Defines LAN connection for token-ring, Ethernet, or Integrated xSeries Server for iSeries adapter
- Starts TCP/IP and selected servers
- Creates Internet shortcuts on the desktop for iSeries 400 Information Center, Technical Studio, iSeries Home Page, iSeries Client Access, and iSeries Technical Support
- Installs the Netscape Navigator browser, if needed
- Configures Operations Console to be ready to use when EZ-Setup completes
- Performs initial NetServer configuration for Client Access, includes starting TCP/IP and setting the system and domain names for NetServer
- Gives the user the option to launch Operations Navigator by using a radio button
- Upgrade the path from twinaxial to Operations Console

In V5R1, EZ-Setup is extended to include:

- Installing and configuring Domino for iSeries
- Configuring LDAP service
- Configuring HTTP (using the Internet Connection Setup wizard)
- Installing Information Center
- Configuring the Extreme Support Connection

EZ-Setup now provides a complete set-up path for many users and allows one to go from out-of-box to serving a business in one quick and easy path. EZ-Setup is now a part of iSeries Client Access Express and is on the *Setup and Operations* CD-ROM (shipped with all orders).

Next Step is a set of HTML pages that you read and then perform the task. Topics include Exploring Operations Navigator, Setup Printing, Create User Profiles, Install Additional Software, Define System Cleanup Options, Create a System Backup and more. Use Next Step after the EZ-Setup Wizard or Guided Setup is complete.

The software requirements for the EZ-Setup Wizard include the Windows operating system and the Dial-Up Networking component Version 1.2 or later.

iSeries Internet Setup Wizard

Simplify the steps required to connect your iSeries server to the Internet and use application and Web serving. The wizard allows you to connect your iSeries server to an ISP over a dial-up connection or directly through a LAN connection. It can also connect your intranet iSeries server to the Internet through a firewall or router and allow for Web and application serving by the iSeries server over that connection. The wizard is organized around three common scenarios:

- Connect your iSeries server as a Web and application server behind a firewall and allow access to it from the Internet
- Connect your iSeries server as a Web and application server to a DMZ outside a firewall and allow access to it from the Internet
- Directly connect your iSeries to the Internet through a dial-up connection

To use all of the wizard's features, install the following options shipped with the operating system (5722-SS1):

- WebSphere 2.02 Standard Edition or WebSphere Standard Edition 3.02 (5733-AS2) or
- WebSphere 3.5 Standard Edition or WebSphere (5733-AS3)
- IBM HTTP Server

It is available in a V4R5 Client Access Service Pack.

Performance and Management

Availability and Recovery

Various functions are available to help maintain the availability of an iSeries server. These include:

- **System Managed Access Path Protection (SMAPP)**: Supports and automates the process of selecting which access paths should be protected. The system uses the EDTRCYAP value to estimate the amount of journaling to perform. The shorter the time in this value is, the more journaling takes place, which impedes system performance, but leads to shorter IPLs. The longer the value is, the longer the IPLs are. However, the impact of journaling on CPU and DASD utilization is less.
- **Uninterruptable power supply (UPS)**: Maintains power to the iSeries server during a site power loss.
- **Disk mirroring**: For the entire system or one individual auxiliary storage pool. If the entire system is mirrored, double the disk capacity is needed. Additional disk

controllers and placement of these controllers on separate buses can give even higher protection.

- **Journaling**: Provides the ability to record all changes to records in a file as they occur. These journaled changes are applied to the file if the system is lost. With the implementation of remote journals, this protection can be extended to cover access paths to provide faster recovery of access paths in the event of an abnormal system termination.

  A single application may access files logged to multiple journals. If the transaction adjusts data in several journal receivers, two-phase commitment control is employed to synchronize the information located in all receivers. If only files from a single receiver are used during the execution of the transaction, the commitment cycle focuses only on that journal with a single-phase commitment.

  In V5R1, journaling has been enhanced for high availability, with the addition of byte stream file and the ability for directories to be journaled. This allows a customer to use third-party software to provide replication on an other iSeries server or to use the journaled information for other recovery and monitoring purposes.
- **Commitment control**: Ensures that if a transaction requires multiple database changes, all of them (or none of them) are made. A single transaction may involve several database changes. Use of commitment control allows the application program to treat all changes for a transaction as a single group – to be either committed in the event of normal completion or backed out in the event of abnormal completion. An application programmer can easily provide for recovery at a transaction boundary using HLL statement to request commitment or rollback. Commitment control requires journaling.
- **Save-While-Active (SWA)**: Allows one or more libraries to be saved while operations, including changes, continue against the libraries. During a short period of quiesced operation, a checkpoint is taken of all libraries being saved before the first save operation begins, so that all libraries are synchronized.
- **RAID-5 disk protection**: Can be implemented with the use of a disk controller and at least four disks to make up an array.
- **Save/restore to multiple tapes concurrently- Parallel Save/Restore**: The SAVLIB, RSTLIB, SAVOBJ, RSTOBJ, and SAVCHGOBJ commands and the QSRSAVO API support using multiple tape devices, or multiple resources in a tape library, in parallel. This support reduces the amount of time required to save and restore very large objects. Previously, the maximum save rate for large objects was limited to the maximum throughput capabilities of a single tape device. By using multiple tapes in parallel, the maximum throughput can be increased and time-to-save is reduced, especially for very large objects. Recovery from this set of parallel save tapes is most efficient when the same number of tape devices is used on the restore as on the save (from two to 32).

- **PTF performance improvements**: The amount of time required to load and apply program temporary fixes (PTFs) is reduced. Only program objects and service program objects that have changed as a result of the PTF are replaced. Objects that were on the system as a result of a superseded PTF are bypassed.
- **Large capacity disk load balancing**: The ability to balance data across disk arms in an ASP, based on performance, is provided in V4R4. The disk load balancing function identifies hot data versus cold data and spreads data across the disk arms to balance utilization accordingly. Disk load balancing also provides the ability to balance data across disk arms in an ASP, based on capacity. Data is spread across arms so each arm average utilization is the same percentage. This is especially useful when disk arms are added. The ability to move low access data to slower, high capacity disk arms within an ASP (for example, compressed disk) is provided as well. This involves identifying hot versus cold data and moving the cold data to slower disk. Specific data can also be targeted to move to a slower disk. These functions are controlled with CL commands (no GUI interface).
- **Teraspace storage**: Each iSeries job has up to 1 TB of contiguous, process-local, temporary storage. Applications can allocate dynamic storage in excess of 16 MB using C dynamic storage functions (malloc, calloc, realloc, and free) and the POSIX shared memory APIs.
- **Expert Cache**: Provides a disk cache tuner option, which allows the iSeries server to take advantage of available main storage capacity. It dynamically responds to system jobs to cache pages of data in main storage to reduce the time to process disk I/O.
- **Auxiliary storage pools (ASPs)**: Are individual disks reserved for particular objects (like individual libraries), which can be used to isolate those objects to assist in their recovery. Up to 15 user ASPs allowed. All systems ship with one system ASP configured.
- **Independent auxiliary storage pool (IASP)**: New with V5R1, IASP can be defined that can be moved from one iSeries server to another. User Defined File Systems (UDFS) can be created in these IASPs. When the IASP is moved from one system to another, the UDFSs on the IASP can then be mounted on the new system and made available to applications and users. This protects customers from hardware failures other than hard disk failures of the IASP.
- **Integrated Hardware Disk Compression**: Compression of data on disk is supported by OS/400. Data is dynamically compressed and uncompressed by the DASD controller as data is written to and read from disk. Disk compression does not effect the main CPU utilization since this function is performed by the DASD controller IOP. Integrated Hardware Disk Compression is supported by select DASD controllers. Compression is limited to user ASPs only. The system ASP cannot be compressed. Most data compresses at a 20 to 40% reduction. The compression reduction and subsequent impact on DASD performance depends on the attributes of the data.

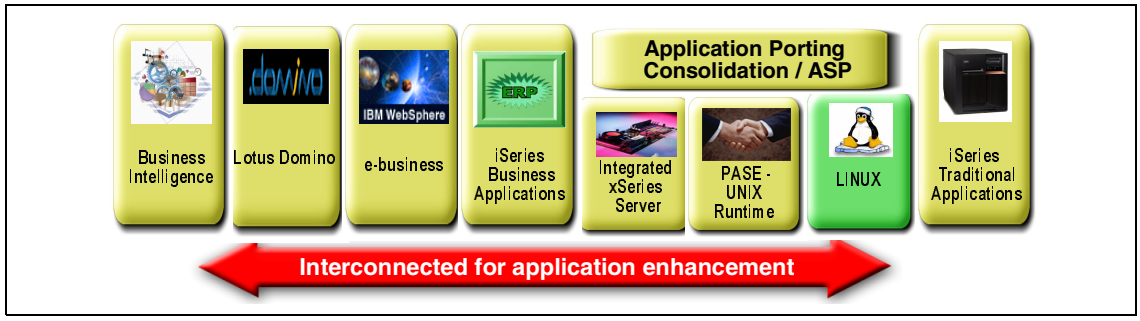
- **Hierarchical Storage Management**: OS/400 includes Hierarchical Storage Management (HSM) APIs used by Backup and Recovery Media Services for iSeries (BRMS), 5722-BR1, to provide HSM functions. Use these APIs to develop custom HSM applications.
- **Concurrent DASD maintenance**: Is supported on an appropriately-configured iSeries 9406 mirrored, mixed mirrored, and device parity protected systems. With a proper configuration, the system can operate successfully while experiencing a DASD failure and subsequent repair action. Diagnosis and repair may require active mirrors to be temporarily suspended.

  Some users may prefer to defer maintenance until all normal operations are completed. In some conditions (for example an IOP failure), the repair action requires that the system be powered off.
- **Concurrent maintenance** (as of V4R3): Included for I/O cards, power, and other components contained in expansion towers. You can power off an expansion tower and add, remove, replace, upgrade, move, or swap a card or other component without stopping or powering off your system.

  Applications that use hardware resources in that expansion tower may need to be stopped and restarted. When the expansion tower is powered back on, new or changed hardware resources are automatically recognized and associated with existing resource names, if appropriate, to preserve existing configuration information and to allow applications to immediately use these resources without having to IPL.
- **Concurrent maintenance and hot swap capability** (with 2xx or 8xx hardware with V4R5): Hot swap capability allows the operator to identify IOPs and associated IOA cards and turn individual or groups of slots off for concurrent maintenance of PCI cards.

Logical Partitions (LPAR)

Logical Partitioning enhances the role of the iSeries as a consolidated server. LPAR is of value to customers who need server consolidation, business unit consolidation, mixed production, and a test environment, as well as integrated clusters. With LPAR, companies have both the power and flexibility to address multiple system requirements in a single machine to achieve server consolidation, business unit consolidation, mixed production/test environments, and integrated clusters.



Logical partitions are ideal for companies that want to run mixed interactive and server workloads in a single iSeries. Logical partitions allow the interactive performance of an iSeries to be flexibly allocated between partitions. OS/400 is licensed once for the entire system by its normal processor group, regardless of the number of partitions. License management across partitions is supported.

Set each partition's system values independently. Partitions have different system names and may have a different primary/secondary national language, or be operated using different time zones. This flexibility is ideal for banks and other multinational companies to centralize operations in a single location yet retain the national characteristics of each system.

LPAR allows for the simultaneous running of multiple independent servers — each with its own or shared (V5R1) processors, memory, and disk — within a single iSeries. Some functions of LPAR are:

- Updates to Software Licensed Management (SLM) APIs allows customers and business partners to monitor usage counts across the system rather than each partition.
- An maximum number of partitions of 24 with V4R5 on the 8xx server models.
- Improvements in power management to minimize abnormal IPLs of secondary partitions when the primary partition initiates a system power down.

LPAR – New with V5R1

LPAR in V5R1is significantly enhanced to allow dynamic movement of processor, memory, and interactive performance between partitions. Up to four OS/400 V5R1 partitions per processor with a maximum of 32 partitions is supported.

New capabilities applying to Models 8xx, 7xx, 6xx, and Sx0 include:

- Dynamic movement of processor, memory, and interactive performance between partitions running OS/400 V5R1

- Innovative Virtual LAN support to establish multiple high speed TCP/IP communication connections between partitions without additional communication hardware
- Multiple OS/400 versions (V4R4, V4R5, and V5R1) within a partitioned environment on appropriate systems
  - **8xx SStar**: Primary V5R1, secondary V4R5 or V5R1
  - **8xx iStar**: Primary and secondary V4R5 or V5R1
  - **6xx, Sx0, and 7xx servers**: Primary and secondary V4R4, V4R5, or V5R1
- Linux is now supported in a logical partition
- Virtual LAN support establishes multiple high speed TCP/IP communication connections between partitions. Additional communication hardware is not required.

Capabilities applying to 270 and 8xx models and V5R1 only include:

- Granularity of processor movement reduced to 1% of each processor
- Support for up to four OS/400 V5R1 partitions per processor, up to a maximum of 32 partitions.
- Extension of partitioning support to select iSeries Model 270 and 820 uniprocessors
- Operations Navigator support to create and manage partitions including scheduled movement of resources
- OptiConnect is supported over HSL

Creating and managing secondary partitions is performed from the primary partition. Releases supported in a logical partition are shown in this table.

Supported Processors	Primary Partition	Secondary Partition			LINUX
		V4R4	V4R5	V5R1	V5R1
n-way 6xx, 7xx, Sxx	V4R4	yes	yes	yes	no
	V4R5	yes	yes	yes	no
	V5R1		yes	yes	no
270 Processors #2253, #2224, #2431, #2432, #2434, #2452, and #2454	V5R1		yes	yes	yes / shared processor
1 way 8xx Processors #2395, #2396, #2425	V5R1			yes	no

Supported Processors	Primary Partition	Secondary Partition			LINUX
		V4R4	V4R5	V5R1	V5R1
820 Processors #2397, #2398, #2426, #2427 830 Processors #2400, #2402, #2403, #2351 840 #2418, #2420, #2416, #2417, #2419	V4R5		yes	yes	no
	V5R1		yes+	yes	yes / dedicated processor
820 Processors #0150, #0151, #0152, #2435, #2436, #2437, #2438, #2456, #2457, and #2458 840 Processors #2461, #2352, #2353, and #2354	V5R1		yes+	yes	yes / shared processor
Note: All partitions must be at V5R1 to support processor sharing and dynamic movement of processor resources.					

Virtual LAN – New with V5R1

Virtual LAN is new with OS/400 V5R1. Virtual LAN provides 16 independent high speed internal bus-to-bus communication paths between logical partitions and supports TCP/IP protocol. Additional communication hardware is not required.

Virtual LAN provides the additional granularity to set up high speed communications between partitions by being selective on which partitions or applications within that partition are allowed to communicate with other logical partitions on the system. More importantly, it allows high speed bus to bus communication between OS/400 partitions and Linux partitions. It is possible to select multiple communication paths between partitions and potentially ties in each of these paths to a specific application.

The enablement and set up of Virtual LAN is easy and does not require an IPL or any special hardware or software. Once a virtual communication port is enabled for a given partition, a communication resource (CMNxx) is created for that partition. The user can then create a high speed 1 GB Ethernet line description over this resource and set up TCP/IP configuration appropriately to start communicating to another partition. A maximum of 16 virtual ports can be enabled for high speed communications per partition.

Virtual LAN does not require any additional software or hardware. It provides the capability for multiple communication paths between applications that are executed in each of the partitions.

Suggested Reading

For additional information on Logical Partitioning, see:

`http://www.ibm.com/servers/eserver/iseries/lpar`

Multiple Operating Environments

System/36 Environment

Most System/36 applications can run on the iSeries server using the System/36 environment. When running in the System/36 environment, all of the following options can be executed:

- IBM supplied procedures, as found on the System/36, such as BLDFILE, SAVE, and RESTORE
- Operation control language (OCL) statements, such as // LOAD, // FILE, and // RUN
- Procedure control expressions (PCE), such as substitution expressions and IF conditional expressions
- System/36 operator control commands, such as CHANGE, STATUS, and JOBQ
- System/36 RPG II and COBOL programs after they are compiled on the iSeries server

OS/400 supports a set of commands designed to migrate data between the System/36 and the iSeries server or the iSeries server and the System/36. These commands save and restore library source, procedure members, and data files between the two systems. A separate licensed program, IBM AS/400 System/36 Migration Aid (5727-MG1), is available on the System/36 to assist in migration from a System/36 to the System/36 environment on an iSeries server.

System/38 Environment

The System/38 Environment provides for:

- Migration from System/38 systems
- Intermixing of System/38 and iSeries functions
- Maintenance of System/38 applications on the iSeries server

The System/38 Environment allows the execution of most programs written for a System/38 system. The same job can execute any combination of iSeries or System/38 programs. The programmer menu on the iSeries supports source types to enable the identification of System/38 syntax. The programmer can maintain either iSeries or System/38 programs during the same job. Compilations of programs to be distributed to System/38s must be done on a System/38. A separate licensed program, IBM AS/400 System/38 Migration Aid (5714-MG1), is available on the System/38 to assist in migration from a System/38 to the System/38 environment on an iSeries server.

Linux for iSeries

IBM is committed to supporting your choice of platform and operating systems – a commitment now extended to include Linux, the open-source operating system. Linux enables a new stream of e-business applications to complement the strengths of the iSeries

as an integrated core business solution. Linux inherits important strengths and reliability features of the iSeries architecture.

OS/400 is enhanced to support Linux running in a secondary logical partition. The primary partition must run OS/400 V5R1 and can support up to 31 Linux partitions, depending on the iSeries model.

Selected new processor features for iSeries Model 270, 820, and 840 servers, allow Linux to run in a shared processor pool, where one processor can be shared between four OS/400 and Linux partitions.

The iSeries Logical Partition capability (LPAR) gives you the flexibility to move processor and memory resources between Linux partitions. This movement requires a restart of the affected Linux partitions. On existing n-way processor features for iSeries Model 820, 830 and 840 servers, Linux requires a minimum of one processor per Linux environment.

The Linux environment on iSeries supports two types of I/O: virtual and direct. A Linux server in a partition can take advantage of both virtual and direct I/O. A Linux partition can use the Virtual LAN capability to establish multiple high-speed TCP/IP connections between logical partitions without additional communication hardware.

With Virtual I/O, the I/O resources (disk, tape, CD-ROM) are owned by an OS/400 partition. OS/400 shares the resources with Linux. The partition sharing the resources is called the host. The host does not have to be the primary partition.

One partition can be the host for multiple Linux partitions. The shared resources are under OS/400 management. For example, disk space is allocated from OS/400's disk drives for Linux to use.

OS/400 provides the RAID protection and some backup/restore facilities for the Linux environment. Virtual I/O takes advantage of the technology used with the Integrated xSeries Server. The Network Server Description has been enhanced to support Linux in a similar way. For example, Linux is started with a vary on command of the NWSD and stopped with a vary off command.

The Virtual I/O devices supported include disk, tape, CD-ROM and DVD. With disk, space owned by OS/400 is reserved for Linux. iSeries disk and removable media devices can be configured for Linux partitions using the OS/400 Network Server Description (NWSD) commands to provide a simple, flexible, and integrated storage solution.

With Direct I/O, the devices are owned by Linux. OS/400 does not see the devices and can not directly use them. Specific iSeries I/O adapters are supported in Direct I/O environment. Specific Ultra SCSI 2 Adapters for Disk, Tape, CD-ROM, and DVD connections are supported. In addition the iSeries 1 Gb Ethernet adapter, the 10/100 Mb Ethernet adapter, and the token-ring adapter are also supported. Since Linux does not support IOPs, they are

not used with Direct I/O. The iSeries configurator supports ordering IOAs without IOPs when a Linux partition is defined.

The Linux console is a PC connected to the iSeries primary or hosting partition via a TCP/IP LAN. Operations Console with LAN Connectivity, part of Client Access Express, is required to establish a secure connection to OS/400 V5R1. A Telnet environment is then used to connect into the Linux environment through the Virtual LAN. The console is used for installation and problem determination operations. There is no console adapter in the Linux partition.

To enable Linux to run on iSeries, IBM uses open source 32-bit kernel version 2.4 for PowerPC. Linux for iSeries is available directly from Linux distributors. IBM is currently working with:

- Red Hat, Inc.
- SuSE Linux AG
- TurboLinux, Inc.

Suggested Reading
For additional information about Linux, refer to the following Web page:
`http://www.ibm.com/eserver/iseries/linux`

iSeries ODBC Driver for Linux

Linux programs written to the ODBC interface are able to access iSeries database data via ODBC driver for Linux. The ODBC driver is called to carry out database requests. These requests are sent to the iSeries for processing via the database host server over an IP connection.

Highlights of ODBC connection include:

- The Linux ODBC driver conforms to ODBC 3.5 specifications.
- The iSeries ODBC driver for Linux connects to OS/400 V4R5 and later.
- The driver is tested and supported only for the versions of Linux that can install in an iSeries LPAR partition.
- The driver communicates with the iSeries via existing OS/400 host servers.
- Beta test code is scheduled to be available in the fourth quarter 2001. An English version is planned to be available in the first half of 2002. Both will be supplied as downloads on the Web.

Clustering

Prior to V4R4, the iSeries server offered multi-system coupling that provided peer or tiered node clusters, constructed by ISVs using distributed data management and journaling. The

customer separately managed the systems in the cluster. Database replication was provided by high-availability business partner solutions.

V4R4 introduced iSeries Logical Partitioning (LPAR) to enhance the role of the iSeries as a consolidated server. With LPAR, companies have both the power and flexibility to address multiple system requirements in a single machine. LPAR is of value to customers that need server consolidation, business unit consolidation, mixed production, and a test environment, as well as integrated clusters.

iSeries clustering takes a major step forward with the introduction of Cluster Resource Services as part of OS/400 V4R4 (APIs). The complexity of managing systems in a cluster and keeping track of data and applications is handled by OS/400. Protecting your business from unplanned and planned outages, as well as site loss disasters, is easier than ever before. Cluster management and enhanced data resilience applications, both provided by high-availability business partners, complete the total solution.

iSeries clusters enable you to set up an environment to provide availability approaching 100% for your critical applications and your critical data. iSeries server high availability business partners and ISVs complete the solution with easy-to-use cluster management, robust data resiliency, and resilient applications that take advantage of the new technology.

Cluster Resource Services consists of an open set of APIs that provide cluster facilities. iSeries application providers and customers use the APIs to enhance their application availability and to create, configure, and administer the cluster. Systems are defined into the cluster as cluster nodes. Communication interface addresses are defined to form the cluster node-to-node interconnection links. Resilient resources (objects replicated to one or more nodes) are associated with a Cluster Resource Group (CRG) so they can be managed as a single unit.

Two types of CRGs are supported: one for data resilience and one for application resilience. Data CRGs provide the control to switch the point of access for a set of data to a backup node that maintains an exact replica of that data. Application CRGs control switching an IP address representing the application server to a backup node and restart the application in the event of a primary node failure.

Cluster Resource Services include integrated facilities such as heartbeat monitoring, reliable message delivery, switch-over administration, and distributed activities. The services are built on a robust cluster topology and messaging functions to keep track of each node in the cluster and ensure that all nodes have consistent information about the state of cluster resources.

Heartbeat monitoring ensures that each node is active. When the heartbeat for a node fails, the condition is reported so that the cluster can automatically failover to the resilient resources on the backup node. System Services for high availability solutions are enhanced

with real-time recording of IFS stream file changes into journals. Data resiliency applications can use this function to provide enhanced support for this class of objects.

IBM has worked closely with the high availability business partners to provide easy-to-use cluster management applications. DataMirror, Lakeview Technology, and Vision Solutions intend to announce their own initiatives for products that take advantage of the cluster resource services and Integrated File System stream file support.

iSeries clusters support up to 128 nodes. Use any combination of the existing OptiConnect WAN and LAN connectivity options to build the cluster. These options include:

- OptiConnect hardware, fully supported as an orderable system feature, is an attractive connectivity method for high-end and mid-range models.
- ATM provides a high-performance connection to remote systems in the cluster.
- Ethernet and token-ring LANs are ideal for connecting low-end iSeries models into the cluster.

All systems are managed from a single workstation containing the high-availability business partner cluster management application. Install OS/400 V4R4 or higher on each node in the cluster.

Cluster Resource Services – New with V5R1

Additional significant functions are provided with V5R1 that allow even more flexibility and improved availability. Capabilities include:

- **Independent Auxiliary Storage Pools (iASPs)** allow you to take data offline and bring data online independent of the System ASP and other User ASPs.
  - System services in support of Option 41, HA Switchable Resources, allows you to use resilient device cluster resource groups containing Independent ASPs.
  - IBM Cluster Management Utility allows you to create and manage a simple two-node, switched disk cluster.
  - HSL OptiConnect is supported as a cluster communications fabric (in addition to what was previously supported).
  - Options to adjust the tuning and configuration parameters of your cluster to better match your communications environment.
  - Journaling of IFS objects, data areas and data queues, and options to reduce the amount of data journaled.
- **High Availability Switchable Resources, OS/400 (option 41)**, a chargeable option of OS/400, provides the capability to achieve a highly available environment using switchable resources. The resources are physically switched between systems so that only one copy of the resource is required.

GUI Management and Administration

Performance Collection and Evaluation

Users can manually collect system performance data for a single time period or automatically collect data on a weekly schedule using a set of commands/menus. This systems management function provides data to assist the user in workload scheduling, system tuning, performance reporting, performance problem analysis, and capacity planning. The user can also work with this data using the Performance Tools/400 licensed program (5722-PT1).

Job Accounting

OS/400 supports multiple levels of job accounting and captures job-related information through the assignment of account codes to users. The accounting information on defined units of work is recorded in a journal receiver and can be accessed and processed by user-written programs.

Work Management

The work management function of OS/400 eases the job of systems management by giving the operator control of the activities of a job and of its performance characteristics. Work management supports concurrent execution of batch jobs, interactive jobs, and non-conversational transactions on the system. Each job is protected from other jobs on the system; however, job-to-job communication is allowed.

The system can be setup to dynamically adjust the execution priority of jobs that are forced to wait for an opportunity to use the CPU. This configuration is designed to prevent high priority jobs from monopolizing the CPU at the expense of all other jobs in the system.

Save/Restore

Save is the capability of making a backup copy of objects or members on tape or online save file. Restore is the capability to copy saved objects back to the original or a different system. Objects saved on V5R1 systems can be restored on V4R3, V4R4, and V4R5 systems.

“Save while active” enables objects to be saved while they are being used by applications. The system ensures the object saved to save media is consistent with the status of the object when the save operation is initiated.

iSeries Control Language

iSeries Control Language (CL) provides a consistent single interface to all system functions. Most commands can be executed both interactively and in a compiled CL program. CL programs provide a high degree of function in that they allow the use of variables, error handling, and access to the database. Therefore, a programmer can tailor solutions using system functions without the end user or operator seeing what is executed. The control

language provides rich function and a consistent set of terminology and syntax. User-written commands can also be created. Most commands can be executed interactively, in a compiled CL program, or in a high-level language program.

The ease of use for CL and its rich function make it a productivity aid for programmers. CL programs allow the use of variables, error handling, and access to the database. Programming functions include reading and writing to a display or database file, IF/THEN/ELSE logic, calling or being called from another program, and so on.

Data Description Specifications (DDS) are used to describe attributes of display, printer, database, and Intersystem Communications Function (ICF) files. These file descriptions can then be used in high level language programs.

Graphical (GUI) Management of System

Operations Navigator and Management Central run on a Windows NT 4.0 or Windows 2000 client. It provides a graphical user interface for most administrative and configuration tasks on the iSeries, and a Central Management point to manage distributed iSeries servers. Performance is monitored graphically.

Extreme Support Through Personalization (ESP)

An important aspect of technology is technical support to help make that technology work for us as people. In our increasingly Web-based world, we look for easier access to total solutions.

IBM has expanded its Extreme Support through Personalization (ESP) initiative to include more easy-to-use, proactive and personalized tools. ESP features and functions for the iSeries include:

- Management Central-Pervasive for remote management of servers
- Easier access to IBM e-Server technical support Web sites
- IBM Electronic Services for iSeries
- Universal Connection: ECS over TCP/IP
- PM400e Integrated with Work Load Estimator
- Physical Device Placement Assistant (PDPA)
- Software Inventory Utility (SIU)
- iSeries University
- Personalized Web Pages

Management Central-Pervasive

Management Central-Pervasive allows network administrators to monitor the performance and status of their iSeries servers while away from their workstation or office. Using a cellular phone or PDA with a wireless modem, the administrator can check on iSeries server status and monitor performance metrics on these systems. This function also runs from a Web

browser running on PCs or Network Stations. For information on which PTFs provide this functionality, see: http://www.ibm.com/servers/eserver/iseries

System Management

OS/400 system management functions include Simple Network Management Protocol (SNMP) APIs and access to additional management information. The SNMP APIs for managing applications have the ability to manipulate management data via local or remote SNMP agents. Information can be retrieved from systems on SNA or TCP/IP networks, therefore making it easier to discover and manage potential problems anywhere within the network.

Electronic Customer Support

Electronic Customer Support (ECS) is an integrated approach to help users service and support single or complex systems and networks. It is menu-driven and supported by online help text. ECS includes functions available locally, with access to remote marketing support systems and IBM service support.

Simplicity and ease-of-use characteristics mean that configuring and supporting systems requires limited data processing knowledge or experience. Electronic customer support enables third party software and support organizations to support systems and networks from a central site, providing business solutions and partnerships to maintain service and support to IBM iSeries customers. Systems management capabilities of ECS include:

- Resource management and configuration management
- Problem management, network management, and change management
- Online and remote technical support
- Electronic hardware and software service support
- Remote marketing support
- Universal Connection

The ability to run Electronic Customer Support (ECS) over TCP/IP is available using the integrated high-speed V.90 modem. This includes electronic fix retrieval and problem reporting. In addition, IBM remote support over a dial-up connection using the integrated high-speed V.90 modem is enabled. This includes making available CL commands for creating simple point- to-point configurations to aid in connecting to IBM Support and for customer use as well. For the PTFs required to enable these functions, see: http://www.ibm.com/servers/eserver/iseries

A standard V.24 communications line is included with all iSeries servers. A chargeable cable and modem are required to enable customers to sign on to remote systems for support from Business Partners or IBM. If a hardware or software problem arises, PTFs can be downloaded to the iSeries server to assist in problem determination and resolution. The line can also be used for IBM Electronic Service Agent for iSeries, where the iSeries server

initiates a call to an IBM service center at a prearranged time for its error logs to be checked and to enable service actions to be taken. This often occurs before the customer is aware of the existence of a problem.

Internet PTFs

iSeries customers can download PTFs over the Internet. The client hardware needed is a PC with Windows 95 or Windows NT, a TCP connection to the iSeries server over a LAN, and access to the Internet. Selected configurations and set up information is documented on the Web at: `http://www.as400service.ibm.com`

Except for the medium of transport, the functionality of PTF download over the Internet is the same as the ECS method of transport. The user selects the PTFs and options using a Web browser and submits the order. At the iSeries service Web site, the user can also search for and read PTF cover letters before the order is placed. The same entitlement rules that apply on the ECS connection are enforced. In other words, if a user can acquire PTFs electronically with ECS, they can acquire PTFs over the Internet.

Application Programming Interfaces (APIs)

There are hundreds of OS/400 APIs that provide access to functions and data not available through any other interface, or levels of performance not available through other interfaces. These CALL-level interfaces are intended for use by independent software vendors and IBM Business Partners whose applications require these functions and data. A complete list is in *System API Reference*, SC41-5801.

Unix APIs

The iSeries server provides support for source code portability of many OS/2, DOS, Windows NT, and UNIX-based applications. OS/400 supports over 70% of the POSIX 1003.1 APIs. BSD Sockets, TCP/IP and UNIX Spec 1170 support improves UNIX C portability to the iSeries.

Unlabeled ¼ inch and 8mm tape media is supported. This enhances application program distribution and data interchange on the iSeries server. The tape media is compatible with POSIX, XPG, and UNIX support.

- **Pthread APIs**: Allow IBM Business Partners or iSeries application developers to take advantage of new system support for kernel threads. Pthread APIs significantly enhance the ability to write large server or high performance parallel applications.
- **Procedures Language 400/REXX**: Is implemented within OS/400. REXX is designed to facilitate the writing of clear, structured, and interpreted procedures.

Extensive Run-time Application Function

Operating System/400 is a functionally-rich platform for applications. Because it is enabled to run a wide range of applications, customers can easily grow their application base as their business needs grow. The extensive run-time function integrated into the OS/400 licensed program enables application programs created with these languages, utilities, and support:

- ILE RPG for iSeries
- RPG/400
- IBM System/36-Compatible RPG II
- IBM System/38-Compatible RPG III
- ILE COBOL for iSeries
- COBOL/400
- IBM System/36-Compatible COBOL
- IBM System/38-Compatible COBOL
- ILE C for iSeries
- SAA AD/Cycle C/400
- System C/400
- VisualAge C++ for iSeries
- AS/400 BASIC
- AS/400 Pascal
- AS/400 PL/1
- RM/COBOL-85 for the AS/400

The corresponding licensed programs are not required for systems executing the code.

Threadsafe Functions and Facilities

The database definition language (DDL) APIs, CL commands, and SQL DDL are threadsafe. You can create or delete tables and add or remove members in a multi-threaded program. DDM files using TCP/IP are also threadsafe. User-defined functions (UDF) use threads as part of their implementation.

The QSYS.LIB, QOPT, and QLANSRV file systems are threadsafe. All objects that reside in those file systems can be accessed from within a multi-threaded application. ILE COBOL runtime is threadsafe.

Client Server Support

iSeries server resources are available to extend resources and solutions to PC clients. The PC client/server products are supported to work with iSeries server resources.

iSeries Support for Windows Network Neighborhood (iSeries NetServer)

iSeries support for Windows Network Neighborhood allows personal computers running Windows 2000, Windows NT, Windows 98, and Windows 95 software to seamlessly access

data and printers managed by the iSeries server. Any data available through the iSeries Integrated File System (including database, stream files, and CD-ROM) and any output queues on the iSeries server can be shared with the network by the iSeries server administrator. No additional software is required on the personal computer.

It takes advantage of the native file sharing protocol using TCP/IP, delivered with Windows 95, Windows 98, Windows NT or Windows for Workgroups. No additional software is required on the iSeries server other than the OS/400 operating system.

Richer client functions are provided by iSeries Client Access Family for Windows (5722-XW1). This support allows the Client Access program to be installed across the network from the iSeries server. The iSeries Client Access and iSeries NetServer programs have separate identities and can coexist on the same server and workstations.

iSeries Support for Windows Network Neighborhood program complies with the “Common Internet File System” (CIFS) standard currently proposed by Microsoft.

iSeries Client Access Express for Windows

iSeries Client Access Express for Windows (5722-XE1) is shipped with OS/400 V4R4 and later. The Express client runs on PCs installed with Windows 98, Windows NT 4.0 (workstation or server) operating systems, or Windows 2000. It provides:

- TCP/IP connectivity with secure sockets layer (SSL) for client functions to improve TCP/IP network security
- iSeries NetServer for PC file serving and network print support
- Operations Console for both local and remote system console access
- 32-bit client/server application enablers for iSeries, such as OLE DB data provider, ODBC driver, Remote Command, and data queues

The Express Client includes all functions of Operations Navigator for working with iSeries resources and administering and operating iSeries servers, plus graphical interfaces to work with these iSeries.

When you acquire an iSeries Client Access Family for Windows product (5722-XW1), these functions and PC5250 display and printer emulation and data transfer are also available.

National Language Versions and Multilingual Support

The iSeries server with OS/400 is a worldwide product that addresses many country-unique requirements. For different countries/languages, specific support is provided, either with translated machine-readable information (MRI), such as screens and messages, or with keyboards and displays on the local or remote workstation twinaxial controller.

Multilingual support allows multiple users on the same system to operate in different languages. This means that system messages, displays and help information, as well as user applications, can be presented to the end user in their national language.

Note: Not all licensed programs are translated into all languages, nor are all national language versions available from all program release support centers.

Information about Secondary National Languages

The national language in which licensed programs are ordered is considered the primary national language. Any other languages are secondary languages. Users can switch among the languages as necessary. Multiple NLVs can be installed on a single iSeries server. Regardless of the NLV, all system commands are in US English. Therefore, a single set of system commands works in all national language environments.

Universal Coded Character Set Support

Many customers do business in a worldwide environment. It is too costly and time consuming to redesign and rewrite an application to support users in another national language or culture. These applications require the ability to store and process character data from more that one national language.

For example, a database file may need to contain customer names in English, German, Greek, Arabic, Japanese, and Thai characters. This capability must be available in a client/server environment and in a network of heterogeneous systems that exchanges character data via customer applications.

The Universal Coded Character Set (UCS) is an emerging global character encoding, developed jointly by the industry (UNICODE 1.1) and the International Organization for Standardization (ISO). ISO/IEC 10646-1 defines a code page (UCS-2) encompassing the characters used by all currently significant languages, a rich set of scientific and publishing symbols, and a variety of script languages. This common code page spans the character sets of many languages. It can ease application development and management issues historically found in multiple code page system environments and networks. This capability is provided in OS/400 with the UCS2 Level 1 support for database to permit characters of any national language to “coexist” in database files.

Locale Support of Cultural Values

“Cultural values” change from one national language to another. Examples of cultural values are:

- Date and time format
- Currency symbol
- Sort (collating) sequence

Locale support allows for the creation, deletion, and access of locale-based information. C-applications can access locale information via C-runtime functions. Non-C applications can retrieve locale information via APIs. OS/400 simplifies the tasks that an application must perform to provide local cultural values. This support can be used whether an National Language Version (primary or secondary) is installed for that language on the iSeries.

Bidirectional Language Support

Bidirectional Language Support (BIDI) is a series of routines to transform the physical order of characters to a logical order. Culturally correct BiDi language support requires that the flow of text, left to right or right to left, be determined by the character entered or displayed at the workstation or printer device. However, the data must be stored in DB2 UDB for iSeries (or any file system) in the sequence the characters are entered, and not how they are displayed.

Euro Currency Support

OS/400 V4R5 includes Phase II of euro currency sign support. Phase I of euro currency sign support was included in V4R4 and previous releases. Phase I is for countries that use a Latin 1-based alphabet, which primarily included the countries in the European Monetary Union (EMU). Phase II is for those countries currently supported in the iSeries national language structure who are outside the EMU and whose national standards bodies have approved the appropriate standards. Examples are Japan, Poland, and Turkey.

IBM considers an IBM product to be Euro Ready if the product, when used in accordance with its associated documentation, is capable of correctly processing monetary data in the Euro denomination and of respecting the euro currency formatting conventions (including the euro sign). This assumes all other products (for example: hardware, software, firmware, etc.) with the IBM product are also Euro Ready.

IBM considers a solution to be Euro Ready when the solution providers have analyzed the euro requirements, including the need to comply with relevant EC rules, and built-in appropriate function accordingly.

OS/400 can input, display, print, and process the euro currency sign for both the host and PC client computing environments. This support includes, but is not limited to:

- Operating system and LPP changes that are transparent to the user.
- Euro country extended code pages (CECPs) and CCSIDs.
- Euro keyboard types, including device configuration and device controller changes.
- Euro font and glyph support.

All current IBM iSeries printers and many withdrawn IBM iSeries printers have been enhanced to support the euro currency symbol. Updates to external display, print, and client functions may need to be obtained from other vendors to support Euro currency.

As part of continuing globalization enhancements to facilitate data interchange with other industry-standard operating systems and link to current technologies like XML and LDAP, the QlgTransformUCSData API is added to convert data from the Unicode encoding form UCS-2 to Unicode encoding for UTF-8 and vice versa. A Code Character Set ID (CCSID) of 1208 is added to support UTF-8.

For the latest available information and a roadmap to euro currency sign support on the iSeries server, go to: `http://www.ibm.com/servers/eserver/iseries/euro`

Programs within OS/400

The programs in the following table are part of OS/400. Each automatically ships with OS/400 automatically. They do not need to be ordered separately. However, they each appear within the iSeries Software Resources and Licensed Program menus as separate products.

Refer to “Referenced Lists” on page 789 for a list of all OS/400 options available at V5R1.

Product Name	Product Number	For Further Information
Universal DB2 for iSeries	n/a	“IBM Licensed Programs: Database Accessories” on page 509
Integration with Windows Server	5722-WSV	“iSeries Integration with Windows Server (Base 5722-SS1 as 5722-WSV)” on page 490
TCP/IP Connectivity Utilities for iSeries	5722-TC1	“TCP/IP Connectivity Utilities (5722-TC1)” on page 533
Client Access Express for iSeries	5722-XE1	“IBM iSeries Client Access Family for Windows (5722-XW1)” on page 663
IBM Toolbox for Java	5722-JC1	“IBM Licensed Programs: Application Development Products” on page 585
iSeries Developer Kit for Java	5722-JV1	“IBM Licensed Programs: Application Development Products” on page 585
HTTP Server for iSeries	5722-DG1	“HTTP Server for iSeries (5722-DG1)” on page 494
HTTP Server Powered by Apache for iSeries	5722-HT1	“HTTP Server Powered by Apache for iSeries (5722-HT1)” on page 501
Performance Manager/400	5722-PM1	“IBM Performance Tools for iSeries (5722-PT1)” on page 705

Options and Licensed Programs Included in OS/400

The following sections describe the options that can be ordered or ship with the operating system.

Note: A table is shown in each option description. It summarize whether the product is included with the operating system automatically or if it must be ordered separately. The status states if the product is a chargeable or a no charge feature.

System Openness Includes (5722-SS1 Option 13)

Included in base	No
Status	No charge
Related products	CPA toolkit

The functions in System Openness Includes are based on industry standards from Portable Operating System Interface (POSIX) and the single UNIX specification. These standards enable source code portability of applications over platforms such as OS/400, OS/2, AIX, MVS and other non-IBM operating systems.

Pthread (POSIX-based) APIs are included in OS/400 as Option 13 System Openness Includes. They allow Business Partners or iSeries application developers to take advantage of new system support for kernel threads. Creating an iSeries thread is faster than creating an iSeries job and is a more efficient way to spin off portions of application or server processing into parallel tasks.

The Pthread APIs are based on open APIs described in the ANSI/IEEE Standard 1003.1, 1996 Edition (also known as ISO/IEC 9945-1: 1996) and the Single UNIX Specification, Version 2, 1997 standards.

Note: These APIs previously shipped as PRPQ 5799-XTH.

Media and Storage Extension (5722-SS1 Option 18)

Included in base	No
Status	Charged feature
Related products	BRMS (5722-BR1) Tivoli Storage Manager (5697-TSM)

For software developers who want to customize their own storage management applications, Media and Storage Extensions provides an API to enable application monitoring and control of media usage, including volumes to be selected and volume expiration dates. The API also enables fast search for IBM 3480, 3490, 3490E, and 3575 tape drives.

An API is provided to handle the interruption that occurs when an application tries to open a database file that has been migrated to off-line media. The API enables an on-demand recall of a database file from offline media to DASD and resumption of the application. Application changes are not required.

These APIs provide support to use or build applications to manage tape usage and the recall of data from offline media to DASD. This feature is a prerequisite feature to Backup Recovery and Media Services for iSeries (BRMS/400) (5722-BR1). It is also required when developing Hierarchical Storage Management (HSM) dynamic retrieval functions.

OptiConnect for iSeries (5722-SS1 Options 22, 23)

Included in base	No
Status	Charged feature
Related products	

OptiConnect for iSeries (Option 23)

OptiConnect for iSeries provides high-speed transparent access to data through fiber optic bus connections and performance enhancements to iSeries Distributed Data Management (DDM).

The mechanism used by OptiConnect for iSeries to access database files on connected systems is modeled after DDM. Just as DDM uses a DDM file and APPC communications to redirect file access operations, OptiConnect for iSeries uses DDM files and a specialized transport service to redirect file access operations to a target system.

Because OptiConnect for iSeries operates only among systems sharing the same bus (connected with fiber optic cables), it can achieve transport efficiencies not possible with more general purpose, wide-area communications protocols.

With OptiConnect for iSeries customers, can offload the database application CPU cycles of up to 13 iSeries servers.

The major advantages of OptiConnect for iSeries are realized by customers who are rapidly approaching system capacity limits, and/or who intend to implement distributed database application servers within a data center or short-distance campus environment. Customers

planning to implement distributed application servers can also benefit from using OptiConnect for iSeries.

When used with the Object Connect for iSeries facility, OptiConnect for iSeries provides a high-efficiency migration aid for the iSeries Advanced Series.

Object Connect for iSeries (option 22)

Object Connect for iSeries provides support to simply and efficiently moves individual objects, entire libraries, or entire Integrated File System (IFS) directories from one iSeries server to another over a standard communications connection or over a high-speed fiber optic bus. Systems can be connected via standard APPC (using APPN), TCP/IP communications lines (using AnyNet), or a fiber optic bus (using OptiConnect for iSeries). The economy of not requiring intermediate save file procedures and copies to distribution queues saves DASD and improves performance in a manner that is non-disruptive to system operations.

DB2 Symmetric Multiprocessing for OS/400 (5722-SS1 Option 26)

Included in base	No
Status	Charged feature
Related products	DB2 Multisystem for iSeries

DB2 Symmetric Multiprocessing for OS/400 expands on the parallel capabilities of DB2 UDB to improve the performance of the database for the iSeries server. This improved performance is critical, especially in a data warehouse or decision support environment. The performance gains allow for business decisions to be made in a timely manner.

DB2 Symmetric Multiprocessing for OS/400 further enables DB2 UDB for iSeries with symmetric multiprocessing (SMP) on any of the iSeries N-way systems. This form of SMP allows multiple database operations to take place simultaneously on multiple processors. Each database operation runs on a single processor, therefore, optimizing DB2 UDB for iSeries for online transaction processing.

With the availability of DB2 Symmetric Multiprocessing for OS/400, DB2 UDB for iSeries becomes optimized for decision support processing. DB2 UDB for iSeries is one of the few databases that can take full advantage of an SMP architecture for online transaction processing environments and decision support environments.

Parallel index build capability is included in DB2 Symmetric Multiprocessing (SMP) for iSeries. An index build can utilize multiple processors at the same time. Or in other words,

work on multiple parts of the index in parallel. This allows significant performance increases in cases where an index is created or rebuilt. These allow faster resolution of queries involving a join or group-by operation without the need to create and maintain indexes over the tables involved in the query.

Both SQL and native database interfaces are supported for queries. To achieve this parallelism with multiple processors, an individual query is split into many smaller sub-tasks. Each sub-task runs independently on a separate processor. Once the sub-tasks complete, the results of each sub-task are combined to form the complete query result. Because of single-level store architecture of OS/400, these sub-tasks efficiently process information on behalf of a user query request. Queries involving table scans, index scans, joins, or group-by operations, will realize the greatest performance benefit from SMP database parallelism.

DB2 Symmetric Multiprocessing for OS/400 can be configured differently for each user of the system. This allows a system administrator to have the greatest control over how parallelism is used on a system, and thus greater control over how system resources are used. Part of this enablement process allows the selection of just how much parallelism is used, or in other words, how many sub-tasks are used for each query. Using fewer sub-tasks than processors available allows a greater amount of the total system resources to be used by other users. Using more sub-tasks than processors available, allows an individual user to use more of the total system resources. This flexibility allows administrators to balance the needs of all system users with the available resources.

DB2 Multisystem for iSeries (5722-SS1 Option 27)

Included in base	No
Status	Charged feature
Related products	DB2 Symmetric Multiprocessing

DB2 Multisystem for iSeries allows multiple iSeries servers to be connected so the processing power and storage capacity of all the servers can be used. From a database perspective, these interconnected iSeries servers appear as a single large system. It is intended for use when iSeries servers are used for large data warehouse installations.

PASE (Portable Application Solutions Environment) (5722-SS1 Option 33)

Included in base	No
Status	Charged feature
Related products	

OS/400 PASE is an integrated runtime that provides simplified porting of selected solution provider UNIX applications. The OS/400 PASE (Portable Application Solutions Environment) complements and expands the iSeries solution portfolio by focusing on rapidly porting UNIX applications to the iSeries platform.

Note: PASE is an integrated component of OS/400 with V5R1. It is a separately priced feature in V4R4 or V4R5.

PASE provides a subset of AIX V4.3.3 functionality to support running 32-bit UNIX applications directly on iSeries hardware. OS/400 PASE applications are created on an AIX workstation and executed on iSeries hardware. The environment provides libraries containing hundreds of basic system APIs that are compatible with current AIX 4.2.1 releases that provide 32-bit support.

OS/400 PASE exploits the iSeries processor's capability to switch between OS/400 and AIX runtime modes within an OS/400 job. This allows applications deployed using iSeries PASE to run directly on iSeries hardware and take full advantage of OS/400 services such as file systems, security, and DB2 Universal Database for iSeries.

OS/400 PASE is not an operating system. It does not provide support for developing UNIX applications. Any changes or additions required to port UNIX applications to OS/400 PASE are compiled and linked on an RS/6000 workstation running a level of AIX supported by OS/400 PASE. Applications deployed using OS/400 PASE run in a normal OS/400 job and are managed using standard OS/400 operations. Serviceability, backup and restore, and other administrative tasks are performed using standard OS/400 operations and system management facilities.

OS/400 PASE contains the same Call Level Interface (CLI) set of APIs for DB2 UDB iSeries that is supported for ILE. Data returned from DB2 UDB iSeries can be presented in ASCII format, which is expected by the majority of UNIX applications.

OS/400 PASE applications can be fully integrated with other iSeries servers applications, for example, an ERP application implemented in ILE, a WebSphere application written in Java, or Lotus Domino. A suite of applications can run together in a job mix or be separated into their own logical partitions, depending on the performance and scheduling requirements of the customer.

PASE – New with V5R1

Some of the significant enhancements to OS/400 PASE in V5R1 include:

- Support of the AIX Version 4.3 64-bit application model
- National language version (NLV) enablement
- Documentation for OS/400 PASE run-time, shells, and utilities in the IBM iSeries Information Center
- Header and export files for OS/400 PASE extensions are packaged with option 33
- SQL Call Level Interface (CLI) server mode support
- Additional locales, run-time APIs and utilities
- Updated versions of the AIX C++ and FORTRAN language run-time libraries

Suggested Reading

More information on OS/400 PASE is available on the Web at:

- `http://www.redbooks.ibm.com` (search on PASE)
- `http://www.iseries.ibm.com/developer/factory/pase`

IBM Print Service Facilities Option (5722-SS1 Options 36, 37, 38)

Included in base OS/400	No
Status	Charged feature/key stamped media
Related products	Advanced Function Printing 5722-AF1 Infoprint Designer for iSeries 5733-ID1 iSeries Facsimile Support 5722-FAX Infoprint Server for iSeries 5722-IP1 Advanced Print Utility 5798-AF4 IBM AFP Font Collection 5648-B45

Print Services Facility for OS/400 (PSF/400) provides support for high-function Advanced Function Presentation (AFP) electronic printing and print management of Intelligent Printer Data Stream (IPDS) printers. With AFP, application output can be transformed into fully graphical documents with electronic forms, image, graphics, barcoding, lines, boxes, and text in a wide variety of fonts. This flexibility enables the production of electronic documents that are more effective and enables the re-engineering of business processes.

Documents and reports can be produced using a variety of enabling tools, including the new Infoprint Designer for iSeries (5733-ID1). Other enabling tools include OS/400 printer file keywords (for front and back overlays, N-Up, and duplex), DDS printer files, iSeries page and form definitions, Advanced Print Utility (APU), and AFP Toolbox. Output created by network

and client applications can be transformed to AFP and thus managed by PSF/400 to IPDS printers. V5R1 includes new capabilities (Infoprint Server for iSeries) to handle PCL, PostScript, and PDF output with PSF/400 print management.

PSF/400 is the OS/400 subsystem driving the interactive management of IPDS printers. IPDS is a bi-directional print architecture that ensures that the printing process can be managed every step of the way. When an OS/400 writer is started to an IPDS printer, PSF/400 provides these services:

- Establish communication and query printer capabilities and status
- Manage overlay, image, and font resources required in the printer
- Transform the iSeries spooled file (from AFP, IPDS, or SCS) into a printer-specific IPDS data stream
- Manage the print process, including handling error conditions and managing error recovery down to the page level

This level of print management helps ensure that every page of each spooled file is printed completely and accurately. PSF/400 enables all parameters of the printer file and all DDS print keywords (subject to printer limitations). IPDS printing takes on added significance across the network. TCP/IP print support is more limited than traditional AS/400 print management. SNDNETSPLF (LPR in TCP/IP terminology) simply sends a spooled file with limited instructions and no feed-back as to whether it was received and printed correctly.

All IP-connected IPDS printers must be configured with AFP(*YES) and therefore, require PSF/400. Applying IPDS to a TCP/IP network restores the same level of print support as twinaxial-connected printers (as described above). This includes sending standard SCS spooled files across the network.

To create an Intelligent Printer Data Stream (IPDS) printer on the iSeries or AS/400e system, select IPDS as the device type and specify `AFP(*YES)` in the printer device description. Any printer defined as Type(*IPDS) and AFP(*YES) requires the Print Services Facility (PSF) of OS/400. Twinaxial connected IPDS printers can be defined as AFP(*NO) and, therefore, do not require PSF. Regardless of connection type, AFP (*NO) means that there will be no AFP resource management for fonts, images, or overlays.

The PSF feature of OS/400 required is based on the speed of the fastest printer measured in Impressions per minute (IPM). The CPU size and number of printers are not factors in PSF feature selection. The speed of the fastest printer is a factor in feature selection.

PSF/400 – New in V5R1

- Automatic e-mail of output (PDF) function

  Infoprint Server provides the PDF server functions and handles the transformation of iSeries output to PDF format. The start page group and end page group keywords in DDS (OS/400) provide the triggers for PDF segmentation (multiple PDF files from one input print file). The multiple PDF files can be e-mailed to different IDs. User exits provide for customization and address book lookup.

- Expanded page definitions for output formatting

  HLL applications can output records of output data (via DDS) or classes of output data (Java) that flow to the new page definition record format interface. The new Infoprint Designer provides the design platform for creating page definitions so all of these changes in design and application interfaces integrate.

- Changes in DDS page composition keywords to create page content, including:
  - Enhanced color specification (more than eight colors)
  - Color for line and box elements
  - Constant text can be “placed” on the page by POSITION
  - Outline fonts support both horizontal and vertical scaling (that is, you can create short wide or tall thin characters)
  - Shading within boxes.
  - Easier control of bar code size
  - Two additional postal

- Improved management of TCP/IP-attached IPDS printers

- Three tiers for print speed range
  - 1 to 45 pages per minute (PPM)
  - 1 to 100 PPM
  - “Anyspeed”

  The OS/400 option number associated with each tier is represented in this table.

Option Number	Feature Description
36	1 to 20 Impressions per minute (IPM)
37	1 to 45 Impressions per minute (IPM)
38	All speeds

- An unlimited number of printers within each tier is supported

Integration Services with FSIOP (5722-SS1 Base)

Included in base	No
Status	Not orderable
Related products	Novell Netware, OS/2

The File Server I/O Processor (FSIOP) is the name for some of the legacy models of what later became the Integrated PC Server (IPCS). It provides enabling of the LAN cards as well as an OS/2 WARP base for the Notes Release 4 when running on a FSIOP/IPCS. It is required for LAN Server/WARP Server for iSeries for OS/400 V4R1 and later. After installation, vary on an IPCS so that it can be used as a LAN adapter to run APPC, TCP/IP, or IPX protocols. To obtain the full function of the IPCS as a file server or groupware application server, install the appropriate server or groupware application.

Note: The 700 and 850 MHz Integrated Netfinity Servers or the Integrated xSeries Servers are not supported.

Integration for Lotus Notes (5722-SS1 Base)

Included in base	No
Status	Not orderable
Related products	5722-SS1 Integration Services with FSIOP (#2644)

Integration for Lotus Notes is required for using Lotus Notes from an Integrated xSeries Server. It provides these functions:

- Installation support of the Lotus Notes Release 4 OS/2 server from a LAN-attached PC to a dedicated Integrated PC Server environment.
- Administrative capability to manage the Notes server on the Integrated PC Server by executing Notes server commands from an OS/400 command line.
- Shadowing of the iSeries System Distribution Directory (SDD) entries to the Notes Name and Address Book residing on the Integrated PC Server. This provides enhanced user-profile management.
- Remote PC dial-in access to Notes applications through supported iSeries and communications adapters and connection with an Integrated PC Server-based Notes server. This is provided with TCP/IP SLIP and appropriate communications hardware support installed.

PC capabilities replace the need to have dedicated communication ports on the Integrated PC Server for Notes' users, therefore, consolidating remote and mobile configurations on the system.

Lotus Domino (Notes Server) 4.5 and Lotus Notes 4.1 are supported on the Integrated PC Server.

Lotus Notes is supported on the IPCS. The serial port supports a single modem that is used by the Notes server. The parallel port is not supported by Notes.

Enhanced Integration with Novell Netware (5722-SS1 Option 25, 5722-SA3)

Included in base	No
Status	No charge
Related products	5769-SS1 Integration Services with FSIOP

OS/400 Enhanced Integration for Novell NetWare provides NetWare client and integration services for iSeries users, operators, and applications. This is achieved using a Network Loadable Module (NLM) that runs on either NetWare 3.12 or 4.1x servers. It supports the NetWare servers whether there is an IPCS installed on the system or not. A license is required for each NetWare server.

TCP/IP support in OS/400 is used to connect the iSeries using a token-ring adapter, an Ethernet adapter, IPCS, X.25, or frame relay adapters. OS/400 Enhanced Integration for Novell NetWare provides user profile and password integration from the iSeries to NetWare. iSeries user or group profiles can be propagated to multiple NetWare Directory Services (NDS) trees and/or NetWare 3.12 servers. When iSeries users change their passwords, the change is propagated to NetWare.

IPX support in OS/400 is used to connect the iSeries server using a LAN adapter or a communications adapter using X.25 or frame relay services.

OS/400 Enhanced Integration for Novell NetWare provides iSeries to NetWare printing support. iSeries users' printed output is sent from an iSeries output queue to a printer queue managed by the NetWare server. OS/400 host print transform services are used to translate the output to print on common PC printers.

Integrated file system support is provided, allowing iSeries users, including Client Access users, and applications access to files and directories in multiple NDS trees or NetWare 3.12 servers throughout the network. Full integration with NetWare security ensures that each iSeries user of these services is fully authenticated in NetWare Directory Services or the

NetWare 3.12 binders. Another use of the file system would be to access files on NetWare servers to be served by OS/400 Internet connection support:

- Internet Connection Server for AS/400 (V4R1 and V4R2 only)
- HTTP Server for iSeries (V4R3 or later release)

Server configuration and management tasks can operate from iSeries interfaces. This is not intended to provide full management and operations of a NetWare server. However, iSeries operators can manage user connections and disk resources. Facilities are provided for creating, extending, and mounting/dismounting volumes on NetWare servers.

Integration for Novell NetWare (5722-SA3)

This feature provides support to run Novell NetWare 4.10 on the Integrated PC Server.

Note: Purchase the corresponding NetWare server software or license from a NetWare distributor.

The support allows the ability to install Novell NetWare on the Integrated PC Server. It also allows the iSeries disk to be used for NetWare file serving and enables the file, print, and application serving functions of Novell NetWare.

High Availability Switchable Resources, OS/400 (5722-SS1 Option 41)

Included in base	No
Status	Charged feature
Related products	
Keyed	yes

High Availability (HA) Switchable Resources provides the capability to achieve a highly available environment using switchable resources. The resources are physically switched between systems so that only one copy of the resource is required.

Option 41 includes support for:

- **Switchable Independent ASPs**: Allow you to move the data to a backup system to keep the data constantly available. The data is contained in a collection of switchable disk units such as an I/O tower.
- **IBM Cluster Management Utility**: Allows you to create and manage a simple two-node, switched disk cluster. The utility includes wizards and help text that simplify the tasks involved in defining and managing the cluster.

To define switchable independent ASPs or to use the IBM Cluster Management Utility, OS/400 Option 41, HA Switchable Resources is required. A valid license key for Option 41 is required.

iSeries Integration with Windows Server (Base 5722-SS1 as 5722-WSV)

Included in base	Yes
Status	Shipped with OS/400/no charge feature
Related products	Windows NT or Windows 2000

Note: Integrated Netfinty Server hardware is required for this feature to function. When a system upgrade occurs, this program will be installed automatically in iSeries servers that currently have OS/400 option 29 installed. Option 29 is deleted when the system upgrade occurs.

In a single combination server, customers can run their mission critical business applications on the iSeries server, while also running Windows NT Server or Windows 2000 for file, print, personal productivity, and other applications. Some advantages of running Windows NT Server on the Integrated xSeries Server are:

- Flexibility for iSeries applications and Windows NT services in a combination server
- Improved hardware control and availability with reduced maintenance costs
- Simplified user administration and server operations

V4R5 and V5R1

iSeries Integration with Windows Server enables Microsoft NT Server Version or Windows 2000 to be installed on the Integrated xSeries Server in a single combination server. The product comes with the OS/400 operating system free of charge and is shipped automatically with OS/400. A separate licence for the Windows operating system has to be purchased. The software installs as separately licensed program 5722-WSV.

Note: The software is included in OS/400 option 29, Integration with Windows NT Server, with OS/400 V4R5.

iSeries Integration for Windows Server has two options to allow an iSeries with multiple Integrated xSeries Server installed to have a combination of servers with either Windows NT Version 4.0 or Microsoft Windows 2000.

- Option 1 contains the support for Integrated xSeries Server to run Microsoft Windows NT Server Version 4.0 or Microsoft Windows NT Server Terminal Server Edition Version 4.0.

- Option 2 contains the support for the Integrated xSeries Server to run Microsoft Windows 2000 Server and Terminal Server Services.

Features

The features of iSeries Integration for Windows Server include:

- Integrated save/restore of Windows files from the iSeries

  Save and restore capabilities of Windows servers enable individual file backup and recovery through the iSeries server. This support is enabled through the iSeries NetClient file system (QNTC) of the Integrated File System. Incremental saving of files and the Windows registry associated with an Integrated xSeries Server can be incorporated into an existing system backup procedure. The registry and files saved through this method can be individually restored if needed. Saving Windows server files in this manner can be used with full system save procedures for disaster recovery.

- Operations Navigator Support for Windows Server Management

  Operations Navigator is the GUI for managing the iSeries server. It is enhanced to manage Windows servers installed on Integrated xSeries Server. You can start, stop, and display the status and properties of the server, which is installed with either Windows NT Version 4.0 or Windows 2000.

- Increased drive size

  iSeries storage availability to the Integrated xSeries Server (or Integrated Netfinity Server) is increased from 8 GB per drive to 64 GB per drive. The system drive remains at a maximum of 8 GB. The increase in storage size enables almost 1 TB of storage available per Windows server.

- System drive installation

  The Windows server installation is enhanced to enable the system disk to reside on the C drive.

- Shared LAN adapter support is not available

  For iSeries Models 8xx, 270, SB2, and SB3 servers, LAN adapters cannot be shared between iSeries and Windows servers on the Integrated xSeries Server. The iSeries server and the Integrated xSeries Server each require their own LAN adapters if LAN connectivity is required for both environments.

- Integrated xSeries Server for iSeries hardware

  The new Integrated xSeries Server includes an Intel 700 MHz Pentium III processor and support for up to 4 GB of memory. The faster processor and increased memory capacity provides increased performance and capacity for Windows applications. This version of the Integrated xSeries Server (Integrated Netfinity Server) is supported on the iSeries models.

The iSeries operator can start and stop the Windows NT Server, improving server management in remote branch office and dealership installations. The system operator can also manage Windows NT disk resources, allocating disk space from the system's disk pool. The system operator can also better manage server operations since hardware error messages and event logs from the Windows NT server are sent to the system message queue. Maintenance costs are reduced compared to a PC-based server, since Integrated xSeries Server maintenance charges are included in the iSeries server maintenance offering. iSeries integration with the Windows NT Server allows customers to share hardware resources between the iSeries and Windows NT Servers. The iSeries CD-ROM drive and tape drives can be allocated to Windows NT for installing an application or for data backup. The CD-ROM drive can be concurrently switched among multiple Integrated xSeries Server and the iSeries servers. Multiple applications can access a CD.

Tape backup utilities written for Windows NT can back up data to the system tape drive. Both Windows NT Backup and Seagate Backup Exec Version 6.11 have been tested. Other backup utilities written for Windows NT are being tested. For the latest information on product testing, see: `http://www.ibm.com/eserver/iseries/windowsintegration/`

iSeries Integration with Windows NT Server provides simplified user administration of a combined network environment. Network operators can create both iSeries and Windows NT user profiles in a single step. Users can change their password on the iSeries server and have it automatically updated on the Windows NT Server. An iSeries administrator can submit Windows NT commands directly to the Windows NT IPCS from the iSeries server with output returned to a job log, integrated file system, or spooled file. This saves the administrator from switching back and forth between the two systems. iSeries integration with Windows NT Server provides an internal connection between the iSeries and Windows NT Server. This internal TCP/IP link provides a reliable and secure connection for applications and database integration utilities between the two systems, protecting the application from local area network hub failures.

Prerequisite

An Integrated xSeries Server or Integrated Netfinity Server and a minimum of 64 MB of memory are required to install Windows NT Server. A PC screen, keyboard, and mouse must be attached to the Integrated xSeries Server (IPCS or Integrated Netfinity Server) to provide a console for the Windows NT Server.

Integration with Windows Server – New with V5R1

iSeries is enhanced at V5R1 with additional Windows server integration facilities. These enhancements enable iSeries to support larger and more complex Windows applications and offer additional tools to help reduce the cost of managing Windows server environments.

Attachment of N-way xSeries Servers

iSeries supports the attachment of n-way xSeries servers via the High Speed Link. With the Integrated xSeries Adapter, select xSeries servers running Windows 2000 Server can be used to extend Windows application scalability, while retaining the storage consolidation and systems management advantages of the Integrated xSeries Server.

Enhanced Hardware Support

Enhancements for the Integrated xSeries Server includes support for:

- Up to 32 servers on select iSeries models
- 1 Gb Ethernet LAN adapter
- iSeries DVD device

Operations Navigator Support for Windows Disk and User Management

Additional facilities are added to Operations Navigator to manage Integrated xSeries Servers and xSeries servers that are directly attached to iSeries via the Integrated xSeries Adapter. In addition to server management, Operations Navigator now supports disk and user management for these Windows servers. Enhancements include the capability to create, delete, copy, link, unlink, and show status for Windows server disks. Administrators can manage OS/400 user profiles that are enrolled into a Windows server environment.

Increased Storage Capacity and Availability

iSeries Storage Area Network support for Windows servers is enhanced in V5R1, for example:

- The number of storage spaces that can be defined is doubled to 32.
- A storage space supports up to 64 GB of disk. Each Windows server can access approximately 2 TB of disk space.
- Up to 16 of storage spaces can be added without requiring a shutdown of the Windows 2000 server.

Improved Availability via Independent Auxiliary Storage Pools (iASPs)

With the introduction of IASPs, additional availability options are available for the integrated Windows environments. Since the Windows operating system and data can be installed in an IASP, the storage spaces associated with Integrated xSeries Servers or direct attached xSeries servers can be switched to another iSeries server with a duplicate hardware environment.

The Windows NT server (Version 4.0) or Windows 2000 is packaged, priced, and supported by Microsoft and must be purchased separately from a Microsoft dealer.

HTTP Server for iSeries (5722-DG1)

Included in base	Yes
Status	Shipped with OS/400/no charge feature
Related products	

HTTP servers are the core foundation of technology at the heart of all e-business applications. They handle the communication with the client (typically browsers or XML-rendering devices such as palm pilots) and provide the entry point into server resources. These resources can range from simple HTML and GIF files, to e-business and e-commerce applications, all the way to full-blown business-to-business, collaborative enterprises.

For the iSeries servers, network computing is supported with HTTP Server for iSeries, formerly known as Internet Connection Server. An iSeries server can access a vast network of computers as if they were a single entity. Everyone and everything can access and distribute information, applications, and services provided by the network.

Apache HTTP Server Features

- Digital ID authentication (certificate support) Socks and SSL tunneling
- 5250/Hypertext Markup Language (HTML) Workstation Gateway (WSG) Server automatically transforms current iSeries 5250 applications to HTML for display on Web browsers
- Logging of World Wide Web server access for tracking activity. This allows iSeries owners to obtain feedback on who accesses their servers and what parts are accessed.
- Automatic browser detection
- Use LDAP to store configuration and user authentication information
- Support for CGI programs, including multi-thread support
- Dynamic caching of Web pages
- Support for the Secure Sockets Layer (SSL) is provided by one of the following cryptographic products:
  - 5769-AC1 Cryptographic Access Provider 40-bit for iSeries (V4R5) *
  - 5722-AC2 Cryptographic Access Provider 56-bit for iSeries
  - 5722-AC3 Cryptographic Access Provider 128-bit for iSeries
  - 5769-CE1 Client Encryption 40-bit for iSeries (V4R5) **

  - 5722-CE2 Client Encryption 56-bit
  - 5722-CE3 Client Encryption 128-bit

  * 5722-AC3 provides equivalent function for V5R1

  ** 5722-CE3 provides equivalent function for V5R1

- TCP/IP support
  - Point-to-Point Protocol (PPP) synchronous and asynchronous communication connections spanning low to high bandwidth connections to the World Wide Web
  - Serial Line Internet Protocol (SLIP) asynchronous communication connections allows inexpensive, limited bandwidth access to the World Wide Web
  - Anonymous FTP support provides access to a restricted area of data on the iSeries system that the public can access without a password or user identification
  - Support for popular graphical FTP clients and Web server development tools
  - Direct database serving to Web browsers, which allows DB2 for OS/400 data to be queried and served (with graphics, if desired) to a Web browser using HTTP Server for iSeries

IBM HTTP Server for iSeries Features

- SNMP Subagent support allows Web server statistics to be placed in a Management Information Base (MIB) and forwarded to an SNMP network manager, such as Tivoli TME 10, on request.
- Log reporting provides the ability to define access reports, generate reports, view reports and maintain report files using a graphical interface based on report templates.
- A standard extended log file format allows more data to be saved in the access log files and allows more control over which data is stored in these files.
- Web server error logs contain messages presented in the customer's language of choice.
- Improved serviceability of the Web server with additional trace points, additional information in service traces, and improved first-failure-data-capture (FFDC) information.
- HTML files are dynamically cached in memory when a URL request for that file is processed. Subsequent requests for that file are handled without the need to perform file I/O.
- Multi-threaded CGI programs are supported. Multi-thread programs can often be more efficient than single threaded programs.

- APIs to the HTTP server are provided that allow third-party management tools to query the value of certain configuration directives, as well as use the Web server's mapping rules for a URL.
- LDAP is used to store configuration information and user authentication information.
- A Domino plug-in to allow the HTTP server to access documents stored in Notes.
- Platform for Internet Content Selection (PICS) support enables labels (metadata) to be associated with Internet content. Originally designed to help parents and teachers control what children access on the Internet, it also facilitates other uses for labels, including code signing and privacy.
- Integrated with OS/400 security, enabling exploitation of the Internet for marketing and merchandising. Multiple HTTP Servers are supported to balance content and workload. A Web browser can be used to administer and configure these servers.
- Tracking of WWW activity through the server to identify the audiences accessing the customer server.
- Direct WWW access to existing DB2 UDB for iSeries data via Internet browser with no programming language required.
- Client Authentication supports SSL V3, including client and server authentication. You can associate client certificates with iSeries user profiles or validation lists, allowing users seamless access to your Web servers resources without having to sign on.
- Socks support and SSL tunneling is helpful, for example, if your environment has a Socks-based firewall for access to the Internet. Then, you can use the HTTP Server for iSeries proxy server to access destinations outside the firewall. Client connections that use SSL are tunneled through the proxy server, eliminating the need to decrypt and re-encrypt the data at the proxy.
- Expanded CGI support includes Java, REXX, and C++. You can bypass the server on output using no-parsed header CGIs. You can also fully configure any codepage conversions the server performs on your Web application's input or output.
- Automatic Browser Detection provides different documents for different clients, allowing your Web site to seamlessly exploit the unique capabilities of whatever browser your customers use.
- Digital ID authentication requires SSL client authentication for HTTP server client certificates. This offers resource protection with:
  - Valid client certificates
  - Client certificates with certain distinguished names values
  - Client certificates associated with iSeries user profiles
  - Client certificates associated with iSeries validation lists
- You can remotely access your HTTP server logs, statistics and status to see how your HTTP server is functioning. You can also generate and view reports on how your HTTP

server is being used. SNMP Subagent allows use of any SNMP-capable network management system, such as TME 10 NetView, TME 10 Distributed Monitoring, or HP OpenView to monitor your server's health, throughput, and activity.

- Extended Log Format allows a broader use of industry-wide Log Analysis tools. Log file customization log archiving allows you to manage and maintain your log files. Error logs are NLS-enabled.
- The administration of certificates is centralized in the DCM product. The HTTP server is a certificate “customer”.
- Dynamic caching of Web pages gives you better static page serving performance without manual configuration.
- APIs are provided to allow third-party tools to access configuration information:
  - To map a URL (request) through the Map/Pass/Exec/Fail rules of the server's configuration and output the physical resource on the server
  - To return the value(s) of a given configuration directive
- LDAP is used to store configuration information. LDAP integration allows you to use directory services for server configuration and authentication.
- Domino runs “on top of” IBM HTTP Server.
- Built-in search capability for SBCS and DBCS data.
- On a system with multiple network addresses, you can configure it to serve different files based on the IP address accompanying the request. You can also configure multiple server instances, allowing a single server to supply customers with multiple Web sites with differing welcome pages, mapping rules, and access control. The Automatic Browser Detection feature allows your Web site to seamlessly exploit the unique capabilities of whatever browsers your customers are using.
- The ability to index and search specific fields in title and meta tags in a group of documents.
- A command to search administrative functions from a batch job.
- APIs for working with configuration, Web server instances, and groups.
- A vehicle to test how your Web server processes URLs.
- Configuration directive to control upper/lower case behavior during request processing.

Enhancements to HTTP Server for iSeries: August 2001

The HTTP Server for iSeries is enhanced to include the latest functions from the Apache Software Foundation (ASF). The major enhancements include:

- Support for the latest Apache 2.0 Level

  Apache 2.0 offers multiple benefits beyond the previous alpha level version, including filtering, I/O buffering, and the latest code fixes from ASF.

- Support and documentation of the Apache Portable Runtime (APR) APIs

  APR APIs allow user written modules to be platform-independent. These APIs allow Web developers to write modules and applications independent of the platform, making it easier to bring your applications to the iSeries platform. Operating system specific functionality is encapsulated into the APIs provided by the IBM HTTP Server product.

  – Header files are provided for all supported APIs.

  – The sample user module mod_example is provided. This module demonstrates a use of the Apache APIs.

- Support for server side includes

  SSI tags are comments within HTML that direct the Web server to dynamically generate information for the page. SSI tags allow a Web developer to easily include common HTML statements such as headers and footers, so that they are easily managed and consistent across an entire Web site. SSI can be used to include static HTML, to call and execute programs (such as through CGI programs) to allow the insertion of results. Added SSI support includes two varieties of SSI and CGI combinations:

  – Parse an HTML document and include the output of a CGI program as dynamic content on an HTML page.

  – Parse the output of a CGI program to resolve SSI tags before returning the output to the client browser.

- Support for WebDAV (MOD_DAV)

  World Wide Web distributed authoring and versioning is a set of extensions to the HTTP protocol that allows users to collaborate to edit and manage files on remote Web servers. WebDAV provides a network protocol to create interoperable, collaborative applications. Features of the protocol include:

  – **Locking (Concurrency Control)**: Long-duration exclusive and shared write locks prevent the overwrite problem, where two or more collaborators write to the same resource without first merging changes.

  – **Properties**: XML properties provide storage for arbitrary metadata, such as a list of authors on Web resources. These properties can effectively be set, deleted, and retrieved using the DAV protocol.

  - **Namespace manipulation**: Since resources may need to be copied or moved as a Web site evolves, DAV supports copy and move operations. Collections, similar to file system directories, can be created and listed.

- Support for Apache Module MOD_REWRITE

  This module provides a rule-based rewriting engine to rewrite requested URLs on the fly.

- Support for named protection setups:

  Named protection setup allows the same set of authentication directives to be defined multiple containers by the use of include files.

- Support for group files

  Group files provide the ability to grant access to resources based on a defined group of users. This support provides similar functionality to the original HTTP server.

The IBM HTTP Server is also enhanced to include and industry-standard Java Servlet and JavaServer Pages engine based on technology from the Apache Software Foundation's Jakarta Tomcat open source code base:

- Lightweight and easy-to-use software is provided as an extension to the IBM HTTP Server (Powered by Apache) Web server. It is compliant with the Java Servlet 2.2 and JavaServer Pages 1.1 specifications.
- Apache Software Foundation's Jakarta Tomcat support can be used as a simple starting point for those business partners and customers interested in learning about or piloting Java Servlet applications.

This function is planned to be available via PTF in the fourth quarter 2001. The function will be NLS enabled, available in English only.

Refer to the IBM HTTP Server for iSeries Web pages for more information:
`http://www.ibm.com/eserver/iseries/software/http`

For more information on WebDav, refer to: `http://www.webdav.org/`

For more information on the Apache Software foundation, go to: `http://www.apache.org/`

These enhancements are delivered via PTFs. Order group PTF SF99156 for V5R1. Order Group PTF SF99035 for V4R5.

Digital Certificate Manager with SSL

The Digital Certificate Manager with SSL offers these features:

- Support for X.509 certificates can be used by the Web Server, Secure Sockets Layer, IPSec, iSeries Client Access, and other applications. The user interface is easier to use.

- Global Server Certificate support is added to the certificate services available on the iSeries server. The Web server and other applications use certificates for network and Web-based security.
- The following services support SSL:
  - HTTP Server
  - LDAP Server
  - Telnet Server
  - Management Central
  - DDM and DRDA
  - Client Access Servers
  - Operations Navigator

With SSL support, these services can establish secure communication sessions with their corresponding clients. Data exchanged between the clients and servers are encrypted, and, therefore, not subject to eavesdropping.

Net.Currency

- Net.Data supports the new DB2 for iSeries data types introduced in this release (LOB and DATALINK).
- You can call SQL stored procedures and handle multiple result sets returned by those procedures.
- Direct program calls to iSeries ILE programs use input and output parameters.
- You can access Java applications or generate Java applets from Net.Data.
- Macros are parsed only once and the results are saved for subsequent requests for that macro.
- Trace and logging support makes it easy to find errors in your macro.
- Built-in functions make it a snap to use Net.Data to send e-mail, generate browser cookies, and manipulate Net.Data tables.

Web Registry

Web pages with built-in Web Registry and Flat File support. Web Registry support allows storage and retrieval of macro variables, giving them persistence across macro boundaries. Save a macro variable and its value can be saved into a Web Registry by one macro, and later retrieved for use in another.

Flat File support allows storage and retrieval of user data into files that contain single-field records. Multiple pieces of data can be contained in this single record, separated by user-defined delimiters. A Net.Data table built in one macro can be retrieved in a second for use in a report, for example.

HTTP Server Powered by Apache for iSeries (5722-HT1)

Included in base	No
Status	Supported/freeware
Related products	

iSeries HTTP support includes the Apache HTTP server. Support for Apache is added so that server instances built using the original iSeries HTTP server can co-exist with Apache-based server instances.

Apache, a freeware HTTP server, is open-source software that implements the industry standard HTTP/1.1 protocol. The focus is on being highly configure capable and easily extendable.

It is built and distributed under the Apache Software License by the Apache Software Foundation. It is available at: `http://www.apache.org`

IBM HTTP Server for iSeries incorporates Apache 2.0. This version includes an update comprised of several new enhancements, including the Apache Portable Run-Time and the multiprocessing modules.

These enhancements are added to the IBM iSeries version of the Apache HTTP Server:

- Authentication using LDAP, iSeries user profiles, and validation lists
- Full native SSL support, including client authentication and association between client certificates and validation lists or iSeries user profiles
- Logging rollover and archiving
- NLS enablement
- Static and dynamic local file caching
- Denial of Service detection and prevention
- SNMP subagent
- CGI support for RPG, COBOL, REXX, CL, and Java languages
- Webserver search engine support
- Support for all iSeries file system types

Refer to this Web site for information on which PTFs are needed to run the Apache HTTP server in co-existence with the iSeries HTTP Server: `http://www.ibm.com/eserver/iseries`

Software Terms

This section discusses software migration, upgrade paths, previous release support, terms and conditions, and software subscription.

Supported Upgrade Paths

Software upgrade paths supported on OS/400 are identified in this table.

Note: OS/400 V4R5 is the last release to offer single step CISC-to-RISC upgrade capabilities from V3R2. For single step CISC-to-RISC upgrades from V3R2, use the Enhanced Upgrade Assistant 5798-TBU.

To: / From:	V4R5	V5R1
V3R2	X	
V4R1	X	
V4R2	X	
V4R3	X	
V4R4	X	X
V4R5		X

OS/400 Single-Step Upgrades

Single step RISC-to-RISC upgrades are supported as normal upgrade procedures. Instructions are found in the software installation manual corresponding to the release.

If a new RISC iSeries server replaces an existing RISC iSeries server, order feature #0205 against the hardware to restrict the preload of all software except SLIC and the basic functions of OS/400. This allows the remaining libraries to be migrated from the existing system to the new system.

Current Release to Previous Release Support

This table also indicates which target release can be specified when compiling or saving objects on a given OS/400 system.

Values for TGTRLS Parameter			
Current OS/400 Release	***Current**	***PRV**	**Other Valid Values**
V5R1	V5R1	V4R5	V4R4
V4R5	V4R5	V4R4	V4R3 V4R2 V3R2
V4R4	V4R4	V4R3	V4R2 V3R2
V4R3	V4R3	V4R2	V4R1 V3R7 V3R2
V3R7	V3R7	V3R6	V3R2 V3R1 V3R0M5

OS/400 Version 5 Terms and Conditions

OS/400 is included in iSeries Model 270, 8xx, and AS/400e Model 170, 6xx, 7xx, and Sxx systems price and licensed under the International Program License Agreement (IPLA). OS/400 Version 5 is software keyed to the designated serial number of the machine where it is initially installed. OS400 Version 5 is licensed to operate on only that serial number machine and may not be moved from one machine to another except in an emergency backup situation.

Four documents are provided with the OS/400 software as proof of a valid license:

- *Proof of Entitlement (POE)*
- *License Information Document (LID)*
- *International Program License Agreement (IPLA)*
- *Software License Key Sheet*

In the event that the designated machine is transferred (or sold), OS/400 must transfer with it. Notify the receiving party of the program's terms, and provide the *POE*, *LID*, *IPLA*, and *Software License Key Sheet* documents for OS/400 to the purchaser. IBM licenses the receiving party when that party accepts the program's license terms by initial use of the program. Your OS/400 license is then terminated.

When ordering upgrades to software licensed under the IPLA, such as OS/400, provide a copy of the POE to your IBM representative or IBM Business Partner to validate the license to the software.

To operate on the designated serial number machine, OS/400 Version 5 requires a unique OS/400 license authorization code supplied by IBM. The OS/400 License Authorization Code is preloaded by IBM on new iSeries server purchases.

In the case of a hardware upgrade to a Version 5 server or a software-only upgrade to OS/400 Version 5, the OS/400 License Authorization Code provided by IBM must be entered at the time of installation. OS/400 Version 5 operates for 70 days without the License Authorization Code. During those 70 days, the system generates daily warning messages requesting that the customer obtain an OS/400 License Authorization Code from IBM. After 70 days, users are not permitted to sign on to the system. A valid OS/400 License Authorization Code is required to reset the 70-day period.

For software-only OS/400 Version 5 orders, the OS/400 License Authorization Code is ordered from IBM. Contact your IBM representative or IBM Business Partner for ordering information.

LPAR Systems and Guidance for Software Keys for Upgrades

Customers running logical partitioning may have more than one version or release of a software product on the same iSeries server. Version upgrades are acquired for customers running in LPAR via software subscription just as they are for customers without LPAR. For customers performing a processor group upgrade and a release upgrade at the same time, the processor group upgrade must be performed for the V4R4 products followed by the release upgrade to V4R5, to ensure the necessary keys are sent automatically. For customers who do a processor upgrade following the V4R5 release upgrade, they need to contact the key center to request the necessary V4R4 keys at the higher processor group level. If a processor group upgrade is performed, all processor-based products will be priced according to the Software Machine Group of the underlying iSeries hardware model.

Software Subscription

Customers must purchase *Software Subscription* when they move to Version 4 or 5. Software subscription addresses the administrative actions for version or release upgrades. Software Subscription is available at a monthly charge (billed quarterly) or with prepayment options for between one and five years.

The price of Software Subscription is the same, regardless of the software that has been licensed to a system. Most iSeries software is covered by Software Subscription. Customers who do not take out Software Subscription when they install Version 5 must either re-license the software or pay the Currency Access Fee of Software Subscription in order to upgrade to a new version or release.

Software Keys and Guidance for LPAR System Upgrades

Customers running Logical Partitioning may have more than one version or release of a software product on the same iSeries server. Version upgrades are acquired for customers running in LPAR via Software Subscription just as they are for customers without LPAR.

For customers performing both a processor group upgrade and a release upgrade at the same time, perform the processor group upgrade for the V4R4 products, and then upgrade the release to V4R5. The necessary keys are sent automatically with this method.

For customers performing a processor group upgrade following the V4R5 release upgrade, contact the key center to request necessary V4R4 keys at the higher processor group level.

When a processor group upgrade is performed, all processor-based products are priced according to the Software Machine Group of the underlying iSeries hardware model.

Suggested Reading
For further information on Software Subscription, contact your IBM Sales Representative, refer to the appropriate announcement letter, or go to:
`http://www.ibm.com/servers/eserver/sftsol/subscript.htm`

Keyed Stamped Media Distribution

Many OS/400 product features are available on iSeries Keyed Stamped Media and shipped with OS/400. This provides on-demand delivery of these products and features and allows a 70-day evaluation period for any of the provided products or features. To use the software distributed on the keyed stamped media after the 70-day evaluation period, a Software License Key must be ordered. Contact your IBM representative or IBM Business Partner for ordering information.

New Software License Keys are required when the Version, Release, or Modifications level of the software changes. If the software is transferred to a different system, a new software key is also required. Some software is keyed, based on the processor group. A new software key must be obtained when the processor group changes.

Note: When ordering Software License Keys for the iSeries server 7xx and newer models, the Processor Feature Code that is used is displayed in the QPRCFEAT system value or in the system rack configuration.

If a Keyed Stamped Media product or feature is to be upgraded, the current Software License Key Sheet for the product must be provided to your IBM representative or IBM Business Partner as proof of license. The products shipped on the Keyed Stamped Media for V5R1 are identified in “Keyed Stamp Media Distribution” on page 802.

Database

Database

IBM Licensed Programs: Database Accessories

This chapter describes the accessories available from IBM to complement OS/400 integrated database.

Product Name	Product Number	Refer to
IBM DB2 OLAP Server for AS/400 Version 7.1	5641-OLP	page 509
IBM DB2 DataPropagator Version 7.1 for AS/400	5769-DP3	page 511
IBM DB2 DataJoiner Version 2.1.1	5801-AAR Feature #3049	page 515
IBM DB2 Intelligent Miner for Data for AS/400 V6R1	5733-IM3	page 519
IBM Query for AS/400	5722-QU1	page 521
IBM DB2 Query Manager and SQL Development Kit for AS/400	5722-ST1	page 522
IBM Warehouse Manager for AS/400 Version 7.1 DB2 Forms Version 2	5697-G23	page 529
Query Management Facility (QMF) for Windows for AS/400 Version 7	5697-G24	page 523
IBM System/38 Utilities for AS/400	5722-DB1	page 530

IBM DB2 OLAP Server for AS/400 Version 7.1 (5641-OLP)

IBM DB2 OLAP Server for AS/400 Version 1.1	
Product number	5641-OLP
Replaces product	None
Minimum OS/400 level	V4R4
Installation prerequisites	None
Related products	Features the same functional capabilities and interfaces as ShowCase Essbase/400 Version 3.0

DB2 OLAP Server for AS/400 includes a comprehensive set of graphical tools for database management, security, and administration for deploying industrial-strength OLAP applications. The DB2 OLAP Server for AS/400 licensed program provides a fast path to turn your warehouse data into business insight. It is built for e-business with tools to help you quickly deploy Web-based analytical applications.

With DB2 OLAP Server for AS/400, choose data storage for the server as either:

- Relational database using a star schema data structure, for SQL access and system management convenience
- Essbase integrated multidimensional storage for simplicity and performance

The relational database choice uses DB2, the industry-leading relational database to store fact and dimension tables, to meet your business requirements.

Data in the DB2 OLAP server can be leveraged by Essbase-ready applications, and a large variety of generic SQL access tools. Use SQL tools to easily join the star schema with existing relational tables in the warehouse, analyze and product reports.

DB2 OLAP Server can be used for management, reporting, analysis, modeling, planning and data warehousing applications. Graphical tools for database management and security. A spreadsheet add-in provides desktop software to seamlessly merge data into a tightly integrated OLAP client.

DB2 OLAP Server for AS/400 can access iSeries and AS/400e servers across all TCP/IP networks connected to Windows and UNIX clients. It maintains and analyzes data stored in the scalable DB2 Universal Database.

IBM DB2 OLAP Server for AS/400 – New with Version 7.1

Significant enhancements at 7.1 includes the support to:

- Create bigger cubes within a given batch window
- Choose storage options (multidimensional or relational) at the application level
- Analyze the next level of detail for data attributes

The DB2 OLAP Server for AS/400 licensed program provides a fast path to turn your warehouse data into business insight. It is built for e-business with tools to help you quickly deploy Web-based analytical applications.

DB2 OLAP Server for AS/400 Version 7.1 Add-on Programs

DB2 OLAP Server for AS/400 Tools Bundle Version 1.1 contains a copy of these tools:

- **Currency Conversion**: Converts financial data using any currency exchange rate scenario. The Currency Conversion module allows modeling of the impact of exchange rates and performs ad hoc conversions directly from a spreadsheet or custom application.
- **Application Programming Interface (API)**: Allows the use of standard tools to create custom DB2 OLAP Server for AS/400 applications that take advantage of the powerful data storage, retrieval, and analytical capabilities of DB2 OLAP Server for AS/400.

The API supports Visual Basic, C, C++, and other application development environments and works with Windows 95/98, Windows NT, and UNIX.

- **Extended Spreadsheet Toolkit**: Includes more than 20 macros and Visual Basic (VB) functions, allowing the user to build custom Lotus 1-2-3 or Microsoft Excel applications that tightly integrate with DB2 OLAP Server for AS/400.
- **DB2 OLAP Server for AS/400 for AS/400 Partitioning Option Version 7.1**: Provides a collection of powerful features to make it easy to design and administer multidimensional databases (cubes or star schemas) that span OLAP applications or servers. The functions can:
  - Integrate multiple physical cubes or stars into a single logical cube
  - Centrally administer and share metadata
  - Allow the connection of cubes and stars with varying dimensionality
  - Allow partition replication between centralized and distributed cubes and stars
- **DB2 OLAP Server for AS/400 for Builder Version 7.1**: Assists in moving enterprise data to the iSeries or AS/400e server by transforming and simplifying online transaction data. The features include:
  - Use full SQL support to easily build a data warehouse or data mart. Select specific data from one or more tables in your OLTP database in DB2/400 and move them to existing or new tables created “on-the-fly” by Warehouse Builder.
  - Call user programs or enter SQL statements to cleanse data before or after the distribution.
  - Implement business rules, such as profit margin formulas, or inventory reorder thresholds, using Builder’s ability to create result columns and assign them meaningful names and descriptions.
  - Distribute data from DB2 DRDA data sources other than the AS/400, including DB2 Universal Database running on OS/390, AIX, and Windows NT.

IBM DB2 DataPropagator Version 7.1 for AS/400 (5769-DP3)

DB2 DataPropagator Version 7.1 provides read-only, update-anywhere, and on-Demand replication between relational sources and targets databases. It defines the architecture for the comprehensive IBM Data Replication solution.

IBM DB2 DataPropagator Version 7.1 for AS/400	
Product number	5769-DP3
Replaces product	Data Propagator V5.1 (5769-DP2)
Minimum OS/400 level	V4R5
Installation prerequisites	None
Related products	None

The IBM DataPropagator Relational consists of three autonomous components:

- **Administration**:
  - *Data Joiner Replication Administration (DJRA)*: Included in DB2 Connect Personal Edition.
  - *Command Line*: Use command to create DataPropagator Version 1 registrations and subscriptions.

  Either DJRA or the commands must be used for administration of DB2 DataPropagator Version 7.1.
- **Capture**: Capture changes made to data on replication sources.
- **Apply**: Previously captured changed data is applied to target tables.

The Administration component for the DB2 DataPropagator Version 7.1 is called the *Data Joiner Replication Administration (DJRA).* DJRA runs on runs on Windows NT, Windows 95, and Windows 98, and OS/2 platforms and does not require a local DB2 database. DJRA is included in the *DB2 Connect Personal Edition* box. A single user license of DB2 Connect Personal Edition is shipped with DB2 DataPropagator Version 7.1.

Use DJRA to:

- Define tables as sources, called *replication sources*
- Define views and join views as replication sources
- Define target table definitions, called *replication subscriptions*
- Clone replication subscriptions to other servers
- Remove replication sources or subscriptions that are no longer needed

Whenever a replication request is submitted from DJRA, such as defining a replication source, the processing information is generated as SQL statements. Statements can be run immediately or saved to a plain ASCII file. The statements can be edited and run at a later time from DJRA.

DB2 DataPropagator Version 7.1 on the iSeries contains commands (in PTF SF65370) to handle the creation and removal of registrations and subscriptions.

Deferred SQL files customizing of the replication tasks and provides the flexibility as to when and how the SQL files are run.

The *Capture* component captures changes made to data in tables defined as replication sources by reading the database log or journal. The captured changes are placed in staging tables.

IBM DataPropagator Relational Capture for AS/400 supports the Remote Journal Function. This function can significantly reduce the CPU and DASD consumption on the primary production system, by making it possible to off load the data capturing process to a different system. Capture for AS/400 also supports the *ALIAS* feature in SQL

The *Apply* component reads the changed data, previously captured and stored in a staging table, and applies it to the target tables. Apply components can also read data directly from source tables, for example, for a full refresh. Supporting update and refresh copying provides greater flexibility and automation in a replication environment.

The Apply component also enhances the data to your specifications as it copies data to the targets. The full power of SQL can be exploited to:

- Create new columns
- Summarize data
- Translate data
- Join data

Run-time processing statements can be defined using SQL statements and stored procedures before and after the Apply program processes the replication subscription. The run-time processing statements can be run at the source server before the answer set is retrieved and at the target server before and after the answer set is applied. The stored procedures use the SQL CALL statement, which is newly supported by IBM Replication, without parameters. The run-time procedures are executed together in a single unit-of-work. Acceptable SQLSTATEs can be defined for each processing statement as well.

The Apply component allows the creation of:

- Read-only copies
  - *User copy tables*: Represent an exact copy of the source table
  - *Point-in-time tables*: Represent source data at a particular point in time plus some overhead columns
  - *History tables*

  - *Staging tables*: Can be used as a source for further copies without recapturing changes, supporting a consistent data environment, and providing flexibility in data distribution across the network

- Updatable copies
  - *Replica tables*: Updates to a replica table are automatically applied to the original source table of the replica, provided no conflicts are detected.

    The Apply component running at the replica site, detects update conflicts after they occur during the subscription cycle. When transactions are rejected, the Apply compensates the transactions at the replica site. During this process, the Apply inserts rejection codes for every rejected transaction in the control table. Conflict detection is provided at three levels: no detection, standard detection, and enhanced detection, specified while defining the replication source.

DB2 DataPropagator – New in 7.1

Replicating Large Objects

DB2 Universal Database supports large object (LOB) data types, which includes binary LOB (BLOB), character LOB (CLOB), and double-byte character LOB (DBCLOB). This section refers to all of these types as LOB data.

BIGINT Data Type

Big integer (BIGINT) data type allows replication of big eight-byte integer data types. This permits the storage and replication of integers larger than 2.1 GB for specialized application needs.

Replicating DATALINK Values

Accessing large files (such as multimedia data) over a remote network can be inefficient and costly. If these files do not change, or change infrequently, faster access to the files and reduced network traffic can be provided by replicating these files to remote sites.

DB2 Universal Database provides a DATALINK data type to allow the database to control access, integrity, and recovery for this type of files. DB2 Universal Database supports DATALINK values on all platforms except OS/390.

Performance Improvements

- The STRDPRCAP command has a new parameter, GENCDROW to specify that only changed columns are replicated.
- For replication scenarios where the target tables reside on the same system as the Change Data tables, the Version 7.1 Apply/400 code no longer resorts to the use of

spill files. This results in a significant performance gain. Users of the remote journal set-up are the primary beneficiaries of this performance enhancement.

iSeries Replication Extensions

- **Remote Journal**: DB2 DataPropagator Version 7.1 can use the remote journal function. The *Capture* component can capture changes from a journal setup for remote journal. Journal receivers are replicated to another system by the operating system function of the remote journal. The *Apply* component is modified to access the actual source to a staging area that eliminates work file processing.
- **Relative Record Number Support**: This function addresses the problem where a unique key could not be found for a copy table. It allows a user to have a unique key for CCD and Point-in-time target tables when no combination of target columns is unique.

IBM DB2 DataJoiner Version 2.1.1 (5801-AAR Feature #3049)

IBM DB2 DataJoiner Version 2.1.1	
Product number	5801-AAR Feature #3049
Replaces product	IBM Data Joiner Version 2.1
Minimum OS/400 level	AIX and Windows NT (on the IXS) only
Installation prerequisites	
Related products	DB2 Spatial Extender Version 2.1.1

DB2 DataJoiner Version 2.1.1 allows access to the joining of data from different data sources with a single Structured Query Language (SQL) statement and a single interface. That single interface hides all the differences that cause problems when accessing information from different vendor databases on different vendor platforms. With DataJoiner, there is one interface to one database image. It's like having one big database.

DB2 DataJoiner Version 2.1.1 is available on two platforms: AIX and Windows NT.

With DB2 DataJoiner Version 2.1.1, you only need to send one query to get the answer from different data sources. These sources include DB2, IMS, VSAM, Oracle, Oracle Rdb, Sybase, Sybase SQL Anywhere, Microsoft SQL Server, Informix, and others. Global schema allows the creation of joins or views across all of these data sources, easily and transparently. There is only one SQL interface to deal with.

SQL dialects, protocols, operating systems, data types, error codes, and functional differences are all transparent to the application. Similarly, client workstations attached to DB2 DataJoiner only need one client interface to DataJoiner and all other supported data sources are then available. This eliminates the need for each workstation to have client code for each data source and is very efficient and cost effective.

One way DataJoiner provides data transparency is with compensation. DataJoiner can provide functions not available at a data source, enriching the native SQL of the data source. For example, a client can submit a query using DataJoiner to a data source. If that function is not supported (such as Recursive SQL) at the data source, but is supported by DataJoiner, the query can complete successfully. DataJoiner compensates by simulating the function, and, therefore, preserving transparent access.

Features

DB2 DataJoiner offers extensive support for nontraditional and traditional applications to fully integrate the database architecture:

- **Large Objects (LOBs)**: Large object support allows multimedia objects, such as documents, video clips, images, and sound recordings, to be stored in any data source (which support LOBs, like DB2 UDB) and manipulated like other database objects. The size of any one LOB can range up to 2 GB.
- **Global User-Defined Types (UDTs)**: Global UDTs allow users to define new data types across multi-vendor data sources, which are represented in the DB2 DataJoiner database using built-in types. For example, a user can define two currency types: CDOLLAR data type for Canadian dollars and USDOLLAR data type for U.S. dollars.

  UDTs, like built-in types, can be used for columns of tables as well as function parameters, including user-defined functions (UDFs). For example, a user can define a data type such as ANGLE (which varies between 1 and 360) and a set of UDFs to act on it, such as SINE, COSINE, and TANGENT.
- **Global User-Defined Functions (UDFs)**: Application developers often want to create their own suite of functions specific to their application or domain. Global UDFs make this possible, expanding the scope of DB2 DataJoiner to include customized business or scientific functions that span multi-vendor data.

  For example, a retail store could define a PRICE data type for tracking the cost of items it sells. This store might also want to define a SALES_TAX function, which would use a given price value as input, compute the applicable sales tax, and return this data to the application.
- **Recursive Global SQL Queries:** DataJoiner supports not only multi-vendor bills-of-material queries but also the more powerful forms of recursive queries such as path expressions. Examples of queries that become possible with recursion are:

  - Global bills-of-material queries, where a user wants to return subparts of parts, and subparts of subparts, and so on.
  - Global path expression queries, where a user wants to calculate the lowest-cost plane fares on multi-hop routes. For example, this query can be formulated using recursive SQL:

    Return all possible flights from San Jose to Perth without making a stopover in London or Chicago and with no more than three plane changes.

  The combination of global user-defined types and functions can mask the multi-vendor representation of the data and the definition of a set of functions that interpret the multi-vendor data.

- **Stored Procedures:** DB2 DataJoiner now supports the invocation of stored procedures. A stored procedure is an executable module stored on the database server that is comprised of SQL statements and application logic that are performed frequently. When a call to a stored procedure is made, only the instruction to invoke a procedure is passed to the database server instead of passing individual SQL statements. The SQL92 level of function for stored procedure calls is supported. Stored procedures can greatly improve the performance of applications by minimizing network traffic.

  DB2 DataJoiner compensates for those data sources that do not support stored procedures. In these situations, DB2 DataJoiner runs the stored procedure locally and creates the instructions and SQL necessary for the remote data source to complete the work.

  DB2 DataJoiner can be used to invoke stored procedures on database servers that support them such as DB2 for OS/400 Version 3.

  With DB2 DataJoiner, application developers and database administrators have greater flexibility in distributing data and applications across various platforms:

- **DRDA Application Server:** The Distributed Relational Database Architecture (DRDA) Application Server (AS) capability allows DB2 for MVS, DB2 for VSE and VM (SQL/DS), and DB2 for OS/400 applications (or any other application that implements the DRDA Application Requestor functionality) to access data located in any of the supported data sources (Oracle, Sybase, and so forth).

- **Distributed Unit of Work:** Distributed Unit Of Work (DUOW) functionality, also known as *Two-Phase Commit*, provides the capability for an application to read or update tables in more than one database from within a single unit of work with full data integrity.

  For example, money withdrawn from a bank account in one country can be deposited into an account in another during the same transaction. Because these multiple units of work are performed during the scope of a single global transaction, the integrity of the data is assured via Two-Phase Commit feature, even in the case of equipment failure.

The replication features of DB2 DataJoiner are fully compatible with the DataPropagator log-CAPTURE and APPLY components for the DB2 Family.

IBM replication offers transaction consistency, condensing of hot spot updates to minimize network traffic, change propagation through DB2 views (including join views), and update anywhere replication between DB2 databases with transaction conflict detection and automatic compensation.

DB2 DataJoiner extends this capability with database transparency and automatic generation of change capture triggers for Oracle, Microsoft SQL Server, Informix, Sybase, and Sybase SQL Anywhere.

A lightweight, update-anywhere capability with row conflict detection, designed for the Microsoft Office environment, lets Microsoft Jet and Microsoft Access desktop database applications interoperate with corporate applications through database replication with DB2, Oracle, Microsoft SQL Server, Informix, Sybase, and Sybase SQL Anywhere. Microsoft Jet is supported for heterogeneous replication only.

DataJoiner also provides a graphical user interface administration tool for defining data sources and targets. The Replication Administration tool runs on Windows NT and Windows 95, and in DB2 DataJoiner Version 2.1.1, it will be available only in English.

These licensed products are currently included in the DB2 DataJoiner product box.

- **Net.Data**: OS/2, AIX, and Windows NT platforms. Businesses today want to harness the power of the Web to reach the global marketplace. With IBM Net.Data, it is possible to build interactive Web-sites with data from the sources that are available today such as relational data, file data, or even Lotus Notes data.

  It is also possible to leverage existing client/server applications to the Web using existing business logic. Embed dynamic SQL, Java applets and JavaScripts, Perl, and REXX programming in your Net.Data applications, or call DLLs written in C/C++. By exploiting existing business applications, Web applications are up and running quickly with Net.Data.

Note: The Lotus Approach database is not included within IBM DB2 DataJoiner Version 2.1.1.

Suggested reading

For more information on Lotus Smart suite products, see this Web site:
`http://www.lotus.com/smartsuite`

For specific hardware and software requirements as well as data sources, see the DataJoiner Web page at: `http://www-4ibm.com/software/data/datajoiner/`

DB2 Spatial Extender Version 2.1.1 (5801-AAR Feature #6507)

DB2 Spatial Extender Version 2.1.1	
Product number	5801-AAR Feature #2716
Replaces product	None
Minimum OS/400 level	AIX and Windows NT (on the IXS) only
Installation prerequisites	None
Related products	None

The DB2 DataJoiner base offering includes free of charge a 60-day trial license for the DB2 Spatial Extender. The DB2 Spatial Extender may be installed and used on a trail basis for 60 days from the date of first use of the feature. The DB2 Spatial Extender feature includes a time disabling service, which prevents its use upon expiration of the 60-day trail period. To permanently install and use this feature, purchase the DB2 Spatial Extender License Pack (31L1137).

DataJoiner supports Geographic Information System (GIS) data (also known as *spatial* or *geographic data*). New data types, spatially-enabled columns, and spatial join capability allow the user to take advantage of geographic data in applications. Powerful two-dimensional functions are included that allow the creation of specific relationships among the defined geographic objects. These components are included with the DB2 Spatial Extender:

- A set of spatial data types
- A set of spatial operations and predicates
- A set of spatial index data types

IBM DB2 Intelligent Miner for Data for AS/400 V6R1 (5733-IM3)

IBM DB2 Intelligent Miner for Data for AS/400 V6R1	
Product number	5733-IM3
Replaces product	IBM DB2 Intelligent Miner for Data V2 (5733-IM2) IBM DB2 Intelligent Miner for Data V1 (5733-IM1)
Minimum OS/400 level	V4R4
Installation prerequisites	None
Related products	None

IBM DB2 Intelligent Miner for Data for AS/400 enables knowledge workers to identify and extract high-value business intelligence from large amounts of enterprise data. Version 6 Release 1 (V6R1) offers new analysis and data exploration options to enhance core data mining capability, while making critical data more accessible to those who need it most. Business analysts and managers are empowered to make better informed decisions to improve customer relations, maximize profits, and reduce the risk of fraud and abuse.

DB2 Intelligent Miner for Data for AS/400 V6R1 places increased focus on bringing the value of data mining to more business intelligence users. Enhancements include integration with warehouse and business intelligence tools. Integrated business intelligence offerings leverage product enhancements to deliver end-to-end mining solutions to the business analyst:

- **SAP Business Warehouse**: Joint SAP and IBM technology pilots are underway to enable SAP users to use Intelligent Miner to mine data sourced from their SAP Business Warehouse. Generated models are applied and ported back to the warehouse. As both data and metadata are imported and exported, users define data once.
- **SPSS**: SPSS integration can provide Intelligent Miner for Data users with additional statistical analysis and data exploration capabilities.
- **IBM GBIS**: Global Business Intelligence Solutions continues to offer data mining consulting that is recognized as the best in the industry
- **Enhancements targeted to the data mining analyst**: DB2 extended column names are used by the Intelligent Miner. DB2 DataJoiner can be used by the Intelligent Miner to mine non-DB2 databases, including both read and write operations.
- **Enhancements targeted to the business analyst**: A powerful new visualizer is provided for interpreting the mining results created by the Associations Discovery algorithm.

Enablement features of the DB2 Intelligent Miner for Data provide the mechanisms for the integration of business intelligence tools. Applying model results to the database enriches the information available to business analysts through familiar business intelligence tools they use every day. Seamless tool integration at the glass facilitates the iterative analysis process. The first tools targeted for integration will offer additional statistical analysis and data exploration options to analysts.

DB2 Intelligent Miner for Data for AS/400 is based on a client/server architecture and mines data directly from DB2 as well as from other data sources using DB2 DataJoiner (see page 515).

IBM DB2 Intelligent Miner for Data for AS/400 – New with V6R1

- A highly interactive Associations Visualizer facilitates interpretation of mining results produced by Associations Discovery. A variety of textual and graphical representations are provided with user customizing and filtering options.
- DB2 extended column names are supported.
- DB2 DataJoiner can be used to mine non-DB2 relational data, including both read and write operations, thereby increasing Intelligent Miner's reach to enterprise data.
- Print support is provided directly to printers, including network printers, for most visualizations, thereby improving communication capability.
- Support for exporting to a comma separated variable (CSV) data format allows users of other business intelligence tools (for example, spreadsheet tools) to further drill down and interpret the significance of mining results. The import of CSV data into Intelligent Miner is supported by additional tools.
- Usability improvements to the user interface provide more intuitive usage, easier navigation, and better performance.
- A fully documented example is provided to illustrate how some Intelligent Miner models can be exported to self-contained C code. This allows further deployment of models in any user application on any platform.
- SAP Business Warehouse integration allows SAP users to mine Business Warehouse data using the Intelligent Miner for Data products.
- SPSS and SPlus integration improve productivity during the data preparation stage by increasing data exploration and analysis functions available to Intelligent Miner users through one of these statistics packages. The implementation also provides an example of how other business intelligence tools might be seamlessly integrated.

IBM Query for AS/400 (5722-QU1)

IBM Query for AS/400	
Product number	5722-QU1
Replaces product	None
Minimum OS/400 level	V5R1
Installation prerequisites	None
Related products	None

Query for AS/400 is an interactive query definition, management, and execution facility allowing users to extract and analyze data from their databases. Create and modify queries using a variety of record selection criteria. Programming knowledge is not required. Users can control the formatting of the extracted data for display upon a workstation or printer or save the data in a database file.

Query for AS/400 supports two expression operators in the Define Result Field function. These contain similar function for character and graphic data as the SQL Development Kit.

IBM DB2 Query Manager and SQL Development Kit for AS/400 (5722-ST1)

IBM DB2 Query Manager and SQL Development Kit for AS/400	
Product number	5722-ST1
Replaces product	None
Minimum OS/400 level	V5R1
Installation prerequisites	None
Related products	None

The DB2 Query Manager and SQL Development Kit for AS/400 provides an interactive query and report writing interface. It also provides precompilers and tools to assist in writing Structured Query Language (SQL) application programs in high-level programming languages.

DB2 Query Manager and SQL Development Kit for AS/400 contain these functions to assist in writing SQL queries and application programs for the DB2 for OS/400 database manager:

- **Query Manager**

  The Query Manager program is an interactive query and report generator that allows users to define and run queries accessing DB2 for OS/400 databases. Data edit and report format capabilities are also provided. Multi-system subquery allows subqueries to be performed over a distributed environment.

- **SQL Development Kit**

  The SQL Development Kit provides precompilers for processing embedded SQL statements in the C++, RPG, and COBOL programming languages. Support is provided for these DB2 for OS/400 functions:

  – IBM SQL Version 1, ANSI X3.135.1992, ISO 9075-1992, and FIPS 127-2 SQL conformance
  – Embedded static, dynamic, and extended dynamic SQL

- Declarative referential integrity
- Stored procedures
- Triggers
- Two-phase commit transaction management
- Explain function
- Long names supported for SQL objects
- Multisystem subquery
- ALIAS support
- Host variables for Large Object (LOB) data types
- Scalar subselect in the UPDATE statement
- ALIAS use for database files or members

A significant advantage of the DB2 for OS/400 database manager along with Query Manager and SQL Development Kit is that DB2 for OS/400 SQL objects are compatible with OS/400 objects.

The interactive SQL program allows users and programmers to enter SQL statements and queries interactively. Full syntax prompting is available to assist in defining SQL statements.

Query Management Facility for Windows for AS/400 Version 7 (5697-G24)

Query Management Facility (QMF) for Windows for AS/400 Version 7	
Product number	5697-G24
Replaces product	QMF for Windows for AS/400 (5697-G04)
Minimum OS/400 level	Microsoft Windows (on the IXS) or client based
Installation prerequisites	None
Related products	None

Query Management Facility (QMF) for Windows is a multipurpose, scalable enterprise query environment for business reporting, data sharing, server resource protection, robust application development, and native connectivity to DB2 for AS/400.

As a general-purpose query environment for DB2 datamarts, data warehouses, and enterprise operational data, QMF for Windows is, in many ways, more powerful and more versatile than special-purpose database front ends and single-user query tools. This is because QMF for Windows is designed for multi-user, production level data access where the broadest base of business operations must be satisfied.

QMF for Windows strategically excels at the most commonly required data access and reporting functions, providing a range of capabilities fundamental to corporate-wide

productivity. Building on the 15 plus years of history of the QMF family's development in parallel with DB2, QMF for Windows allows you to bring the same standards of performance, security, and reliability to Windows and the Web that you might have traditionally expected only from entirely host-based technologies.

32-bit Windows users (Windows 95, Windows 98, and Windows NT) may explore data within the point-and-click QMF for Windows query interface, build robust reports, automate even the most complex tasks with procedures, and automatically store the resulting QMF “objects” in a common object space shared by other QMF users across the enterprise. Alternatively, the QMF application programming interface (API) allows the user to stay entirely within their favorite Windows applications (such as Lotus 1-2-3, Microsoft Excel, or Microsoft Access) as they execute QMF objects, query multiple DB2 databases, and merge the resulting data into the spreadsheet, database, or other desktop application of choice. The user can quickly convert an unlimited number of existing QMF reports for publishing to the Web server of choice and schedule unattended refreshes, rapidly creating “warehouses” of business reports accessible to all through a Web browser.

These robust data distribution and integration capabilities are packaged with advanced administrative controls, accessible only to authorized database administrators, that prevent waste or abuse of database server resources. Administrators have a wealth of options available, from closing access to a database server altogether, restricting groups of users to a “read only” status (disallowing ad hoc query access), to finely-tuned limits on rows fetched and re-use of connections to the database. Database access techniques such as static structured query language (SQL), uncommitted read, and DB2 stored procedures are supported to minimize contention for database resources and maximize the value obtained from any given database server. In addition, detailed object use tracking helps locate heavily used (or unused) queries and forms and identify every object ever executed by a user, including how often.

Features

Connectivity

QMF for Windows V7 implements distributed relational database architecture (DRDA) and provides native support for TCP/IP connectivity to DB2 for OS/400 V4R3 (or later). For connectivity to SNA environments, it employs the Advanced Program-to-Program Communication (APPC) language and the Common Programming Interface-Communications (CPI-C) interface. By using the CPI-C interface, QMF for Windows operates with the SNA connectivity solution of your choice, such as, IBM eNetwork Personal Communications, Microsoft SNA Server, Novell NetWare for SAA, and others.

QMF for Windows features include:

- DB2 stored procedures.
- Creating and running QMF linear procedures.

- Command line parameters, which allow you to more easily automate start-up procedures and integration with other applications, such as Visual Warehouse.
- Enhanced object tracking, which allows you to view a detailed run history for all QMF objects to locate unused objects, determine frequently accessed data sources (tables/columns), and spot potential problem areas.
- Web publishing, which allows you to convert a standard QMF form to an HTML format.
- Specialized form variables for HTML publishing, which lets you build advanced Web features into your QMF report, such as hyperlink, e-mail link, and embedding images in reports. Includes report preview feature.
- Global Variables for use in QMF for Windows procedures, forms, queries, and session variables.
- QMF Form calculations (requires 32-bit QMF for Windows and IBM Object REXX).
- The most commonly used attributes of form components, now grouped together on a new form dialog for ease of use.
- Custom edit codes can be added to QMF (requires 32-bit QMF for Windows and IBM Object REXX). A sample user edit code routine is supplied that formats U.S. social security numbers, telephone numbers, and ZIP codes.
- Euro currency symbol.
- Control formatting of date and time values in your QMF reports.
- Multiple formatted reports displayed on your desktop at the same time, while performing other application functions.
- Control over the tables and QMF objects that are displayed when users view lists.
- Import/Export data, using the IXF format, that allows you to use your QMF query results to create new (or append to existing) DB2 tables.

Benefits

A summary of benefits to users, application developers, database administrators, and the enterprise follows.

User benefits

- Run queries directly to DB2 from Windows applications
- Integrate QMF objects (queries, forms, and procedures) and commands into Windows applications
- Run ad hoc queries or stored queries
- Save new queries to a local drive, network drive, or as shared QMF queries
- Select existing QMF for Windows objects from drop-down lists

- Run more than one query at a time in the foreground or background
- Query more than one DB2 for AS/400 database server at a time
- Limit size of the query results
- View resource limits in effect
- Access information about queries, such as remarks and tracking
- Use the QMF for Windows interface or your favorite application interface
- Integrate with Excel, Visual Basic, PowerBuilder (all OLE 2.0 compliant applications) using simple application macros or developer environments such as Visual Age for Basic or Visual Basic

Developer benefits

- Eliminate database gateways, middleware, or ODBC drivers
- Integrate with any Windows OLE 2.0 automation client application
- Call on QMF for Windows services with its API
- Use HELP for supplied sample API code as templates
- Bring industrial strength to ordinary desktop languages
- Leverage skills of the desktop development community
- Query in native DB2 syntax (the server's SQL)
- Get the reliability, performance, and security of DB2
- Let QMF for Windows automatically manage DB2 resources (threads, conversations, states) in the background
- Use performance enhancing technologies, such as static SQL, directly in your Windows applications
- Shield users from the complexity of connections
- Retrieve QMF for Windows objects stored on servers and launch than from within Windows applications
- Eliminate manual export and import procedures from the host to PC

Administrator benefits

- Protect DB2 from runaway queries and novice users with robust governing
- Use existing DB2 security
- Safely store Windows user resource limits at the DB2 database server
- Supports different limits for different users, groups, and schedules
- Temporarily suspend a user's limits
- Use many governing criteria, including:

- Schedule by time of day, day of week
- Maximum rows or bytes to fetch
- Amount of time a cursor can remain open without being used
- Amount of time to wait for a response from the DB2 database server
- Amount of time a connection to a DB2 database server can remain unused
- Set query isolation level
- Allow or disallow running static SQL or stored procedures
- Allow or disallow ad hoc query capability
- Allow or disallow SQL verbs including:

  ALTER, CALL, CREATE, DELETE, DROP, GRANT, INSERT, REVOKE, UPDATE, COMMENT, EXPLAIN, LABEL, LOCK, SELECT, SET

Enterprise benefits

QMF for Windows is built for the networking enterprise with the understanding of the need to connect and protect your data sources. QMF for Windows is a unique Windows querying tool, providing:

- Top performance
- Extensive control
- Features for optimizing access to large databases

Governor settings are controlled from the QMF for Windows Administrator, which is included with the product. It is easy to add to the list of servers available to users, bind database packages, grant authority, and administer resource limits by groups and schedules. This gives you control over user actions and resource consumption that can automatically change by day-of-week and by time-of-day.

In addition, QMF for Windows allows the specification of whether it will track usage and execution of QMF for Windows objects.

Now the enterprise can:

- Centralize control over server resources
- Eliminate runaway queries
- Eliminate extended open cursors
- Track user access to queries
- Maintain full security, standard authorizations
- Exploit DB2 performance, system integrity
- Support a variety of DB2 database servers

Note: QMF for Windows V7 “Try and Buy” can be obtained from the QMF Web site at:
`http://www.ibm.com/software/data/qmf`

DB2 Warehouse Manager for AS/400 (5697-G23)

DB2 Warehouse Manager for AS/400 5697-G23	
Product number	5697-G23
Replaces product	5697-VW5 Visual Warehouse 5.2
Minimum OS/400 level	V4R4
Installation prerequisites	Warehouse server and administrative client components of DB2 UDB Enterprise Edition V7.1
Related products	None

Data warehousing is the foundation for business intelligence and customer relationship management. To provide the best benefit for your business, data warehousing needs to:

- Accurately translate business users' needs into workable data models
- Build a readily accessible data warehouse to continually draw on diverse application and data sources
- Maintain a warehouse that is responsive to changing user needs in an ad hoc query environment.

DB2 Warehouse Manager for AS/400 provides access to IBM and non-IBM data sources. It empowers the data center to govern queries, analyze costs, manage resources, and track usage. It provides a rich graphical environment to create and manage high performance, scalable DB2 data warehouses from your workstation.

Once the warehouse is in place, DB2 Warehouse Manager provides flexible, easy-to-use tools to access the data warehouse, and to govern and track its usage. Features for these functions follow:

- **Data Warehouse Center**: Within the DB2 Control Center of DB2 Universal Database is the Data Warehouse Center, which serves as the command console for warehouse management. Use the Control Center to access multiple sources of data, extract and build processes, analyze, test and monitor processes with a unique graphical environment. Standard transformations within the product provide powerful functions, saving valuable time, resource, and development testing.

  The Data Warehouse Center provides access to DB2, Oracle, Sybase, Informix, Microsoft, flat file, ODBC, and OLE database sources. As your data warehousing needs diversify, DB2 Warehouse Manager makes it easy to provide access to disparate data sources and populate dependent datamarts across distributed platforms from a centralized control point.

- **QMF for Windows**: This functionality provides extends business reporting capabilities to Windows clients or Web browsers. QMF for Windows allows you to integrate query results with any OLE2 desktop tool including spreadsheets, report writers, and desktop databases. Launch Java queries and publish reports to the Web. Use command line parameters or APIs to integrate function.
- **Information Catalog**: This helps users find, understand, and access the data available to them so they can quickly make informed decisions using accurate data. Populate the catalog with popular OLAP, query, and desktop tools.
- **AS/400 Agent**: This is a powerful tool, running natively on the AS/400, which manages the flow of data between the data sources and the target warehouses.

  Note: The AS/400 Agent contained in the DB2 Warehouse Manager requires AS/400 V4R5 for full function (Java stored procedures). DRDA support requires AS/400 V4R3, or later, for TCP/IP support to DB2/400.

IBM Warehouse Manager for AS/400 V7.1 DB2 Forms V2 (5697-G23)

DB2 Forms is used to build Java and Windows front ends to any DB2 for OS/400 V4R3 or later. DB2 Forms Version 2 provides a drag-and-drop solution to quickly build user-friendly, robust e-business front ends to any DB2 database. Users can simply drag-and-drop to create tightly controlled cross- platform applications to embed into existing Web pages, run as stand-alone Java applications, or distribute throughout 32-bit Windows environments.

A DB2 Forms wizard and point-and-click business and data validation rules facilitate rapid creation of any number of unique applications for viewing, creating, or updating DB2 data. Application code stays at the DB2 server for access by users wherever they are, so new applications or application changes are available instantly and globally. Application access is centrally controlled.

DB2 Forms Version 2 has built-in support for DB2 data warehouses and operational data allows applications to be created and executed, seamlessly and on demand over closed SNA environments, intranets, or the Internet. Overnight, Web sites can gain the ability to host scalable, data-intensive e-business applications that read and write directly to the open architecture of the DB2 database of choice.

DB2 Forms Version 2 requires no database gateways, middleware, or ODBC drivers. However, it permits users to choose among the open connectivity of the JDBC standard, the DB2 Call Level Interface (CLI), or The Open Group's Distributed Relational Database Architecture" (DRDA).

DB2 Forms Version 2 generates on-line applications that can be run as Java applets embedded in Web pages for access through a browser, or as stand-alone Java applications without a browser. It generates the specifications for a Java application in XML vocabulary,

laying the groundwork for future integration in Web-based data interchange and leveraging of IBM's DB2 XML Extender. This compliance to standards adds universal portability to DB2 Forms applications, allowing application developers, end users and the enterprise to enhance any Web site's data handling and e-business capabilities.

It can also generate Windows-based applications which may be distributed freely on demand over networks while remaining architecturally coupled to DB2 via the open standards of DRDA.

Suggested reading

http://www.ibm.com/software/db2forms

IBM System/38 Utilities for AS/400 (5722-DB1)

IBM System/38 Utilities for AS/400	
Product number	5722-DB1
Replaces product	None
Minimum OS/400 level	V5R1
Installation prerequisites	None
Related products	None

System/38 Utilities is used for running applications that were written using System/38 Data File Utility or System/38 Query and that were migrated from the System/38. The alternative is to rewrite all these existing System/38 applications. The Text Management/38 component of System/38 Utilities for AS/400 is for use by migrators whose word processing and data processing personnel use the Text Management/38 component of System/38 Personal Services.

TCP

TCP

TCP/IP Connectivity Utilities (5722-TC1)

The TCP/IP communication protocol function, along with related administration and configurations, is packaged with OS/400. TCP/IP applications, such as TELNET, Simple Mail Transfer Protocol (SMTP), File Transfer Protocol (FTP), Routing Information Protocol 1 and 2 (RIP), and LPR/LPD (remote print support) remain part of the TCP/IP Utilities along with the Pascal-based API. These TCP/IP Utilities are automatically shipped to all customers that order OS/400.

TCP/IP is fundamental to the network computing paradigm. Much of the new iSeries e-business infrastructure runs exclusively on TCP/IP, including Lotus Domino, Java, WebSphere, Web serving, and IBM Network Stations. Recent TCP/IP enhancements make iSeries an even more powerful e-business server.

Enterprise-class TCP/IP for Real Business Networks

TCP/IP is an extremely popular protocol and is now regarded as the de facto standard for computer networking. iSeries servers come with a complete and robust suite of TCP/IP protocols, servers and services. It is easy to implement full-featured intranets by simply cabling iSeries servers and workstations together and starting the desired services. In most cases, no additional software or hardware is required.

GUI Configuration Support

TCP/IP networking on iSeries is simpler than ever to administer, manage TCP/IP server from a single graphical interface. You can define Dynamic Host Configuration Protocol (DHCP), Domain Name System (DNS), Dynamic Domain Name System (DDNS) servers, and many others directly from the Operations Navigator running on a PC client.

iSeries TCP/IP configuration can be managed through all new graphical user interfaces which is now integrated with the iSeries Operations Navigator. Included is a graphical wizard that provides simplified step-by-step guidance for configuring TCP/IP. A service to centrally administer all workstation configuration data for IP networks is included with OS/400. This service is based on the Dynamic Host Configuration Protocol (DHCP). iSeries server network administration has never been easier.

The TCP/IP protocol stack on the iSeries is tuned for robust, secure, and scalable TCP/IP services and servers. The results in significant improvements in capacity for TCP/IP users.

TCP/IP Connectivity Utilities – New in V5R1

TCP/IP Connectivity Utilities software enhancements in V5R1 include:

- **Domain Name System (DNS)**: Now reaches industry level BIND 8.2 and dynamic update capabilities (DDNS). Combined with enhancements made to Dynamic Host

Configuration Protocol (DHCP), it allows configuration information to be sent dynamically to update the Domain Name System (DNS).

- **Network Quality of Service (QoS)**: The iSeries QoS functions for managing TCP/IP traffic provide the ability to drop, mark, and shape TCP/IP traffic based on the QoS policy to be applied.
- Enhancements to **OS/400 File Transfer Protocol (FTP)**.
- Enhancements to **Simple Mail Transport Protocol (SMTP)**.
- Enhancements to **OS/400 Telnet**.
- **Network Security and VPN**: iSeries Virtual Private Network (VPN) support is enhanced to provide additional security, greater reliability, improved performance and easy of use.
- **VPN configuration**: Use the VPN wizard to setup and implement your network security policy.
- **Networking Software Management and System Setup** (new in V5R1):

  Several TCP/IP management enhancements in V5R1 give the network administrator more control when monitoring their TCP/IP network and troubleshooting networking problems. The enhancements include:

  – A graphical version of network status (NetStat)

  – The ability to trace the route a TCP/IP packet takes through the network (TrcRoute) (This includes a TrcRoute CL command)

  – The ability to find a host name for an IP address, or to find an IP address for a host name (Also known as NSLookup).

  – Address resolution protocol (ARP) cache monitoring. You can monitor, and manage the ARP cache now.
- **Internet Setup Wizard**: The iSeries Internet Setup Wizard simplifies the steps required to connect your iSeries to the Internet and provide application and Web serving.
- **Point-to-Point (PPP) connectivity enhancemen**ts: Operations Navigator enhancements improve the ease of use when configuring and managing PPP connectivity.
- **Support for Lightweight Directory Access Protocol (LDAP) Directories**: New support has been added to allow information about iSeries printers and NetServer print shares to be published into LDAP directories.
- **Internet Printing Server for iSeries**: The Internet Printing Protocol (IPP) defines an industry-standard method of delivering print jobs using Internet technologies providing for Web-enabled print compatibility around the world.

- **Multilink**: The PPP Multilink Protocol (MP) allows to group multiple PPP links together to form a single virtual link.
- **RADIUS**: RADIUS is the widely used standard for user authentication, authorization, and accounting.

TCP/IP Connectivity Utilities for iSeries (Included in 5722-TC1)

TCP/IP Connectivity Utilities for iSeries has a rich suite of servers and services including:

- GUI configuration support
- File Transfer Protocol (FTP) client and server
- Simple Mail Transfer Protocol (SMTP)
- Post Office Protocol (POP) Version 3 server
- Web-based Administration server
- Network File System (NFS) client and server
- Domain Name System (DNS) server
- Dynamic Domain Name System (DDNS) server
- Dynamic Host Configuration Protocol (DHCP) server
- IP Printing
- Line printer requester (LPR) and line printer daemon (LPD)
- 5250/HTML Workstation Gateway (WSG) server
- TELNET client and server
- Remote EXECution (REXEC) client and server
- Remote IPL support
- BOOT-P server
- TFTP server

The iSeries servers support a wide range of physical interfaces including:

- IBM Token-Ring LAN
- Ethernet LAN
- Ethernet 100 Mb LAN
- 1 Gbps Ethernet
- Frame relay
- Wireless (LAN)
- Integrated PC Server LAN
- Asynchronous support
- Synchronous support
- ATM (LAN emulation)

The base protocols are implemented within OS/400 and OS/400 microcode for excellent performance, security, and stability.

Included in base	Yes
Status	No charge
Related Products	OS/400 for iSeries

TCP/IP Internet Setup Wizard

The iSeries Internet Setup Wizard simplifies the steps required to connect your iSeries to the Internet and provide application and Web serving. The wizard allows you to connect your iSeries to an Internet Service Provider (ISP) over a dial-up connection or directly through a LAN connection. The Wizard can also connect your intranet iSeries to the Internet through a firewall or router and allow for Web and application serving by the iSeries over that connection.

Network Quality of Service (QoS) – New in V5R1

In V5R1, iSeries provides the ability to control and manage TCP/IP traffic in the network and take advantage of the leading-edge networking Quality of Service (QoS) functions contained in routers and switches. The iSeries QoS functions for managing TCP/IP traffic provide the ability to drop, mark, and shape TCP/IP traffic based on the QoS policy being applied. In addition, QoS admission control capability is provided for controlling bandwidth management requests. The QoS functions supported are:

- Resource Reservation Protocol (RSVP) including an iSeries RSVP agent
- RSVP APIs (X/Open standard APIs) for applications
- Differentiated Services (DiffServ)
- QoS policies based on the TCP/IP 5-tuple (Source IP address, Destination IP address, Source Port, Destination Port, and Protocol), address ranges, and wild-cards. This support includes a policy agent, and a wizard-based GUI in Operations Navigator for configuring the QoS policies.
- QoS monitoring APIs and a GUI for monitoring the effectiveness of your QoS policies

TCP/IP Base Protocol Support

iSeries natively supports all the base TCP/IP communications protocols. TCP/IP applications are typically implemented to the SOCKETS API which support both TCP (connection-based) and UDP (connectionless) applications. As an alternative to the SOCKETS API, applications can be implemented to Remote Procedure Call (RPC) which is based on SUN Version 2 of network file system (NFS). The base protocols of IP, ICMP, and ARP are fully supported as are the security protocols IPSec and IKE. iSeries TCP/IP conforms to all relevant RFCs. Its communications performance characteristics are equal to or better than SNA in most cases.

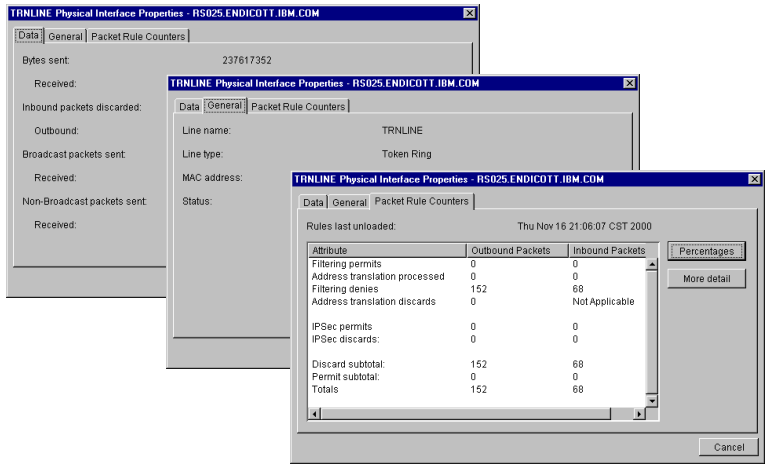
Sockets over SNA

AnyNet/400 Sockets over SNA allows applications written to the sockets interface to communicate between iSeries servers in an SNA environment. AnyNet/400 provides this with little or no change to application programs. AnyNet/400 Sockets over SNA is compatible with AnyNet/2 and AnyNet/MVS and, therefore, provides connectivity to workstation and host environments.

Simple Network Management Protocol (SNMP)

Simple Network Management Protocol (SNMP) provides a means for managing an Internet environment. SNMP is used in each node of a TCP/IP network that is monitored or managed by an SNMP manager. An iSeries SNMP agent provides support for the exchange of network management messages and information among hosts. OS/400 supports Management Information Base II (MIB-II). The features included in SNMP for iSeries are:

- SNMP APIs for managing applications have the ability to manipulate management data via local or remote SNMP agents. Using AnyNet/400 support, information can be retrieved from systems on SNA or TCP/IP networks, which makes it easier to discover and manage potential problems anywhere within the network.
- SNMP agents are extendable, and APIs are provided that allow the dynamic addition of sub-agents to show additional information needed to make good management decisions. OS/400 also supports a Host Resources Management Information Base (MIB) for hardware and software inventory of an iSeries server. Independent Software Vendors (ISVs) can use the SNMP APIs to write iSeries management applications to collect inventory data, monitor and change resources in the network and a variety of other tasks. They can also write sub-agents that allow access to additional iSeries management information from management applications running on other platforms.



- The SNMP management function is split between two kinds of entities, named the “manager” and the “agent”. The SNMP agent function runs on the iSeries server and allows it to be managed by network management stations that have implemented the SNMP manager function. The OS/400 SNMP agent provides configuration,

performance, and problem management data concerning TCP/IP to an SNMP manager. Management Information Bases supported include:

  - MIB-II
  - Transmission Groups
  - APPN
  - Private

- Placing printers in a TCP/IP network on a LAN is common practice today. SNMP management gives you the option to send print files to those printers and manage responses from those printers in this network. This option is configured in the OS/400 printer device description and is based on the industry-standard Simple Network Management Protocol (SNMP). It supports SNMP printers that support the printer message information block (MIB).
- Prior to V4R5, either the current Printer Job Language (PJL) driver or Line Print Requestor (LPR) is used to print to ASCII printers with the output from the Host Print Transform. The new SNMP driver allows more printers to be accessed from an iSeries server with the same capabilities seen with direct attached printers or those using the Printer Job Language (PJL) driver.

NETwork STATus (NETSTAT)

NETwork STATus (NETSTAT) allows a system administrator to monitor and control the network status of an iSeries server running TCP/IP or APPC over TCP/IP applications. iSeries NETSTAT provides information about the status of TCP/IP network interfaces, routes, and connections on a local iSeries server.

A graphical version of network status (NetStat) that includes the ability to map a socket connection to a list of jobs for that connection.

Trace Route – New in V5R1

In V5R1 Operations Navigator includes an interface to the Trace TCP/IP Route (TRACEROUTE) CL command. Use it to trace the route of IP packets to a user-defined destination system. Each system along the way is referred to as a hop. Each IP packet contains an upper limit (called Time To Live (TTL)) for the number of hop systems the packet can pass through. The trace ends when either a packet response is received from the destination system or when the packet TTL value equals the maximum allowed (255).

Lookup Host (NSLOOKUP)

The Operations Navigator Lookup hot utility now allows to search a host name for an IP address, or to search an IP address for a host name. Using NSLOOKUP via the green screen interactive query tool gives you more function. But for a simple day-to-day queries of the mappings between names and IP address, the Operations Navigator utility is perfect.

Dynamic IP Routing (RIP and RIP2)

Routing Information Protocol (RIP) is a dynamic IP routing protocol that communicates with adjacent routers, informing each other of their respective network connections. Dynamic routing protocols make network maintenance easier and improves network performance and reliability. iSeries includes both RIP version 1 and RIP version 2. Version 2 of RIP adds security and efficiency features.

Proxy Address Resolution Protocol (Proxy ARP)

Proxy ARP is an IP networking technique that allows one machine, the proxy agent, to answer ARP request on behalf of another machine. It is useful for SLIP, PPP, and twinax connections. This is because it can make devices appear to be all logically on the same local LAN subnet and, therefore, avoid the need to implement either dynamic routing protocols or static route definition.

Point-to-Point Protocol (PPP)

Point-to-Point Protocol (PPP) is an open protocol for wide area network TCP/IP connectivity that can support both dial and leased lines. It can be used to extend an enterprise intranet across multiple locations. It is also the defacto standard for connecting to the Internet through an Internet Service Provider (ISP). PPP is a more robust alternative to SLIP (Serial Line Internet Protocol), when used as a dial-up protocol. PPP's IDSN support enables iSeries to attach to ISDN switched networks. Using PPP, the iSeries provides an excellent integrated solution for remote LAN access and as a remote office gateway into an organization's intranet.

Point-to-Point (PPP) Connectivity Enhancements – New in V5R1

Operations Navigator enhancements improve the ease of use when configuring and managing Point-to-Point connectivity. Significant enhancements in function and the GUI capabilities improve the iSeries Point-to-Point connectivity.

- Multi-link allows multiple PPP links to be grouped together to form a single virtual link or bundle. The links that make up the bundle must be the same type. For example, all L2TP lines, all PPP analog leased, all PPP ISDN switched, etc. If a switched line connection is utilized, the PPP connection could be configured to use multiple links for one connection.
- MP requires that MP support is implemented on both ends of a PPP link. MP can be implemented with both Originator and Receiver Connection Profiles. The benefits of MP include:
  - Reducing the latency of data sent between systems by increasing the total effective bandwidth.

- Increased reliability through the use of multiple lines. If a line fails, the link is maintained as long as one line in the MP bundle remains operational.
- The ability to dynamically add and remove lines from a bundle allows bandwidth to be supplied as needed, making more efficient use of the bandwidth available.

Application Programming Interfaces (APIs): SOCKETS and RPC

Many times an enterprise has unique interoperability requirements for its private networks. The enterprise must provide its own applications to fulfill these unique requirements. iSeries provides programming interfaces to accomplish this. The Sockets API allows distributed applications to exchange data locally and over networks. Both connection-oriented and connectionless communications are supported by the Sockets API. In addition to IP, you use the Sockets API to write applications that communicate over Internetwork Packet Exchange (IPX) protocols directly.

Also, available to distributed application developers is the Remote Program Call (RPC) interface. This approach views remote applications essentially as callable programs. In addition, both Java and Lotus Domino provide various programming options for implementing distributed applications over TCP/IP networks.

Sockets and SSL Support

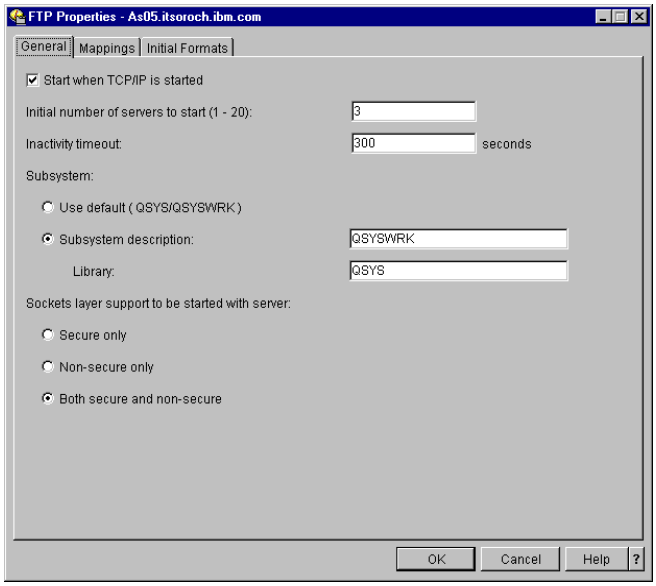
Sockets programming uses the socket application program interface (API) to establish communication links between remote and local processes. The sockets API is located in the communications model between the application and the transport layers. The sockets API allows applications to interface with the transport or networking layers on the typical communications model. It is shipped as part of OS/400. The sockets API is part of the open environment on the iSeries server. The sockets API, along with the Integrated File System, eases the effort that is required to move UNIX applications to iSeries servers.

Note

With V5R1, OS/400 now also supports Transport Layer Security (TSL). For further information on TSL, see “Transport Layer Security Support on iSeries (TSL)” on page 542.

Asynchronous I/O Completion Port Support and APIs for OS/400 Sockets

TCP/IP includes support for Asynchronous I/O Completion Ports (Async IOCP) as part of the OS/400 sockets APIs implementation. These new socket APIs provide scalable, efficient, and powerful method for multi-threaded Internet and e-business server applications to process client data.



Internet, e-business, and other network server applications utilizing Asynchronous I/O Completion Ports design models and APIs should allow a much smaller pool of threads to process work from clients when compared to other design models and APIs. In the typical threaded server application design model, there is usually one thread per client connection. Each thread, especially in applications where there is intermittent data flow being exchanged, such as an interactive application like TELNET, spends much of its time waiting for data. This means each thread expends CPU cycles going to sleep when no data is available or waking up when data finally becomes available.

Applications using Async IOCP designs and APIs should allow any of the applications threads to service any client. This means fewer threads are needed per server application, and each thread is constantly kept busy. Therefore, little or no system resource is consumed by the server application's threads either waiting for data, going to sleep, or waking up. This means that for many Internet or e-business applications designed and written to use Async IOCP APIs, there can be a drastic and dramatic reduction in CPU utilization rates. In general, less system CPU resource, less paging resource, less system memory, and less system storage is needed by Async IOPCP-enabled applications.

Sockets on the system are based on and are compatible with Berkeley Software Distributions (BSD) 4.3 sockets. Application programs written in the Integrated Language Environment (ILE) C/400 language can use the sockets API.

Secure Sockets Layer (SSL) is a security protocol that provides privacy over an open communications network (for example, the Internet). SSL protocol allows client/server applications to communicate in a way that is designed to prevent eavesdropping, tampering, and message forgery. Many applications on the iSeries servers are SSL enabled in V4R4, including TELNET, HTTP server, CA/400 host servers, systems management, and LDAP. Also, OS/400 SSL support includes a set of APIs, which, when used in addition to the existing OS/400 sockets APIs, provide the functions required for applications to establish secure communications.

Transport Layer Security Support on iSeries (TSL)

Support for Transport Layer Security (TLS) is the latest protocol and the industry-standard definition of Secure Sockets Layer (SSL) support.

The TLS protocol, is an evolutionary upgrade of the SSL Version 3.0 protocol. TLS Version 1 and SSL Version 3 share the same basic record construction and line flows. TLS provides the same function as SSL and is compatible with SSL, but includes new features and clarifications for protocol flows. TLS helps standardize the SSL definition and implementation, making the SSL protocol more secure, and the specification of the protocol is more concise and complete.

TLS support on the iSeries server allows customers and business partners continued access to take advantage of the latest technology implementation of Internet application security enablement in the industry. TLS support is automatically part of any SSL-enabled application, like HTTP and TELNET servers. Parameter values on the SSL APIs enable TLS for business partner and customer-provided SSL applications.

TCP/IP Packet Security

TCP/IP packet security selectively limits, or journals, network access to applications and services. This security enables additional protection for iSeries servers that run sensitive applications or act as Web servers. TCP/IP packet security helps protect an entire subnetwork when the iSeries acts as a casual router.

Virtual Private Networks

iSeries virtual private networking support is based on industry standards that include:

- IP Security Protocol (IPSec)
- Internet Key Exchange (IKE)
- Layer 2 Tunneling Protocol (L2TP)

The iSeries virtual private network (VPN) solution applies to these environments:

- **Intranets**: Secure connections within an intranet
- **Extranets or ValueNets**: Secure connections between intranets of different companies
- **Remote office or branch office**: Secure connections between intranets of the same company
- **Mobile workers**: Secure connection from a mobile worker, using different Internet Service Providers (ISPs) to an intranet

VPN – New in V5R1

iSeries VPN (Virtual Private Networking) support, introduced in V4R4, is enhanced to provide additional security, greater reliability, improved performance and is easier to use. Operations Navigator has been redesigned to intuitively navigate VPN configurations, and you can use the VPN wizard to setup and implement your network security policy. Digital certificates provide a scalable and secure mechanism for cryptographic operations. Now in V5R1, you can use them in your VPN configurations to authenticate the identities of the VPN endpoints. An integral part of iSeries VPN is IP Packet Filtering. In V5R1, this component is enhanced to allow filter activation and deactivation on a per-interface basis.

Layer 2 Tunneling Protocol (L2TP)

Layer 2 Tunneling Protocol (L2TP) is an enhanced link protocol that provides a multi-hop virtual circuit through the Internet. L2TP is also known as “Virtual PPP” since it creates a virtual circuit at a link layer and then utilizes Point-to-Point Protocol (PPP) to complete the connection at the network layer. L2TP is typically used in conjunction with Virtual Private Networks (VPN) to provide a secure connection over the Internet.

The following modes are supported for Layer 2 Tunneling Protocol:

- **Remote dial-on-demand (compulsory tunnel)**: This mode type is to enable the iSeries to set up an L2TP tunnel between an ISP and your iSeries server. The remote user would be unaware that any tunneling was occurring. Compulsory tunnels are ideal, but the ISP of your choice must support this L2TP mode.
- **Initiator-on-demand (voluntary tunnel)**: This mode is to enable the iSeries to automatically connect to a remote system over an L2TP tunnel. When outbound IP traffic needs to be routed to a remote system, this iSeries would automatically initiate a tunnel to connect to the remote system which would act as the L2TP Network Server (LNS).
- **Multi-hop**: This mode type enables the iSeries to redirect L2TP traffic on behalf of client L2TP Access Concentrators (LACs) and L2TP Network Servers (LNSs). To establish an L2TP Multi-hop connection, this iSeries would act as both an LNS to one or more LACs at the same time as acting as a LAC to a given LNS.

UDP multicast support is now enabled on iSeries. Applications written using this support can make better use of the bandwidth thus reducing network costs. This represents another improvement to the overall TCP/IP enablement package for iSeries which can be accessed through the industry standard sockets API.

TCP/IP Servers and Services Descriptions

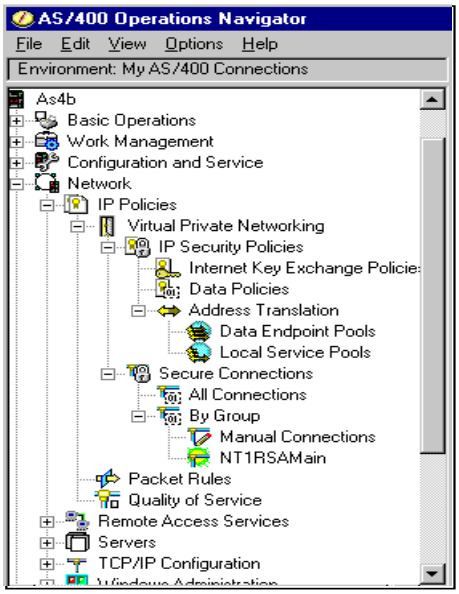
Anonymous FTP

Anonymous FTP support provides access to a restricted area of data on the iSeries server that the public can access without a password or user identification. The anonymous FTP supports graphical FTP clients and Web server development tools.

File Transfer Protocol (FTP) Client and Server

File Transfer Protocol (FTP) allows users to send or receive copies of files to or from systems across a TCP/IP network. FTP also provides functions for renaming, adding, and deleting files.

OS/400 TCP/IP supports the following FTP functions:



- Transferring database files of up to 1 TB.
- Transferring save files and members in physical files, logical files, distributed data management files, and source physical files.
- Transferring binary files “as is”.
- Using exit points to pass control to exit programs for anonymous FTP and security controls.
- Sending text files in EBCDIC format or converting them to ASCII (the default format).
- Creating and deleting libraries, files, and members using iSeries FTP server subcommands.
- Creating and deleting folders and directories using iSeries FTP server subcommands.
- Running FTP unattended in batch mode.
- Converting double-byte character set (DBCS) data from iSeries EBCDIC code pages to and from Internet ASCII code pages.
- Ability to transfer database files containing null field data.
- Support for popular graphical FTP clients and Web server development tools. This enhancement includes support for UNIX format file listings from the iSeries FTP server.
- Ability to use directories other than database libraries as the initial working directory for the iSeries FTP server.

- Options to create new database files using the system or user default CCSID.
- Ability to transfer files larger than 2 GB in all file systems that support these file sizes.

The *Trivial File Transfer Protocol (TFTP)* is used by thin clients, such as the IBM Network Station, to receive their initial program load. The iSeries TFTP server includes an extension called broadcast TFTP that dramatically improves load time when many Network Stations are requesting loads simultaneously (for example, after a power outage).

Lightweight Directory Access Protocol (LDAP) on the iSeries

OS/400 provides an LDAP-accessible directory server and corresponding APIs that communicate with other LDAP directory servers. APIs are provided for both OS/400 and Windows applications written in Java, C, and C++. LDAP-enabled applications, such as Internet mail clients, can access, update, and manage the iSeries directory.

You can develop OS/400 applications to use LDAP for managing distributed information across the Internet and intranets using LDAP directories for both IBM and non-IBM platforms. iSeries user information, such as e-mail addresses, is accessible to mail clients and other LDAP applications.

Directory Services implements SecureWay Directory for OS/400. This provides support for LDAP V3. LDAP V3 includes support for internal characters (UTF-8), which supports national language data and is a mixed, multibyte codepage. LDAP V3 also provides support for dynamic schema where the schema is stored in the directory and is managed by the LDAP server. The schemas can be updated using the new Directory Management Tool, importing from an Lightweight Directory Access Protocol Data Interchange Format (LDIF) file, or from LDAP command line utilities.

- Directory Management Tool (DMT) to administer directory contents and schema. DMT is a GUI tool used to manage LDAP directory content. It is part of the Windows LDAP client, which is included with iSeries Directory Services. Use the Directory Management Tool to:
  - Browse the directory schema
  - Add, edit, and delete object classes and attributes
  - Browse and search the directory tree
- SecureWay Directory schemas support the IBM standard object classes and attributes to enable your LDAP directory for applications using the IBM schema.
- Simple Authentication and Security Layer (SASL) is supported and is a method for adding authentication support to connection-based protocols. The SASL External mechanism can be used to establish secure client connections that use SSL client authentication. The SASL CRAM-MD5 mechanism provides a one-way encryption mechanism to securely authenticate clients without incurring the overhead associated with SSL.

LDAP Directories Support – New in V5R1

New support is added to allow information about iSeries printers and NetServer print shares to be published into LDAP directories. This allows the user to write applications that query the LDAP directory for iSeries printer information such as a printer's location or capabilities. It also allows the user to configure iSeries printers directly on their Windows 2000 desktop by using the Add Printer wizard available in Windows 2000 and specifying that the information necessary to publish the printer be obtained from the Windows 2000 Active Directory.

Simple Mail Transfer Protocol (SMTP)

Simple Mail Transfer Protocol is used to send or receive electronic mail. For consistency with other iSeries mail functions, SMTP interoperates with Systems Network Architecture (SNA) Distribution Services (SNADS) through AnyMail/400. SNADS and AnyMail/400 are part of OS/400.

SMTP supports mail objects up to 2 GB, SMTP distribution, MIME, optional automatic enrollment of senders of incoming mail, in the system distribution directory and alias tables, OfficeVision for AS/400 notes, messages and attachments. You can tune SMTP depending on the mail load on your system, therefore enabling greater scalability.

New option to enable journaling for mail delivery status tracking and mail statistics. Like TELNET and FTP, SMTP supports both client and server functions on iSeries. It can serve as a mail gateway to Interconnect SNADS, and TCP/IP SMTP electronic mail networks.

iSeries SMTP is enhanced with the following features:

- Increased simultaneous connection support. iSeries SMTP is no longer restricted to a maximum of 16 inbound and 16 outbound simultaneous mail connections. You can tune SMTP depending on the mail load on your system, and therefore, enable greater scalability.
- Enhanced domain name system resolver support. The iSeries SMTP client processes all mail exchanger (MX) records returned by a domain name server query. This means that there is less undeliverable mail when sending to large Internet Service Providers.
- New option to enable journaling for mail delivery status tracking and mail statistics.
- New option to require all mail received by iSeries SMTP to be processed by the iSeries Mail Services Framework (MSF) to improve security.
- Enhancements for the automated retry of mail when dial-up connections are established and finer granularity of mail delivery retry timing.

Post Office Protocol (POP) Version 3 Server

The Post Office Protocol (POP) Server is the iSeries implementation of the POP3 mail server. This server enables iSeries to act as a POP server for any client that supports the POP mail

protocol, including major e-mail clients, such as Netscape and Eudora, running in Windows, OS/2, AIX, and Macintosh. The POP server allows users to exchange mail, including Multipurpose Internet Mail Extensions (MIME) mail, between OfficeVision for AS/400 and POP clients through the AnyMail/400 mail server framework which is part of OS/400.

Domain Name System and Dynamic Domain Name System Server

OS/400 includes a full-function DNS server. It can be configured for primary, secondary, and caching roles. DNS configuration data from other platforms can easily be migrated to the iSeries DNS server. In addition, a migration utility that moves existing iSeries host table information into the DNS configuration databases is provided.

DDNS - New in V5R1

OS/400 DNS (Domain Name System) services are enhanced significantly in this release. The V5R1 OS/400 DNS services are based on the widely used industry-standard DNS reference implementation. Topping the list of enhancements are the new dynamic update capabilities, which have transformed the DNS into a Dynamic DNS (DDNS).

Prerequisite for DNS BIND

The new BIND version 8.2 of the DNS services requires the installation of the operating system feature PASE (option 33).

Combined with enhancements made to iSeries Dynamic Host Configuration Protocol (DHCP) server that allow it to be configured to send dynamic DNS update transactions, iSeries now supports an integrated Dynamic IP solution that automatically manages TCP/IP addresses and their associated DNS host names on your networks.

Dynamic Host Configuration Protocol (DHCP) Server

Deploying DHCP to centrally control all TCP/IP workstation configuration tasks can dramatically reduce the cost of managing a TCP/IP network. DHCP is a standard protocol supported natively by most popular workstations including Windows 95/NT, UNIX and IBM Network Station. Using DHCP, all IP configuration data (IP addresses, subnet masks, default routers, etc.) is dynamically assigned when new workstations are added to the network. Furthermore, DHCP can automatically recover and recycle network resources when workstations are removed from the network. These capabilities eliminate the time-consuming and error-prone task of manual workstation configuration.

OS/400 includes a full-function DHCP server with an intuitive GUI administrative interface. OS/400 also comes with a DHCP relay agent (also called a BOOT-P relay agent), which can be deployed to route DHCP requests from multiple subnetworks to one or more central DHCP servers.

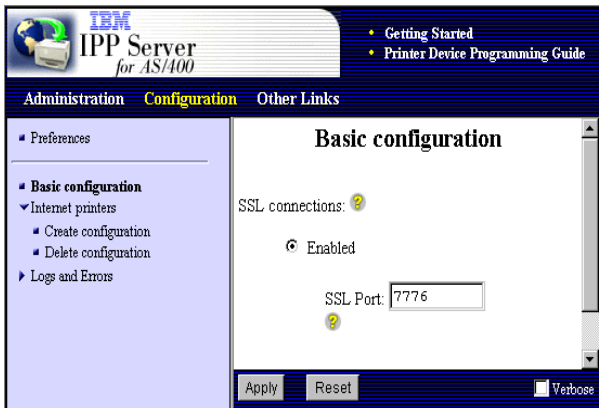
IP Printing to Network Printers

The iSeries has a built-in print driver for direct IP printing to HP PCL/PJL compatible network printers. Automatic conversion of SNA Character String (SCS) and Advanced Function Printing (APF) print data into HP Printer Control Language (PCL) is done using the iSeries Host Print Transforms. In addition to direct support of a variety of network printers from HP, IBM and other vendors, the PJL support also can monitor status from those printers. Printing for TCP/IP networks can also be implemented using the Printer Passthru function available in Client Access. See “Telnet client and server” on page 549 for more details.

Internet Printing Server for iSeries

The Internet Printing Protocol (IPP) defines an industry-standard method of delivering print jobs using Internet technologies providing for Web-enabled print around the world. The IPP was developed by the Printer Working Group, a consortium of all major companies involved in network printing. IPP is fast becoming the single standard interface for printing on the Internet, with broad vendor implementation and customer acceptance.

The IPP Server for iSeries, included in OS/400, provides an IPP Version 1.0 compatible print server for the iSeries. The IPP Server for iSeries allows anyone working remotely, to submit and manage print jobs on a distant iSeries. IPP is built on top of HTTP, which in turn, runs over TCP/IP. Customers can now use the same print solution on local area networks, intranets, and the Internet. The same process used to send a print document to the department printer down the hall can be used to send the document to the corporate printer across the country.



The IPP Server for iSeries provides security features for user authentication and encryption of print jobs using Secure Sockets Layer 3 (SSL).

Line Printer Requester (LPR) and Line Printer Daemon (LPD)

Line Printer Requester (LPR) and Line Printer Daemon (LPD) allow users to print a spooled file from any system in a TCP/IP network. LPR is the sending or client portion of the spooled file transfer. LPD is the receiving or server portion of the spooled file transfer. On the iSeries, the Send TCP/IP Spooled File (SNDTCPSPLF) CL command allows you to print a spooled file on a remote system and specify appropriate printing operations. You can send files to iSeries servers and non-iSeries systems.

Telnet client and server

The Telnet protocol allows a system (the Telnet client) to access and use the resources of a remote system (the Telnet server) as if the Telnet client's workstation were locally connected to the remote system. iSeries Telnet provides both the Telnet client and the Telnet server functions. The Telnet protocol provides a mechanism for the client and server to negotiate options that control the operating characteristics of a Telnet connection. Among other things, these negotiations involve determining the best terminal type supported by both the client and server.

Depending on the terminal type negotiated, the iSeries Telnet client operates in one of the following full-screen modes: 3270, 5250, VT100 or VT220. The iSeries Telnet server operates in ASCII line mode or in one of the following full-screen modes: 3270, 5250 or VT100. The functions available in a Telnet session depend on the operating mode. Security and automation features are included in the iSeries Telnet 5250 server:

Registered Telnet server exits for both session initialization and session termination. These exits require only that a customer-written user exit program be registered at the proper exit point. No changes are needed for the connecting Telnet client emulator, so existing clients can immediately benefit from this feature.

Virtual Device selection by the attaching client (or a registered Telnet server exit program) provides for more traditional job-routing to preferred subsystems and allows for associated work management tuning. With Virtual Device selection, preferred code page, character set, and keyboard attributes can be established on a per session basis, thereby offering greater flexibility in national language support.

Printer Passthru support consists of two new terminal (IBM 3812-1 and IBM 5553-B01) which provide additional printer support for the TCP/IP environment. This support allows the Telnet server to provide the client with the flexibility to dynamically create and/or select a virtual printer device through enhanced negotiation, or via assignment by the initialization exit program.

Telnet server supports secure Telnet sessions via SSL.

Network Address Translation (NAT) TCP/IP Address Mapping and Hiding

When the TCP/IP addressing schemes of networks conflict, or you need to hide all or part of the network topology, network address translation (NAT) capabilities provide a solution. In addition, TCP/IP address hiding allows all the computers on one network to access servers on another network by sharing a single TCP/IP address. Masquerading is particularly useful when connecting to another network, such as the Internet, using a dial-up link.

TCP/IP Dial-on-Demand (DOD) Networking

Connections are made only when there is a need to communicate. Dial-on-Demand is supported on all switched network types and is particularly well-suited to ISDN with its fast call setup time. It is also valuable for burst and infrequent traffic patterns – especially if you have more remote locations than physical lines. With Dial-on-Demand, modem and telephone line resources are not committed until an application attempts to communicate with a remote site. Therefore, a small number of physical resources can dynamically serve a large number of remote networks.

TCP/IP Integrated Load Balancing: Virtual IP Addressing (VIPA)

Virtual IP Addressing creates a virtual TCP/IP address that is not associated with a physical network interface on the iSeries. This virtual address on the iSeries server can be reached from the network through all installed physical interfaces. This allows the use of a single IP address with load balancing over multiple physical interfaces and can dramatically increase network performance for high-volume iSeries e-business servers.

WebSphere

WebSphere

WebSphere and e-business

OS/400 contains a complete set of products and features that can be used to create a Web presence. These include TCP/IP, Java, Virtual Private Networking, Cryptographic Services, Secure Socket Layer, Certificate Management, HTTP Server, Apache Server, and many more. In addition to these base features, a set of e-business products is available that allows you to build a complete e-business Web Site that is secure and easy to develop, maintain, and scale based on your needs. These products belong to the WebSphere family of products offered by IBM for the iSeries. They are listed in this table.

Product Name	Product Number	Refer to
WebSphere Application Server Standard Edition for iSeries (128-bit)	5733-AS3	"WebSphere Application Server Standard Edition for iSeries (128-Bit) (5733-AS3)" on page 555
IBM WebSphere Application Server Version 3.5, Advanced Edition for AS/400 (128-bit)	5733-WA3	"WebSphere Application Server V3.5 Advanced Edition for iSeries (5733-WA3)" on page 557
IBM WebSphere Commerce Suite Pro Edition for AS/400 4.1	5798-WC4	"IBM WebSphere Commerce Suite, Pro Edition for AS/400, V4.1 (5798-WC4)" on page 562
IBM WebSphere Payment Manager for AS/400 V2.2	5733-PY2	"IBM WebSphere Payment Manager for iSeries V2.2" on page 568
Connect for iSeries	5733-B2B	"Connect for iSeries 1.1 (5733-B2B)" on page 572
IBM WebSphere Host Publisher V2.2 for AS/400	5648-D31	"IBM WebSphere Host Publisher V2.2 for AS/400 (5648-D31)" on page 576
IBM WebSphere Personalization for AS/400, V3.5	5733-A47	"IBM WebSphere Personalization for AS/400, V3.5" on page 581

Each of these products addresses specific customer requirements to build e-business applications quickly and easily. They often include GUI-based PC development and management tools.

The base of these WebSphere products is the WebSphere Application Server technology. iSeries and AS/400e customers have two WebSphere options from which they can choose. The base option is WebSphere Application Server Standard Edition. The more advanced option is WebSphere Application Server Advanced Edition.

- **WebSphere Application Server Standard Edition for iSeries** is a powerful Java-based development and deployment environment for e-business applications. As

the core element of the IBM Application Framework for e-business, WebSphere Application Server Standard Edition forms the foundation of the WebSphere application server family and offers application developers a solution to build, deploy, and manage e-business Web sites. WebSphere Application Server Standard Edition provides companies with an open, standards-based Web server deployment platform and supports servlets as well as JSP components. WebSphere Application Server Standard Edition provides an excellent way to initially transform your business to an e-business.

- **WebSphere Application Server Advanced Edition** is an even more powerful Java based development and deployment environment for e-business applications. WebSphere Advanced Edition builds on and enhances the Standard Edition to provide additional support for scaling Web sites into security-enhanced, transactional-based e-business application sites. WebSphere Advanced Edition provides Enterprise JavaBean (EJB) support for host-based transactions, and offers sophisticated tools to simplify distributed, component-based application development. The EJB architecture is component-based for the development and deployment of server-based business applications. It greatly simplifies the separation of business applications from underlying system services.

Product Positioning: WebSphere Application Server and Jakarta Tomcat

IBM's strategic web application server is WebSphere Application Server. The latest version of WebSphere Application Server is Version 4. It includes two editions for iSeries customers: WebSphere Application Server Advanced Single Server Edition and WebSphere Server Advanced Edition. These two editions of WebSphere Application Server V4 support Servlets, Java Server Pages, Enterprise JavaBeans, and more.

Some iSeries customers want a basic, no-cost web application server which supports Servlets and Java Server Pages. Relying on the IBM HTTP Server (Powered by Apache) as its web server, the Apache Software Foundation's Jakarta Tomcat provides a basic Web application server for iSeries customers. Jakarta Tomcat is available with OS/400 and at no additional cost to customers.

Jakarta Tomcat is offered as a way for iSeries customers to "get started" with Java server-side components and web application serving. Customers should select WebSphere Application Server when they need to deploy e-business solutions that are J2EE compliant, provide the most function, and deliver the highest levels of reliability, scalability, and security.

If an IBM or ISV application requires WebSphere Application Server as the base Web application server, Jakarta Tomcat should not be considered as an alternative Web application server. Examples of IBM products which require WebSphere Application Server as the base web application server include WebSphere Commerce Suite, WebSphere Payment Manager, and WebSphere Host Publisher.

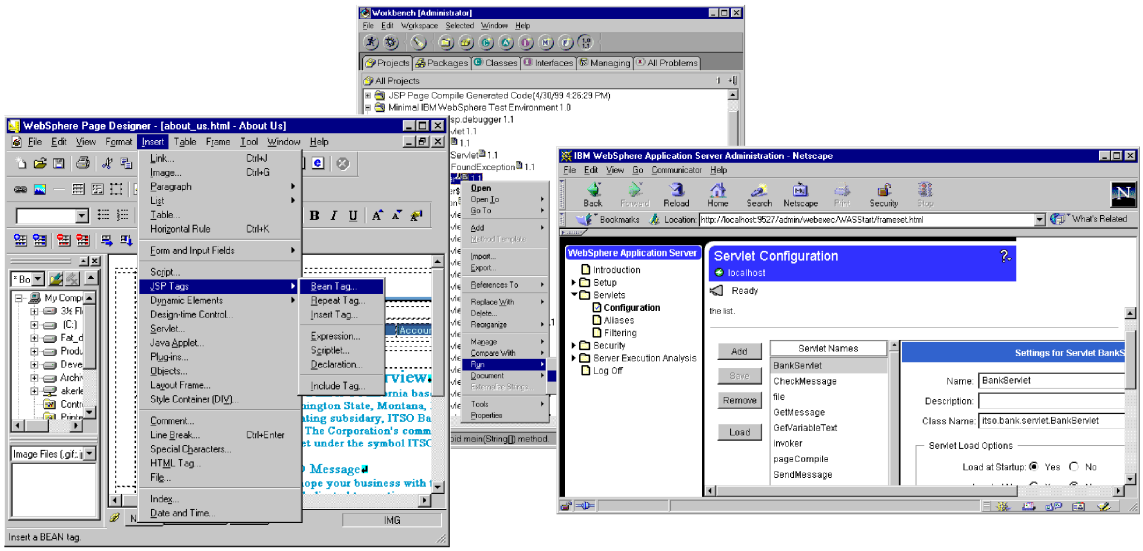
Customers who require a robust and scalable web application server will select WebSphere Application Server. Jakarta Tomcat provides fewer functions and capabilities compared to the IBM WebSphere Application Server. For example, Jakarta Tomcat does not support Enterprise JavaBeans, it is not J2EE compliant, and it does not provide Domino integration, and more.

Suggested Reading

See *iSeries e-business Handbook: A Product and Reference Guide*, SG24-5694.

WebSphere Application Server Standard Edition for iSeries (128-Bit) (5733-AS3)

WebSphere Application Server Standard Edition for iSeries (128-bit)	
Product number	5733-AS3
Replaces product	5769-AS1 WebSphere Applications Server
Minimum OS/400 level	V5R1
Installation prerequisites	For a detailed description of the prerequisites, see: `http://www-1.ibm.com/servers/eserver/iseries/software/websphere/wsappserver/docs/as400v35std/docs/instprrq.html`
Related products	



WebSphere Application Server Standard Edition for iSeries is a deployment environment for e-business applications. Its components let you build and deploy personalized, dynamic Web content quickly and easily. WebSphere Application Server Standard Edition for iSeries uses open Java-based technologies and application programming interfaces (APIs) as well as the latest eXtensible Markup Language (XML) technologies to leverage your existing business logic.

Benefits

The WebSphere Application Server Standard Edition components provide the ability to build and deploy personalized, dynamic Web content quickly and easily. The Standard Edition allows existing resources to be leveraged, cycles shortened, and administrative burdens eased.

The WebSphere Application Server Standard Edition is a strong cross-platform, Java-based Web application platform supporting deployment of e-business applications and components for transactions, enterprise system access, and dynamic content generation, including:

- Java servlets
- JSP technology
- XML

It also integrates and connects to enterprise applications and systems to enable powerful interactions with:

- Enterprise databases
- Transaction systems
- Applications

Also included are tools to enable sites to tailor data to specific devices including initial support for the Wireless Markup Language.

Features

Its features include:

- Deployment of Java servlets, JavaServer Pages (JSP) technology, and XML
- Deployment manager interface and application execution services
- Protocol and application adapter interface support
- Security controls and management

The Standard Edition integrates new XML/XSL features to enable sites to take advantage of the latest technology to define and share data, while allowing data to be separated from its presentation. These updates include:

- An XML parser utilizing the latest W3 XML 1.0, DOM 1.0, and SAX 1.0 recommendations
- W3 name spaces recommending a DTD library for local validation

- A new, enhanced XSL processor

The Standard Edition includes full support for levels .91, 1.0, and 1.1 of the JavaServer Pages (JSP) specification. Two additional tags are included:

- **Query Tag**: For rapid building of a database connection
- **Connection Tag**: For building and maintaining stated connections

The administrative client helps create and deploy servlets. JSP components focus on ease-of-use and flexibility as well as control of the execution and monitoring of these e-business applications. See “WebSphere Application Server Standard Edition for iSeries (128-bit)” on page 553 for a more complete description of the administrative client.

Security controls and application access protection are significantly enhanced with V3.5. The secure access control lists can be established at a more granular level than in the past. In addition to setting up security at the user and group levels, control and policies can be established for specific calls or methods within the applications themselves. A greater depth of control and protection is available within the server deployment environments. Support is also provided for LDAP-based user registries.

Suggested Reading

- *Web Enabling AS/400 Applications with IBM WebSphere Studio*, SG24-5634
- *Developing an e-business Application for the IBM WebSphere Application Server*, SG24-5423
- *Design and Implement Servlets, JSPs, and EJBs for IBM WebSphere Application Server*, SG24-5754
- *WebSphere Application Servers: Standard and Advanced Editions*, SG24-5460

WebSphere Application Server V3.5 Advanced Edition for iSeries (5733-WA3)

IBM WebSphere Application Server V3.5, Advanced Edition for AS/400	
Product number	5733-WA3
Replaces product	
Minimum OS/400 level	V5R1
Installation prerequisites	`http://www-1.ibm.com/servers/eserver/iseries/software/websphere/wsappserver/docs/as400v35std/docs/instprrq.html`

IBM WebSphere Application Server V3.5, Advanced Edition for AS/400	
Related products	DB2 Query Manager and SQL Development Kit (5769-ST1)

WebSphere Application Server V3.5 Advanced Edition for iSeries extends the Standard Edition into the world of Enterprise JavaBeans (EJB) with additional support for scaling Web sites into security-enhanced transactional e-business application sites. It provides a high-performance EJB server for implementing components that incorporate business logic.

Features

WebSphere Application Server Version 3.5 Advanced Edition for AS/400 features:

- Enhanced support for Java 2 SDK V1.2.2 across operating systems
- Improved product integration with other key application offerings in IBM e-business platform, including VisualAge for Java and WebSphere Commerce Suite
- Improved usability for administration
- Rich e-business application deployment environment with a comprehensive set of application services for transaction management, security, clustering, performance, availability, connectivity, and scalability
- Leading-edge implementations of the most up-to-date Java-based technologies and APIs
- Comprehensive connectivity support for interacting with relational databases, object databases, transaction processing systems, MQ-enabled applications, and hierarchical databases
- Migration path to a more scalable and transactional environment from WebSphere Standard Edition for a complete Java-based Web application platform
- Focus on medium- to high-level transactional environments used in conjunction with dynamic Web content generation and Web-initiated transactions
- Performance and scaling attributes that support bean-managed and container-managed persistence for entity beans and session beans with transaction management and monitoring
- Container management and persistent storage within a transactional environment for servlets and Enterprise JavaBean components
- Rich XML parsing and configuration environment
- Tivoli-ready modules that can be managed by Tivoli-based tools

The administrative client helps easily deploy and manage servlets. EJB, JSP, and JavaBean components focus on ease-of-use, flexibility, and greater control in executing and monitoring

these e-business applications. The administrative client can be installed in the following environments:

- Windows NT
- Windows 2000
- Sun Solaris
- AIX

Enhanced protocol and API support is integral to dynamic content access, generation, and presentation within the applications being deployed. Integration of an enhanced Java-based Object Request Broker (ORB) within the EJB server allows for enhanced Internet Inter-ORB Protocol (IIOP) support and true Remote Method Invocation (RMI) over IIOP support.

Security controls and application access protection are significantly enhanced with this new version of WebSphere. The secure access control lists can be established at a more granular level than in the past.

Security can be set up at the user and group levels and establish control and policies for specific calls or methods within the applications. This provides greater depth of control and protection within the server deployment environments. WebSphere Application Server V3.0.2, Advanced Edition for AS/400, now has first-class support for Lightweight Directory Access Protocol (LDAP)-based user registries to leverage existing directories.

A completely new and exciting package of site usage and analysis tools are included with WebSphere Application Server Advanced Edition. Site analysis focuses on developing basic traffic measurement functions, while allowing the user to gauge traffic volume (hits, visits), identify traffic sources (domains, subdomains, referrers), and manage site integrity (link verification, site conformance). These are the key features enabling the user to enhance and improve the Web site content and performance, making Web sites more enticing, informative, and ultimately beneficial to the “bottom line” of the business.

The new “server” contains the analyzers whose responsibility is to transform the raw data into valuable information and store it into the provided UDB DB2 database. The client provides administrative, visualizing, and report-generating functions. From the client, the user can schedule analysis tasks to run at a specific time or time interval. Progress status is broadcast to interested clients and displayed as appropriate and necessary. Once the analysis is completed, users can generate reports or view the data.

The system offers many predefined, ready-to-use reports. The general features include:

- Detailed analysis of Web content integrity, site performance, and usage statistics
- Flexible client/server architecture supporting a team environment
- A database that is scalable and trending with historical data
- Fully-customizing and configuring to suit end-users
- Remote administration and report capabilities from the client

WebSphere Application Server continues to provide the following features as part of its Web deployment environment:

- Full support for Java across multiple operating platforms
- Quick and easy installation
- Easy-to-use application deployment management and control support for dynamic Web content generation, including usage of Java servlets and JSP and JavaBean technology within a common runtime environment
- Services and support using bean-managed and container-managed transaction persistence
- Server capability for applications built to the EJB specification providing transaction management and monitoring
- Enhanced administration for application deployment and server administration
- XML Documents Structure Services, which enable e-business applications that interchange data using eXtended Markup Language
- XML to parse, generate, manipulate, and validate XML and XSL-based content

Benefits

WebSphere Application Server Advanced Edition enables powerful Web transactions and interactions with a robust deployment environment for e-business applications. With a portable, Java-based Web application deployment platform focused on supporting and executing Java servlets, and JavaBeans, JavaServer Pages (JSP), and Enterprise JavaBean (EJB) components, this edition interacts with enterprise databases, transaction processing systems, and other applications for dynamic Web content. It builds on the Standard Edition to provide the portability and control of server-side business applications along with the performance and manageability of EJB technology. It extends the proven value and versatility of the iSeries with modern technology, such as:

- Complete Java and Enterprise Java support, including a server for applications built to the EJB specification. The focus is on medium- to high-level transactional environments used in conjunction with dynamic Web content generation and Web-initiated transactions.
- Performance and scaling attributes with support for bean-managed and container-managed persistence, for entity beans and session beans, with transaction management and monitoring. Container management and persistent storage helps provide a high-performance transactional environment using servlets and EJB technology.

The Advanced Edition product is integral to managing and integrating enterprise-wide applications, while leveraging open Java-based technologies and APIs. It enables powerful interactions with relational databases, transaction processing systems, and other

applications. It is built using Common Object Request Broker Architecture (CORBA) IIOP protocol. This Web application server provides deployment and management of Java and EJB applications.

Integration and connectivity to enterprise applications and systems is core to WebSphere. It enables powerful interaction with enterprise databases, transaction systems, and applications. This WebSphere edition focuses on extensive performance, scaling, and security control improvements to its premium and complete implementation of an EJB server. This edition continues to provide a strong, Java-based Web application platform supporting deployment of e-business applications and components. This includes Java servlets, and JavaBeans, Enterprise JavaBeans, and JSP technology for transactions, enterprise system access, and dynamic content generation.

WebSphere Application Server V3.5 Advanced Edition for iSeries focuses on higher performance and scalability across the deployment environment. It addresses load balancing, application partitioning, and workload management for EJB components. This involves enhanced and added “container” deployment environment services for servlets, and EJB and JSP technology. The improved transaction management has intelligence for the type of applications executing and can deploy and execute across multiple applications and components accordingly. Object management and performance are optimized.

The EJB server provides improved monitoring and control of containers used within the server. It offers enhanced Java Transaction Service (JTS) support within the EJB server, better interoperability, and a major rewrite of the deployment environment.

The single, robust server engine provides more control, better performance, more flexibility, and better serviceability.

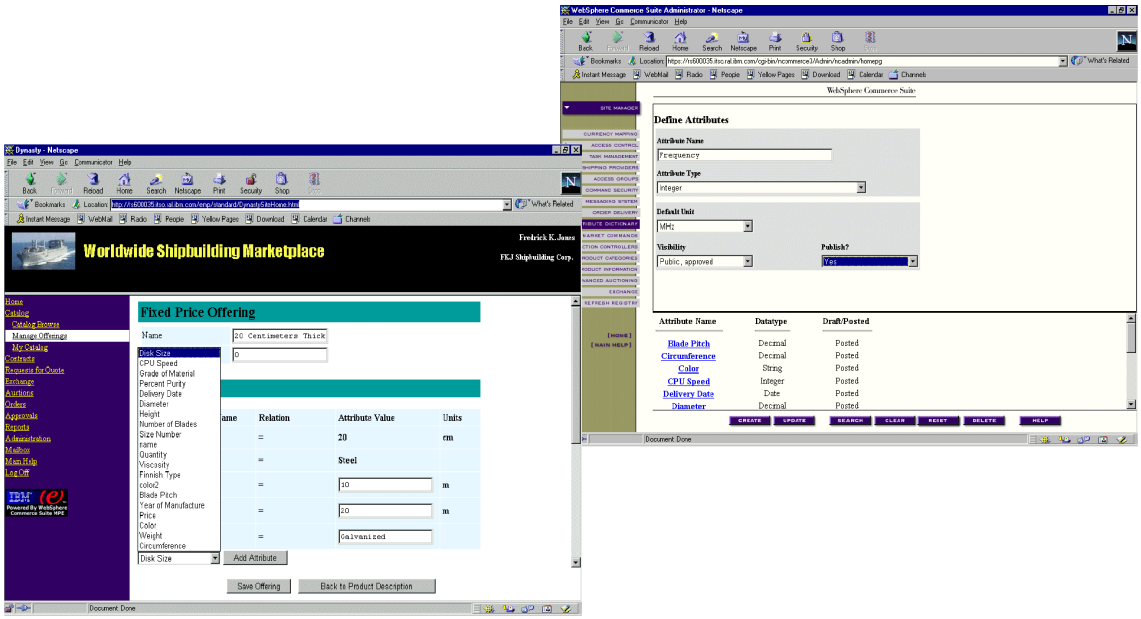
Suggested Reading

- *WebSphere Scalability: WLM and Clustering Using WebSphere Application Server Advanced Edition*, SG24-6153
- W*eb Enabling AS/400 Applications with IBM WebSphere Studio*, SG24-5634
- *CCF Connectors and Database Connections Using WebSphere Advanced Edition Connecting Enterprise Information Systems to the Web*, SG24-5514
- *Design and Implement Servlets, JSPs, and EJBs for IBM WebSphere Application Server*, SG24-5754
- *Developing an e-business Application for the IBM WebSphere Application Server*, SG24-5423
- *WebSphere Application Servers: Standard and Advanced Editions*, SG24-5460

IBM WebSphere Commerce Suite, Pro Edition for AS/400, V4.1 (5798-WC4)

IBM WebSphere Commerce Suite Pro Edition for AS/400 V4.1	
Product number	5798-WC4
Replaces product	Net.Commerce for AS/400 V3.2 (5798-NC3)
Minimum OS/400 level	V4R4
Installation prerequisites	Refer to “WebSphere Commerce Suite Pro Edition for AS/400 Prerequisites” on page 797
Related products	IBM WebSphere Payment Manager V2.1 (5733-PY2)

The integrated e-commerce solution provides the framework to create dynamic e-commerce marketing integrated sites, from catalog and storefront creation to merchandising, relationship and payment processing, in a secure, scalable environment.



Features

WebSphere Commerce Suite Pro Edition for AS/400, Version 4.1, provides more function, power, flexibility, and scalability than Net.Commerce. For a low entry price, Payment Manager

with SET Secure Electronic Transaction support, WebSphere Application Server Advanced Edition, and MQSeries Adapter for back-end integration is available.

An upgrade from Net.Commerce for AS/400, V3.2 5798-NC3 to WebSphere Commerce Suite, Pro Edition for AS/400, V4.1 is available. Establish or enhance your current e-commerce Web site quickly, easily, and affordable.

Benefits

The benefits of WebSphere Commerce Suite include:

- Supports e-commerce applications in both the business-to-consumer and business-to-business environments.
- Supports customizing and standardization of product or service displays to help increase the impact of online catalogs.
- Provides Dynamic Hypertext Markup Language (DHTML) pages, which can be customized for each product or buyer group.
- Provides powerful search and navigational aids to help buyers quickly retrieve product information.
- Provides Payment Manager with SET implementation.
- Allows sellers to readily make use of their existing catalog Web sites.
- Allows sellers to easily update product and pricing information so buyers can always see the most current information.
- Allows sellers to target pricing and catalog information for buyer groups, especially useful in business-to-business applications.
- Supports a high volume of transactions through the use of DB2.
- Allows database to be secured behind a firewall.
- Supports a scalable configuration with multiple front-end servers and back-end database.
- Provides a staging capability to allow the seller to test changes before implementation.
- Provides a TAXWARE International interface for sales tax calculations in the U.S. and Canada. In addition, an API is available for the seller to provide their own sales tax calculations.
- Provides a data import capability to allow the seller to integrate existing data.
- Provides dynamic page caching for product and category pages resulting in near Web server performance.

Provides sellers with usage statistics and logs to analyze activity.

Improved Relationship Management

Merchants can provide a unique and satisfying shopping experience to customers by personalizing each customer's visit to their Web site. This can lead to improved site traffic and sales.

The Business Rules Engine enables administrators or business analysts to specify a set of rules resulting in a personalized experience for the customer. The system can recommend products based on shopper information such as demographics. It can also cross-sell or up-sell products based on items that the shopper intends to purchase.

Associations, packages, and bundles can be incorporated into the merchant's system. Associations relate one product with complementary products, which is similar to a belt that goes with a pair of pants. Packages are the creation of a unit that cannot be broken up, but may be sold separately for more money, such as a computer system. A bundle is several items that can be sold separately but may be grouped (such as a complete ski outfit) to entice the customer to buy related items.

Auctions are offered as an additional selling model for businesses. Three common types of auctions are supported:

- Open cry (price is bid up)
- Dutch bid (price starts high and is bid down)
- Sealed bid (bid is confidential and viewable only by the seller)

A product advisor enables e-businesses to provide its customers intelligent catalogs, quickly find the right products based on features, or a friendly question-and-answer process using parametric searching. The Product Advisor supports WebSphere Studio and JSP.

WebSphere Commerce Studio Pro Edition

The WebSphere Commerce Suite Pro Edition consists of:

- A server that manages the interface to the buyers, who can browse, save, query, and order items in the interactive catalog.
- A powerful authoring and administration environment, allowing store personnel to design the buying process and create an interactive product catalog.

  This product is the new design and development environment for the WebSphere Commerce Suite. Based on the award-winning WebSphere Studio V3, the Commerce Studio is available in two versions: the Developer and Professional Developer Editions. Use one of these to develop your WebSphere Commerce Suite site. Each includes the features of the WebSphere Studio with additional commerce tools to support the WebSphere Commerce Suite.
- Developer Edition

- Developer's kit for WebSphere Commerce Suite, Pro Edition for the AS/400
- Professional Developer Edition

  Developer's kit for WebSphere Commerce Suite, Pro Edition for the AS/400 includes these additional features:

  – WebSphere Catalog Architect, V4.1

    - Create, import, and update product information
    - Reduce the time for traditional catalog information management
    - Selectively publish information into production
    - Automated validation of catalog information
    - Familiar spreadsheet and drag-and-drop interfaces

  – Tools and support for rules-based personalization
  – Tools for setting up auctions
  – Product Advisor tools

Benefits

Increase profitability by:

- Reducing the cost of sales transactions
- Extending your reach with business-to-business capability
- Attract and retain customers with easy-to-use advanced catalog tools
- Creating a compelling shopping experience through customizing storefronts
- Providing personalization for powerful one-on-one marketing

Improve efficiency by:

- Accelerating setup time with a store-creation wizard
- Providing data interchange by integrating with existing back-end systems
- Tracking shoppers' past purchasing activities for a more streamlined customer service

WebSphere Commerce Suite Pro Edition for AS/400 V4.1 provides a wide range of easy-to-use features and functions for content management, relationship marketing, order management, and payment management for total business transformation, integration, and growth. Pro Edition supports a wide range of business models including business-to-consumer, business-to-business, and e-marketplaces. Commerce sites with Pro Edition can easily integrate with internal and external systems and grow with the changing need of an e-business. Customers will benefit from the power of the WebSphere family, which integrates Web commerce, Web server, Web application development, transaction processing, and distributed component software.

These enhancements make WebSphere Commerce Suite Pro Edition the industry's leading e-commerce product. WebSphere Commerce Suite is built on the industry-leading application server WebSphere Advanced Server V3. JavaServer Pages (JSP) enablement provides

support for all catalog and product display. This is a significant step in the evolution to a full Java environment.

- Integration with IBM Payment Manager V2.1 provides more payment options with cassettes for SET Secure Electronic Transaction and CyberCash.
- Lightweight Directory Access Protocol (LDAP) for shopper registry allows sharing of user registry information among subscribers. LDAP servers supported are Netscape Directory Server, Domino, and IBM SecureWay Directory.
- Order notification lets merchants notify customers via e-mail to confirm an order.
- Domino Integration with WebSphere Commerce Suite provides single sign-on, allowing all shoppers to be managed by Domino with a simplified and familiar management process. X.509 certificate support allows automatic recognition and authentication of customers whose browsers are enabled with these certificates.

Commerce Studio Tool Set – New

WebSphere Commerce Studio Tool Set is built on WebSphere Studio V3, providing an easy-to-use toolset that can reduce time and effort when creating, managing, and debugging Web applications. Significant improvements in usability and functionality of site creation and management are possible with:

- Page Designer to hide the complexity of Web-page creation
- Workbench to assist in managing the content and version of site pages
- Store Creator Wizard and Store Profile Editor to help you create and modify store information

WebSphere Catalog Architect Content Management

Catalog Architect (CA) Content Management is more powerful in creating and managing catalogs. Client-Server Database Support enables centralized data with data sharing and access. CA can have the client and server running separate machines as well as supporting local databases. Features include:

- Enhanced Extensible Markup Language (XML) to support adding, modifying, deleting catalog objects, or creating and updating in batch mode. CA supports a superset of the common Commerce Suite XML DTD.
- Merchandising Support includes aggregation of items in kits, bundles, sets, and packages, and product or item associations with cross-sells, up-sells, or substitutions.
- Field Values SQL Access simplifies data entry and increases validity of data.
- Users can create a drop-down list of pick values for populating CA. They have the ability to disable or enable show or hide fields that are not to be managed by CA. This enables certain fields that are sourced from inventory, availability, or other back-end

ERP systems to be “turned off” so that they are not populated or validated by CA. This avoids any conflict between CA and these disabled or hidden fields.

- Improved migration for existing Commerce Suite stores. Migration retains existing reference numbers in Commerce Suite and avoids disabling any macros or orders that reference these numbers.
- Support for WebSphere Studio Store Creator for creating a store and the products contained within it.
- National language support is provided for CA in nine major non-English languages.

Business-to-business and business-management

Enhancements to business-to-business and business-management include:

- Batch user registration allows one person to register up to tens of thousands of users in a single update rather than having to register them individually. This allows centralized control for access privileges and authorization levels.
- Core business-to-business messages are provided in XML format so that the exchange of data using emerging industry standards can facilitate universal exchange of business information. Order processing is improved with a quick order capability that bypasses many current steps, orders based on previous orders, and processes regularly scheduled orders automatically.

Developer Edition, Professional Developer Edition, and Catalog Architect

Both Developer Editions include WebSphere Studio. However, only the Professional Developer Edition includes Catalog Architect and the tools to create a personalized Web experience for your customers. Developer Edition customers can order Catalog Architect separately.

The Developer Edition, Professional Developer Edition, and Catalog Architect are available only on a Windows NT or Windows 2000 platform. Use these products to develop your site for an iSeries server.

Suggested Reading

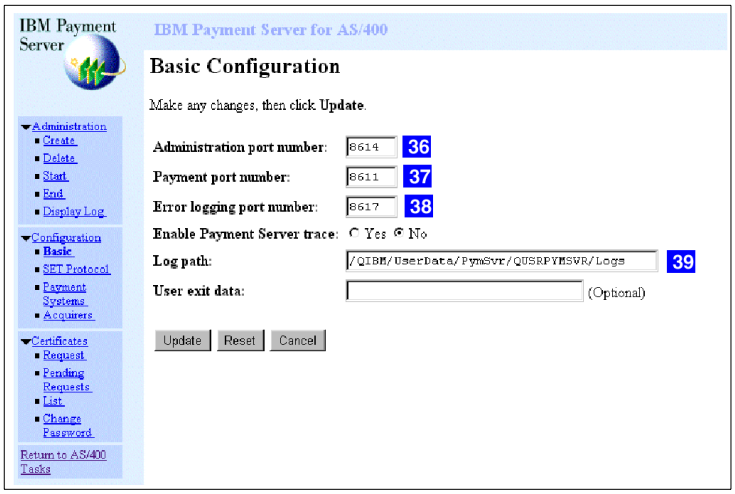
- *e-Marketplace Pattern using WebSphere Commerce Suite, MarketPlace Edition Patterns for e-business Series*, SG24-6158
- *e-Commerce Patterns Using WebSphere Commerce Suite, Patterns for e-business Series*, SG24-6156

IBM WebSphere Payment Manager for iSeries V2.2

IBM WebSphere Payment Manager for iSeries empowers merchants to securely manage Internet payments. It integrates payments into business processes and software such as online catalogs and accounting packages. It can manage credit card, debit card, stored value smart cards, and emerging Internet payment methods with the ability to add new payment methods (cassettes) to the system.

IBM WebSphere Payment Manager for iSeries V2.2	
Product number	5733-PY2
Replaces product	IBM WebSphere Payment Manager for AS/400 V2.1 IBM Payment Server (5733-PY1)
Minimum OS/400 level	V4R4
Installation prerequisites	Refer to “WebSphere Payment Manager V2.1” on page 798 and “WebSphere Payment Manager V2.2” on page 798
Related products	WebSphere set of products

Features



WebSphere Payment Manager provides similar levels of functionality and capability for the iSeries platform as the product available on AIX, Solaris, Windows NT, and WIndows 2000.

Merchants who integrate WebSphere Payment Manager into their business software and business process can deploy multiple Payment Manager instances as needed to support multiple merchant instances. This allows communication using HTTP command requests and receive XML responses – an industry standard.

WebSphere Payment Server allows only designated employees who administer merchant accounts to:

- Add new merchant customers
- Remove existing ones
- View or edit sensitive customer business data stored on the system
- Modify the system, such as adding new payment types or cassettes
- Set the privileges or restrictions for other employees or customers

There is an exported data model to secure customer-critical business data. This assures that access to merchant financial information is protected and access to merchant data is restricted. Access to merchant data from business applications is secure.

Medium, large, and enterprise companies can process business-to-consumer and business-to-business payments by connecting to a suitable gateway, and, using SET, an industry-standard protocol, or a proprietary protocol such as CyberCash, or other protocols served through the use of independently developed and installed cassettes. Combined with IT services (in-house or contracted), Payment Manager can integrate existing front end or back-office business systems to:

- Manage sophisticated payment options in demand by ERP systems.
- Solve payment needs for corporations with multiple distant branch locations.

Payment processing management means that catalog and order management applications are integrated using APIs to perform functions such as:

- Securing credit authorization while the customer is still present
- Charging the customer only after the product is shipped
- Collecting payment when a back-ordered product is shipped at a later date
- Crediting a customer account when an item is returned

Flexibility allows the exploitation of the multipayment framework to choose the financial institution that fits business needs. Additional payment choices can be created when needed.

WebSphere Payment Manager manages Internet payment transactions for e-commerce. It includes:

- MPF application
- Cassette for SET
- Test cassette to verify installation and setup
- Cassette for CyberCash CashRegister Service, Version 3 (available separately, initially only in the U.S. and Canada)
- Hosting service for businesses that outsource payments
- Integration of payments into catalog software and business processes
- Processing of credit card and other Internet payment methods
- Straightforward, automated installation

- Designate capabilities by user and function:
  - User authentication
  - Role-based access control
- Deliver exceptional service:
  - MPF: Add current or emerging payments types using cassettes
  - Secure, browser-based, cash register user interface
  - Access to tools and utilities to remotely assist your customers
  - Continuous up time, even when adding new users or changing system configuration
- Secure communications between remote customers and the product through data encryption
- Help secure critical business data, protected access, and validation for access control
- Ability to delete an open batch or prune outdated payment information
- Order cancellation (used mostly for time-sensitive pricing)
- Ability to customize your application interface with client API library in Java or HTTP
- Network management support:
  - Enabled for use by network management systems
  - Tivoli base support built-in
  - Broadcast of system events to external applications
  - Full-function trace utility with:
    - Multiple concurrent trace levels
    - Logical controls for trace starting and stopping

The WebSphere Payment Manager Cassette for CyberCash is built to communicate with the CyberCash CashRegister Service, Version 3. The protocol between the Payment Manager and the CyberCash CashRegister is the secure protocol defined by the CyberCash Merchant Connection Kit, (MCK) Version 3.2. Currently, only the North American CashRegister service supports the MCK Version 3.2 protocol. This service enables merchant access to the set of North American participating financial institutions listed at: `http://www.cybercash.com/partners`

Note: While CyberCash CashRegister services may be available in other countries, they may not support the Version 3 interface.

Benefits

The WebSphere Payment Manager Version 2.2 program empowers merchants to securely manage Internet payments. As the successor to the Payment Server product, this new release is ideally suited to integrate payments into business processes and software such as online catalogs and accounting packages. It can also manage credit card, debit card, stored value smart cards, and emerging Internet payment methods. Support is provided for

Multipayment Framework (MPF), the ability to add new payment methods (cassettes) to the system. The ability to host a payment service for multiple remote merchants is also provided.

Every business needs to receive payment for their goods or services. Individual merchants benefit from a browser-based GUI for remotely managing payments and remote product administration functions. They have the ability to select specific payment types (cassettes) from all cassettes made available by a Payment Manager administrator. The merchant can also search, with parameters and criteria, for customer transaction and batch data history. There are role-based access controls for granting privilege levels to merchant's employees. The merchant can also enable and disable event notification service.

Payment Service Providers

A hosting service, or Payment Service Provider (PSP), is ideal for any business with low payment transaction volumes. PSP customers are typically:

- Companies that do not want to manage onsite software and hardware
- Merchants needing a service to handle the complexity of clearing payments with credit card associations, such as Visa, MasterCard, and Europay
- Businesses new to e-commerce, or that have low payment transaction volumes, browser-based, familiar cash register user interface

Becoming a Payment Service Provider (PSP) is a natural extension for financial institutions that process credit card transactions for retail stores, mail or telephone order companies, or small Internet-based businesses. This allows the retention of and increase in the financial institution’s customer base. Payment services can be outsourced to a third-party such as a business partner. Some Internet Service Providers (ISPs) add payment services to their business customer offerings. PSPs are positioned to help secure and develop merchant relationships. They increase profitability by collecting revenue from an increasing volume of transaction fees and through value-add services.

A PSP that uses WebSphere Payment Manager values the ease of adding, modifying, removing, and provisioning remote merchants, including the ability to deploy separate and multiple instances of Payment Manager to support multiple merchants. Also valuable is the Multipayment Framework (MPF), which offers the ability to add new payment methods to the system and deploy for merchant use. Dynamic configuration updating without system disruptions is also supported to reduce downtime. A browser-based GUI is provided to securely manage multiple merchants with individual business data privacy, protection, and integrity. A basic network management support, certified Tivoli ready, is provided. There is a multilevel trace capability to enhance serviceability.

Suggested Reading

Consult `http://www.software.ibm.com` and `http://www.redbooks.ibm.com` for further information.

Connect for iSeries 1.1 (5733-B2B)

The objective of business-to-business operations is to reduce costs, increase responsiveness, and increase communications between businesses. With Connect for iSeries, you extend your processes and products to other businesses.

Connect for iSeries 1.1 enables seamless and secure integration of your existing core business applications with the business applications of your trading partners. Connect for iSeries helps you achieve low-cost, high-function business integration previously only available with EDI solutions.

IBM Connect for iSeries	
Product number	5733-B2B
Replaces product	
Minimum OS/400 level	V5R1
Installation prerequisites	Refer to “IBM Connect for iSeries Prerequisites” on page 799
Related products	WebSphere Application Server, WebSphere Commerce Suite, Lotus Domino

Benefits

Connect for iSeries integration framework for business to business (B2B) enables seamless and secure integration of your existing core business applications with the business applications of your trading partners. Connect for iSeries helps you achieve low-cost, high-function business integration previously only available with expensive EDI solutions.

The Internet and XML standards enable open, cost-effective, quickly deployed solutions. It's easy to connect your business to a trading service such as the Ariba Network or Metiom. You can also save expenses as you automate transactions such as purchase orders. Tools, samples, and runtime software aid your B2B integration efforts.

Connect is built on industry standards, such a Java and XML, but requires neither Java nor XML skills to use. It works with both Domino and WebSphere platform technologies. In addition, MQSeries provides reliable handling of business transactions. MQSeries or Connect provides basic tools, connectivity, and catalog functions to help implement B2B solutions effectively and affordable.

With Connect for iSeries, you extend your processes and products to other businesses. Take advantage of low-cost and pervasive Internet access and widespread use of XML-based business transactions to automate business transactions with your customers and suppliers. Support is built in for some popular Internet business transaction dialects including Metiom's mXML.

Samples and tools help you create connectors to pass these transactions to your existing business applications for processing. It accommodates a variety of integration interfaces including MQSeries messages and mapping the XML transactions to API calls. Not only does this product make it easier and faster to implement your solution, it insulates your business applications from the likely changes to these XML-based business transactions as technologies mature. Start simple at a very low cost, and then grow at your own pace.

Connect for iSeries: New in Version 1.1

Version 1.1 of Connect for iSeries builds on a solid foundation, extending functional capability and flexibility. Some of the additions include:

- Support for new trading partner protocols
- Better application integration
- Enhanced flow processing
- Enhanced mapping tools
- Improved catalog management capabilities
- Support for the latest middleware from IBM
- Support for the latest versions of the cXML protocol from Ariba and the mXML protocol from Metiom.
- The ability for you to integrate your back-end applications with the addition of a database connector type that allows you to map elements of incoming B2B messages to fields in your database tables.
- The iSeries Connect Flow Manager allows multiple back-end applications or database calls to be made for a single trading partner request. This allows for more complex flow processing, therefore, greatly enhancing the flexibility of the product.
- Significant enhancements to the business process editor tool make it even easier to create application connector documents (ACDs) and multi-step process flow models (PFMs).
- Create and publish a subset of a catalog to provide categorizations appropriate for particular buyer organizations and customer specific pricing. Generate catalogs from multiple database tables.
- Support of WebSphere Commerce Suite and WebSphere Application Server 3.5.
- Open Interfaces that provide support of Private Trading Partner Protocols. Connect for iSeries provides a set of Delivery Gateway APIs and connectors that enable the framework to be configured to accept private trading partner protocols.
- Outbound Message Handler Support provides the capability to initiate messages such as advanced shipping notices from back-end applications to buyers and trading partners.

- A Web browser interface enables a Connect for iSeries administrator to search through audit log information for requests by date/time, buyer, supplier, marketplace, and to view activity information and other details associated with each request.
- Connect for iSeries is compatible with V5R1 and V4R5.
- Tool Enhancements. Graphical “drag-and-drop” capability is added to Connect for iSeries tools making it easier to create application connector documents and multistep process flows. New tools are provided to support creation and deployment of private trading partner protocols. These tools are distributed as a functional PTF after 31 August 2001.
- Transaction Management Integration with Operations Navigator. An Operations Navigator interface for the Connect for iSeries administrator provides the facility to monitor, automate, and analyze application activity. Features include real-time graphs of request activity, threshold triggered command execution, and a search engine. This ability is distributed as a functional PTF after 31 August 2001.

This program operates with all earlier RISC hardware models of comparable performance specifications, running OS/400 V5R1.

Note: Connect for iSeries V1R0 is compatible with OS/400 V5R1 (5722-SS1).

Application Connectors

Software vendors develop connectors between IBM Connect for iSeries and their applications. The connectors allow requests processed by Connect for iSeries to be sent to the vendors back-end software applications for processing.

Suggested Reading

Information on available connectors and PTFs is found on the IBM Connect for iSeries Web site at: `http://www.ibm.com/eserver/iseries/btob/connect`

Connect for iSeries

Two PTFs provide a shipping vehicle for these enhancements to be available second quarter 2001 for Connect for iSeries V1R0:

- **WebSphere Application Server**: Support has been extended for WAS 3.5
- **Metiom**: Support for the mXML protocol from Metiom allows connectivity to the trading network

Connect for iSeries Components

Delivery Gateway

This component provides an SSL connection between a buyer or an e-marketplace and your business. The Delivery Gateway can communicate over multiple trading partner protocols such as Ariba's cXML and Metiom's mXML. It uses an SSL connection with the trading partner or marketplaces for maximum privacy. Properly authenticated requests are passed on to the Flow Manager.

Flow Manager

This component provides an easy integration of a trading partner request with your existing data or applications. Integration methods supported include program calls and queuing mechanisms. With these mappings, new or existing applications can be called to process incoming requests. Tools are provided to simplify the mapping of the incoming requests to a format appropriate for the back-end application.

Electronic Catalog

An electronic version of a supplier's catalog is usually described in XML. An electronic catalog is often required for a supplier to sell to buyers using eProcurement software or e-marketplaces. The electronic catalog feature enables you to publish catalog information from a variety of sources including IFS files, DB2 UDB databases, or WebSphere Commerce Suite. Render the gathered information into an appropriate e-catalog format for the various e-marketplaces. The electronic catalog feature avoids manual re-keying and dual maintenance of catalog information. It is published directly from files where information is maintained.

Tools

Install, configure, and deploy Connect components with intuitive tools and wizard. The tools and wizards simplify the task of setting up a B2B infrastructure when plugging into an e-marketplace, and when connecting to your business applications and data. The tool allows you to register your supplier information as well as information about the buyers and marketplaces to which you will be communicating.

MQSeries

An integrated version of MQSeries messaging is a core technology licensed for use with Connect for iSeries. MQSeries messaging provides the robust and reliable inter-application communication necessary for business-critical processes. The use of MQSeries messaging in Connect for iSeries provides the flexibility of distributing the solution across multiple systems.

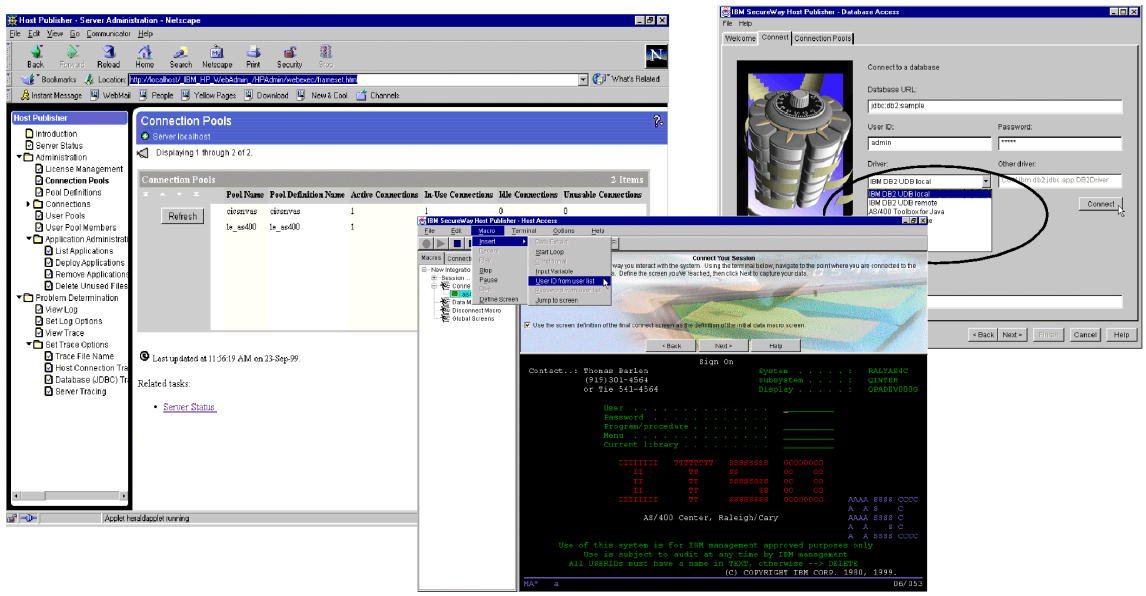
Suggested Reading

Consult `http://www.software.ibm.com` and `http://www.redbooks.ibm.com` for further information.

IBM WebSphere Host Publisher V2.2 for AS/400 (5648-D31)

Designed for ease-of-use, IBM WebSphere Host Publisher enables IT professionals familiar with existing applications to simply extend them to the Web. For Webmasters, Host Publisher offers the scalability, flexibility, and robustness of an industrial grade Web platform coupled with development tools that enable the reuse of previous work in the creation of new, sophisticated, host-linked e-business applications.

IBM WebSphere Host Publisher V2.2 for AS/400	
Product number	5648-D31
Replaces product	SecureWay Host Publisher V2.1 for AS/400
Minimum OS/400 level	V4R4
Installation prerequisites	“IBM WebSphere Host Publisher V2.2 for AS/400 (5648-D31)” on page 576
Related products	IBM WebSphere family



Benefits

WebSphere Host Publisher V2.2 for AS/400 provides a quick and easy way to implement e-business applications. Extend the reach of mission-critical applications to new users across the intranet and Internet without changing the existing applications. WebSphere Host Publisher allows you to integrate multiple sources of host data into a single Web page, giving end users the appearance of a single new application.

WebSphere Host Publisher supports applications written for 3270, 5250, VT, Java, and databases that provide a Java Database Connectivity (JDBC) interface such as IBM DB2 Universal Database, Oracle, and Sybase. It supports any HTML-based browser and does not require any specific Java-enabled browser.

You can use Host Publisher Integration Objects in new WebSphere applications to provide legacy access to those applications. Therefore, the investment you make in Host Publisher legacy extension today can be leveraged in the new WebSphere applications that you'll create in the future.

Provide host access for new e-business applications and significantly reduce the time and expense that would otherwise be incurred to complete these new e-business application projects. WebSphere Host Publisher V2.2 enables you to extend your current applications to the Internet, providing the quickest and easiest way to implement e-business.

The benefits are:

- Provides a quick and easy way to implement e-business by extending your current applications to the Internet
- Requires no change to existing applications
- Consolidates multiple sources of host data into a single Web page
- Extends the reach of your business by allowing you to contact new customers and enabling inter-company projects
- Enables you to gain a competitive advantage by extending your sales channels and providing new Web self services
- Helps improve the productivity of your workforce by enhancing aging applications with new front ends and extending real-time access to your mobile workforce

WebSphere Host Publisher AS/400 – New in V2.2

- Supports WebSphere V3
- Enables you to extend Host Publisher to remote Java applications and applets with the new Remote Integration Objects (RIO) support
- Provides an XML Gateway that allows program access to 3270 and 5250 application data in an XML format

- Includes an HTML Mapper that provides an HTML entry-level emulator for 3270 and 5250 application access
- Includes WebSphere Studio Professional Edition
- Uses a new licensing method that bases usage on concurrent sessions or connections

Products Included

IBM WebSphere Host Publisher V2.2 for AS/400 includes IBM WebSphere Application Server and Standard Edition. All of the functions explained in the following sections are included.

Host Publisher Studio

The Host Publisher Studio is a collection of task-oriented, easy-to-use graphical user interfaces that assist the Web application builder in managing and creating Web-to-host projects. It uses task-oriented prompts to guide the user through the creation process, including:

- Recording host and database interactions
- Identifying desired data
- Labeling that data for retrieval

The Studio automatically generates a JavaBean, called an Integration Object, which encapsulates the interactions and data retrieval. You can use the Studio to generate a fully customizing HTML Web page for modeling interaction with the Integration Objects and presenting the resulting data. The HTML Web page can be enhanced with Web authoring tools such as, WebSphere Studio, to meet corporate guidelines on style and image. Once the Web page is completed, you can publish it to a Host Publisher Server for production access by end users.

The Host Publisher Studio is provided on a separate CD assembly and runs on Windows 95, Windows 98, Windows N,T and Windows 2000 operating systems.

Host Publisher Server

The Host Publisher Server provides the runtime environment for supporting Web applications created with the Host Publisher Studio. Host Publisher is on a separate CD assembly and works with the IBM WebSphere Standard Edition and other runtime components such as:

- Connection management
- License monitoring
- Run-time administration
- Log and trace management

The Host Publisher product also includes a separate CD assembly for IBM Network Dispatcher to provide load balancing across multiple Host Publisher Servers. The Network Dispatcher can only be used for the load balancing function for Host Publisher. If you require load balancing for other applications or servers, you must purchase these additional copies separately.

Remote Integration Objects (RIO)

WebSphere Host Publisher Remote Integration Object support provides a standard interface for program access to Integration Object data in an XML format. It also provides remote access to Host Publisher server Integration Objects. This enables remote Java applications or applets running on a remote client or server to execute Host Publisher Integration Objects for existing application access as though they were physically running on the Host Publisher server machine. The interface to the Host Publisher Integration Objects is unchanged regardless of whether the customers Java application is calling it from a remote client or is running on the Host Publisher server.

XML Gateway

WebSphere Host Publisher provides an XML Gateway for accessing legacy 3270 and 5250 applications and making that application data available to programs in an XML format. The Host Publisher XML Gateway also provides an HTML Mapper capability that provides a load-and-go HTML entry-level emulator for 3270 or 5250 application access. Without any customizing, existing 3270 and 5250 applications can be extended to Web users. This capability is targeted at end users who:

- Need occasional access to the host application
- Consider a native terminal screen look and feel to be acceptable
- Do not yet have Java-capable desktops

Java-enabled users should consider IBM Host On-Demand to meet their emulation needs.

WebSphere Studio Professional Edition

The WebSphere Studio Professional Edition is now included as part of WebSphere Host Publisher V2.2. The WebSphere Studio provides all the tools needed for a complete Host Publisher e-business implementation, such as:

- HTML/JSP editing
- New business logic creation
- Site deployment enhancement

You are authorized to install and use up to five copies of WebSphere Studio Professional Edition for every WebSphere Host Publisher purchased. If you require additional copies of WebSphere Studio Professional Edition, you must purchase these additional copies separately.

Enterprise-class Functionality

To enhance performance, WebSphere Host Publisher provides connection pools, which are defined in the Host Publisher Studio. Connection pools are used during runtime to cache connected, logged on, and ready connections to improve response time to end users. A user-defined number of connections will be started on demand and remain active in the pool for subsequent requests from any user. This eliminates the overhead of establishing a connection, and connecting and disconnecting each host request.

WebSphere Host Publisher supports object chaining. Object chaining allows you to break a complex task into logical subtasks to improve performance and flexibility, and reduce the administration of creating complex Web pages. For example, you might use chaining in a typical 3270 application that uses multi-level menus. A corporate phone directory might have several menus to take you step-by-step to the point where you can list everyone in a particular department. At this point, you want to display the office location of someone in the list, return to the department list, select a new name, and then display the second person's office location. Object chaining enables you to break the task into several reusable Integration Objects so that the end user does not have to navigate back down through the several menus to reach the department list again.

Secure Sockets Layer (SSL) Security

Host Publisher provides SSL V3 for helping to secure the connections for TN3270E and TN5250 communications with hosts and iSeries and AS/400e servers. The SSL support provides data encryption and server authentication using signed certificates.

The SSL support is now available on a worldwide basis with 128-bit encryption. The encryption level can negotiate to the specific encryption level of the clients (either 128-bit or 40-bit). You should have your IBM representative contact the importing country's Export Regulation Coordinator (ERC) for details.

Suggested Reading

- *IBM Web-to-Host Integration Update*, SG24-5237
- *Building Integration Objects With IBM SecureWay Host Publisher Version 2.1*, SG24-5385

IBM WebSphere Personalization for AS/400, V3.5

IBM WebSphere Personalization for AS/400, V3.5	
Product number	5733-A47
Replaces product	
Minimum OS/400 level	V4R4
Installation prerequisites	“IBM WebSphere Personalization for AS/400 Prerequisites” on page 799
Related products	WebSphere Application Server (Advanced Edition)

WebSphere Personalization provides the run-time extension to WebSphere Application Server (Advanced Edition) that allows deployment of personalized sites developed using WebSphere Studio Advanced Edition.

Products Included

Recommendation Engine

WebSphere Personalization also contains the LikeMinds collaborative filtering product from Macromedia. LikeMinds can use multiple inputs such as individual clickstream data, purchase history, explicit preferences, and product similarities to make product recommendations that help customers decide what to buy. An example of usage for collaborative filtering is in making product recommendations on a business-to-consumer site.

The copy of LikeMinds supplied with WebSphere Personalization is licensed for the storage of 25,000 profiles. This can be expanded by purchasing WebSphere Collaborative Profiles. Each license of WebSphere Collaborative Profiles authorizes a customer to expand the storage capacity of LikeMinds by additional 250,000 profiles. There is no licensing limitation on the number of profiles that can be stored and utilized with WebSphere Personalization rules and resource engines. These run-time extensions can be used with WebSphere Application Server Advanced Edition to deploy rules-based personalization sites with an unlimited number of stored profiles.

Benefits

WebSphere Personalization provides the run-time extension to WebSphere Application Server (Advanced Edition and Standard Edition) that allows deployment of personalized sites developed using WebSphere Studio Advanced Edition.

Customizing a site's content for each site visitor makes the site easier to use, more interesting, and more useful for the site visitor. More visitors can be attracted to a site while also improving the service to each site visitor.

WebSphere Personalization contains the following run-time extensions to WebSphere Application Server that support rules-based personalization of sites:

- **Rules Engine**: Executes the site's business rules. Business rules determine what content is displayed to each site visitor. A site's business rules are defined by the site owner and entered using the graphical rule editor in WebSphere Studio Advanced Edition.
- **Recommendation Engine**: Makes recommendations regarding the content or products to show a site visitor. WebSphere Personalization's Recommendation engine is the LikeMinds collaborative filtering product from Macromedia. Site designers can use LikeMinds multiple approaches (such as individual clickstream data analysis, transaction history analysis, and content similarities) to make recommendations based on the site visitor's interests.
- **Resource Engine**: Allows the site owner to define and manage the users and content on which the rules and recommendation engines operate. An HTML management interface is provided for categorizing users and content into groups and associating dynamic properties with those groups.

The combination of rules-based personalization with collaborative filtering allows a business to choose the mix of personalization strategies that are optimum for their business objectives.

Suggested Reading
WebSphere Personalization Solutions Guide, SG24-6214

Application Development

Application Development

IBM Licensed Programs: Application Development Products

Product Name	Product Number	Refer to
IBM VisualAge Generator Server for iSeries	5769-VG1	page 585
IBM CICS Transaction Server for iSeries	5722-DFH	page 586
IBM Application Program Driver for AS/400	5722-PD1	page 587
IBM WebSphere Development Studio for iSeries Application Development ToolSet ILE COBOL ILE RPG ILE C ILE C++	5722-WDS	page 597 page 615 page 597 page 601 page 603 page 585
IBM WebSphere Development Tools for iSeries	5724-A81	page 608
System/36 Migration Aid	5727-MG1	page 615
System/38 Migration Aid	5714-MG1	page 616

IBM VisualAge Generator Server for iSeries (5769-VG1)

IBM VisualAge Generator Server for iSeries	
Product number	5769-VG1
Replaces product	VisualGen Host Services for OS/400
Minimum OS/400 level	V4R4
Installation prerequisites	ILE COBOL for AS/400 (5769-CB1) for compile on server
Related products	DB2 Query Manager and SQL Development Kit (5722-ST1) VisualAge for Java

VisualAge Generator is the IBM VisualAge offering focused on bringing productivity to organizations. It is a powerful, integrated development workbench used by programmers to fully define, test, build, and deploy traditional as well as Web-ready enterprise level systems on a variety of platforms in record time.

With VisualAge Generator, applications are defined from a productive desktop environment, using easy to learn, powerful, and high level specifications. The application definition is completely independent from the target runtime environment. The complexity of the system

software infrastructure (transactional and DBMS APIs, Web server complexity, and communications protocols) is hidden.

A powerful simulation and test environment enables the programmer to fully test the system without ever compiling or deploying to the final target system. This environment, built and integrated into the development workbench, allows rapid iteration between specification and verification. Once the application is fully verified, a code generation facility can be invoked to transform the high level environment-neutral specifications into native 3GL source code. The resulting source is optimized for the compilation and deployment to the selected execution systems.

This solution combines the productivity of an iterative desktop development environment with the scalability and the performance of a compiled and optimized 3GL production application.

Suggested Reading
For further information, see: `http://www-4.ibm.com/software/ad/visgen/`

IBM CICS Transaction Server for iSeries (5722-DFH)

The CICS platform is widely-used as a basis for implementing business solutions. CICS for iSeries enables many of these existing applications to be made available on the iSeries server without excessive costs of code conversion. iSeries applications can coexist with CICS applications.

IBM CICS Transaction Server for iSeries	
Product number	5722-DFH
Replaces product	None
Minimum OS/400 level	V5R1
Installation prerequisites	IBM WebSphere Development Studio for iSeries (5722-WDS)
Related products	VisualAge for Java IBM WebSphere Development Studio for iSeries (5722-WDS)

CICS for iSeries supports CICS COBOL Command-Level or C applications on the iSeries server. It is based on a major subset of the CICS/ESA application programming interface (API) and supports Minimal Function Basic Mapping Support (BMS).

If a user wants to write an application program using the CICS for iSeries API, then ILE COBOL for iSeries or ILE C for iSeries is required. COBOL or C applications developed for CICS/DOS/VS, CICS/OS/VS, CICS/ESA, CICS/MVS, CICS/VM, CICS OS/2, and CICS/6000 are generally source-compatible with CICS for iSeries if they use only the CICS

command-level API. Application support is available for both single-byte and double-byte character-set based applications.

Basic Mapping Support (BMS) maps are source-compatible, provided they use only CICS family base level BMS when ported to CICS Transaction Server for iSeries. The CICS macro-level API is not supported by CICS for iSeries. CICS for iSeries offers server support for direct communication with workstation-based CICS clients over SNA APPC links, without the need for an intermediate CICS OS/2 server.

Improved data integrity is ensured with CICS for iSeries exploiting the OS/400 two-phase commit capability. When a CICS for iSeries application updates multiple systems, it ensures successful updates of all files and backs out partial updates if the full transaction is not completed. CICS for iSeries two-phase commit support provides a backward recovery facility.

The Inter-Systems Communications (ISC) facilities of CICS for iSeries allows connectivity to other CICS platforms, giving access to both applications and data on those systems. CICS for iSeries supports ISC functions on the following products:

- CICS for iSeries (other iSeries servers running CICS for iSeries)
- CICS/ESA V3R2 and V3R3
- CICS/MVS V2R1
- CICS/VSE V2R1
- CICS OS/2 V1R2 and V2R0
- CICS/6000 V1R1

CICS for iSeries InterSystem Communications (ISC) capabilities allow OS/400 users to share data and applications with other CICS systems. Enhancements include a binary call interface from other languages and more simplified OS/400-based administration.

IBM Application Program Driver for AS/400 (5722-PD1)

IBM Application Program Driver for AS/400	
Product number	5722-PD1
Replaces product	None
Minimum OS/400 level	V5R1
Installation prerequisites	None
Related products	

APD for AS/400 is a tool that can help bring productivity to both developers and users of AS/400 applications. For developers, it provides a set of standardized functions that are

needed in almost every business application. These are run-time functions, such as backup/restore, sophisticated security controls, and more, that can be incorporated with little or no change into existing code. APD for AS/400 allows menu items from different applications to be integrated on the same menu and to be accessed from that menu without intervening security constraints. This can greatly simplify user navigation between applications.

APD/400 includes these features:

- **Menu driver**: Allows interactive creation and modification of menus
- **Access control**: Access control functions (which can be granted and revoked interactively by the administrator) are available for menus and menu options
- **Fastpath**: Supports fastpath jumps to other menus, programs, or applications
- **Conflict management**: Control of mutually exclusive programs (the choice of one menu option can disallow one or more other options)
- **Save/restore**: Allows the user to define save intervals, number of generations, restore sequences, and backup volume IDs
- **Batch scheduling function**

All APD/400 administrative programs offer help text for screens and input fields.

Java for iSeries (5722-JC1 and 5722-JV1)

Java is a complete computing environment, reaching new standards for program portability and programmer productivity. Java provides an object-oriented programming environment that is dramatically simpler than C++. iSeries Java implementation provides improved scalability compared to other Java platforms and synergy with the iSeries object-based architecture.

A Java-compatible Java Virtual Machine (JVM) is integrated under the iSeries machine interface (MI) to optimize Java software performance. Java programs are compiled into platform-independent object code interpreted by the run-time support (JVM) on each platform.

Remote Method Invocation (RMI) is built into the iSeries Java software. It can be used to communicate with the iSeries Toolbox for Java support running on any platform.

iSeries Developer Kit for Java (5722-JV1) and iSeries Toolbox for Java (5722-JC1) are included with every OS/400 order of V4R2 and later.

Java includes three primary functions and capabilities:

- An Object-Oriented Programming Language, developed at Sun Microsystems
- A Java Virtual Machine (run-time environment) that can be integrated in Web browsers (such as Netscape Navigator and Microsoft Internet Explorer), and operating systems (such as OS/400)
- A standardized set of Class Libraries (packages) that support:
  - Creating GUIs
  - Controlling multimedia data
  - Communicating over networks
  - Accessing data in stream files and relational databases

There is also a Java “static compilation” option, designed for improved performance, that compiles Java into iSeries-dependent object code. Java's primary benefit is its ability to develop portable client/server applications using the Internet and intranets, whose “objects” can run on many different platforms in the same network.

A Java SSL package is included with OS/400 to leverage the integrated SSL function built into the iSeries server. You can easily build more secure client/server applications using Java. All data exchanged between the client and the server can be encrypted using the SSL protocol.

SQL is embedded in the Java programming language at V4R4 and later. Supported SQL statements include SQL data-manipulation statements to operate on data stored in tables in relational databases.

iSeries Toolbox for Java (5722-JC1 Included with 5722-SS1)

IBM iSeries Toolbox for Java	
Product number	5722-JC1 (included free of charge with the operating system 5722-SS1)
Replaces product	None
Minimum OS/400 level	V5R1
Installation prerequisites	None
Related products	OS/400 (5722-SS1)

The iSeries Toolbox for Java enables a Java applet or application to easily access iSeries data. It is a collection of classes that represent iSeries data, providing familiar iSeries client/server program interfaces for Java programs. The Toolbox also provides a set of GUI classes. These classes use the access classes to retrieve data, then present the data to the user. The classes use Java's Swing 1.0.03 framework.

The toolbox supports the Secure Sockets Layer (SSL) specification. Data flowing between the workstation and an iSeries or AS/400 running OS/400 V4R4 or later can run across an SSL connection providing data encryption and server authentication. iSeries Toolbox for Java provides access to the following iSeries server resources:

- iSeries user and group information
- Database access via JDBC
- Database access via Record-Level File Input/Output
- iSeries program call
- iSeries command call
- iSeries Integrated File System
- iSeries print resources, including spooled files
- iSeries message queues
- iSeries data queues
- iSeries active job information
- iSeries system values
- Authority on an iSeries object

The iSeries Toolbox for Java includes:

- A user interface framework to provide a productive development environment for building graphical panels. The framework automatically handles the exchange of data. The developer only needs to create one or more data beans and bind them to the panel components using tags defined by the Panel Definition Markup Language (PDML).
- A user interface framework to create a platform and technology independent representation of graphical panels based on the Extensible Markup Language (XML). Also included is a pure Java framework for interpreting the XML and constructing user interface panels based on the Java Foundation Classes (JFC).
- A resource script converter to convert Windows dialogs to equivalent Java panels defined in XML.
- A GUI builder tool (a WYSIWYG GUI editor) to develop Java GUIs.
- A program-called framework, provided via a Program Call Markup Language (PCML) – a tag language used for supporting the program call function of the toolbox. The language fully describes all parameters, structures, and field relationships necessary to call an iSeries program.

iSeries Toolbox for Java is Java-compatible so it can run on any platform that fully supports the JVM 1.1.6 specification, supports Java applets and applications, and provides JavaBeans for most public interfaces. It uses OS/400 servers as the access points to the iSeries server and is fully NLS enabled.

A Java program using the toolbox can connect to OS/400 V4R2 or later. OS/400 V4R4 or later is required when a Java program using the Toolbox is running on the iSeries.

The Toolbox requires JVM 1.1.6 or later and Swing 1.0.3 or later to balance content and workload. Use a Web browser to administer and configure these servers.

The classes can be used by Java applets and applications to easily access iSeries data and resources. They require no additional support over the inherent OS/400 support of Java Virtual Machine and the iSeries Developer Kit for Java. The Toolbox for Java provides support for similar functions to that provided by Client Access APIs. It uses the OS/400 host servers (part of OS/400) to access the iSeries data and resources.

Each of these servers runs in a separate job on the iSeries server, communicating with a Java client program using architected data streams on a socket connection. The socket interfaces are hidden from the Java programmer by the Toolbox classes. JavaBeans are provided for most public interfaces. They provide access to these iSeries resources:

- Database using JDBC driver. Supports the JDBC 2.0 specification.
- Database using Record-Level file access using the interface of the classes.
- Integrated file system.
- Programs: Any iSeries program can be called, parameters are passed to the iSeries program, and data is returned to the Java program.
- Commands: Any iSeries batch command that is not interactive can be run.
- Data Queues: Access to both keyed and sequential data queues.
- Print: Using the print classes lists of spooled files, output queues printers, and other print resources can be retrieved.
- User spaces: Create, read from, write to, and delete iSeries user spaces.
- Digital Certificates: Manage digital certificates stored on the system.
- Jobs: List active jobs on the iSeries and retrieve information about those jobs, including the messages in the job log of a job.
- Message Queues: List, delete, and answer messages in a message queue. The ability to send messages is also provided.
- Users: List users on the iSeries server and retrieve information about those users.

Additional classes provide the infrastructure needed to manage signon information, create and maintain sockets connections to the iSeries services, and send and receive data. Data description classes for numeric and character data are provided to allow the Java program to describe the record format of a buffer of data with an object.

The Toolbox provides a set of Graphical Access classes. These classes use the access classes described previously to retrieve data and then present the data to the user. The classes use Java's Swing 1.0 (JFC 1.1) framework. Graphical APIs are available to access various iSeries resources, such as the database, Integrated File System, command call, and data queues. The iSeries data is then displayed in various pane formats.

In addition, the iSeries Toolbox for Java provides:

- Easy access to additional iSeries resources, to work better in a three-tier environment, and to make it easier to write servlets and write GUI applications with improvements to the GUI builder tool.
- Additional Java APIs for accessing iSeries resources. APIs are added to call iSeries service programs, call iSeries Java programs, interact with the iSeries FTP server, and work with profile tokens.
- Ability to run many Toolbox classes with a proxy server running on a middle tier.The Toolbox separates interface classes from implementation classes. These two parts can be run in the same JVM (traditional two-tier model) or can be run on different machines (three-tier model). By running in a three-tier model, the Toolbox package on the end tier is smaller. In an applet environment, this makes the download faster, and a thinner client can be used on the end tier. Since much of the processing is done on the middle tier, the Toolbox uses less resources on the end tier.
- Servlet/HTTP components new to the Toolbox help developers write applications for a Web environment. As in the other Toolbox components, these are not complete applications, but are building blocks for application developers. Two sets of components are provided. HTML classes provide a set of generic HTML components. Servlet classes provide components that use the Toolbox access classes to retrieve data and then convert the results to an HTML table or form.
- Enhanced GUI Builder tool of the Graphical Toolbox with an improved, easier to use interface and additional editing capabilities. Some of the highlights of the new V5R1 enhancements include support to generate Java source for event handlers and the capability for editing panes in other resources. Runtime and tools support are enhanced to include context menus, menu bars, and toolbars. Panels are resizable, so when the end user resizes a panel, the controls on that panel can also resize to show more data. Support for handicapped accessibility, including user-setable fonts and colors, and fully-functional keyboard navigation has been added.
- Support for Toolbox to run on a Linux workstation, run in Java 2, and implement GUI components using Swing 1.1. The Toolbox connects to iSeries servers running OS/400 V4R2 or later.
- The Toolbox contains a spooled file viewer class. This GUI class shows print output.

- An Integrated File System class extends Java's java.io.file class. This class can be used in applications that currently use java.io.file so the application acts on files in the Integrated File System of the iSeries server.
- Access to system data areas.
- Access to system values (both low level and GUI classes).
- Access to iSeries authority on an object (both low level and GUI classes).
- Improved access to information on users on the iSeries server.
- Access to system status.
- Improved security

The Toolbox supports the Secure Sockets Layer (SSL) specification. Data flowing between the workstation and OS/400 V4R4 or later can run across an SSL connection providing data encryption and server authentication.

iSeries Developer Kit for Java (5722-JV1 Included with 5722-SS1)

IBM iSeries Developer Kit for Java	
Product number	5722-JV1 (included free of charge with operating system 5722-SS1)
Replaces product	None
Minimum OS/400 level	V5R1
Installation prerequisites	None
Related products	OS/400 (5722-SS1)

The iSeries Developer Kit for Java facilitates the creation of Java applets and full-scale applications. It includes a collection of development tools, help files, and documentation for Java programmers. As Sun Microsystems, Inc. rolls out new Java technologies and provides updates, the Developer Kit will also be updated. iSeries server support of Java will be made available over several releases, and applications written using the Developer Kit are portable.

With V4R4, multiple JDK levels were supported on a single iSeries server. In V4R5, options for Java 1.1.8 and Java2 Standard Edition (J2SE) are shipped with the iSeries Developer Kit for Java. Options for Java 1.1.6 and 1.1.7 can be enabled on V4R5 by installing Developer Kit over the V4R4 version. The concurrent JDK support enables different versions of Java to be used for application development and deployment on the iSeries. This support should also permit future installation of additional JDK versions as they are made available.

This updated version of iSeries Developer Kit for Java includes the IBM Just in Time (JIT) Version 3.5 programs.

The iSeries Developer Kit for Java is compliant with Sun's Java 1.1.8 and Java2 Standard Edition specifications and includes:

- Java programming language and compiler
- Java interpreter and virtual machine
- Java run-time (class files and packages)
- Java Developer Kit commands and utilities
- iSeries server CL commands for creating and managing Java programs
- Java debugging facility

For additional JDK support information, including service requirements, refer to the online publication *iSeries Developer Kit for Java* available from the iSeries Book Server at:
`http://publib.boulder.ibm.com/pubs/html/as400/infocenter.htm`

The iSeries Developer Kit for Java is optimized for use in an iSeries server environment. It uses the compatibility of Java programming and user interfaces, so you can develop your own applications for the iSeries server. The iSeries Developer Kit for Java allows you to create and run Java programs on the system. Unique aspects of the iSeries Developer Kit for Java design include:

- The integration of critical Java Virtual Machine components below the Technology Independent Machine Interface (TIMI)
- A Java transformer for the conversion of Java bytecodes to RISC machine instructions
- Advanced, scalable implementations of garbage collection, object allocation, and synchronization
- The Remote Abstract Window Toolkit implementation that supports the java.awt APIs

The iSeries Developer Kit for Java is not an integrated language environment (ILE) language. It introduces a new language environment on iSeries that is built on Java, American National Standard Code for Information Interchange (ASCII), Integrated File System, and other industry standards.

The iSeries Developer Kit for Java supports the common JDK tools, such as javac, javadoc, and jar. There are also CL commands and Operations Navigator interfaces to the iSeries Developer Kit for Java.

Option 5 includes support for J2SE 1.3 and is added to OS/400 V4R5 and V4R4. You gain concurrent support for all three major versions of Java (1.1, 1.2, and 1.3) on these releases.

This updated version of iSeries Developer Kit for Java includes an upgrade to the IBM 3.6 Just in Time (JIT) compiler. JTOpen 2.0 (iSeries Toolbox for Java) is now available and can be found at: http://www.ibm.com/servers/eserver/iseries/toolbox/

Enhanced support allows you to build Java applications for the iSeries servers. Enhanced functions include:

- JDBC Standard Extension support
- Bidirectional CCSID support
- Environment variable wrappers
- Additional SSL encryption and key support
- Graphical enhancements to the GUI builder, wizards, and help utilities

New function includes improved classes for handling lists of iSeries objects (users, jobs) including list buffering, data faulting, and lazy data conversions. Performance improvements include:

- Command and program call optimizations
- Text conversion improvements
- Connection pooling
- Improved list handling of files in the Integrated File System

JTOpen 2.0 (Toolbox) connects to iSeries servers.

Suggested Reading
For additional Java support information, including service requirements, refer to the online publication iSeries Developer Kit for Java at:
http://publib.boulder.ibm.com/pubs/html/as400/infocenter.htm

IBM VisualAge for Java Enterprise Toolkit for AS/400 (ET/400)

IBM VisualAge for Java is a PC-based client product, separately priced from OS/400. It is a powerful, rapid application development tool for building Java-compatible applications, applets, and JavaBean components supporting IBM's Visual Construction from parts. Delta changes are compiled automatically and incrementally using VisualAge for Java.

VisualAge for Java comes in two packages: the Professional Edition and the Enterprise Edition. ET/400 is part of the Enterprise Edition of VisualAge for Java or later versions. It is also included in WebSphere Development Tools for iSeries V4R5M1 or later versions. ET/400 is fully integrated into the IBM VisualAge for Java Version 2.0.

In addition to the advanced integrated development environment (IDE) of VisualAge for Java, ET/400 makes the job of developing Java client and server programs to target iSeries much easier.

Toolbox for Java is a set of Java programs that enables the Internet programming model. The tools can be used to access iSeries resources.

All of the IBM Toolbox for Java classes are part of the ET/400 feature in VisualAge for Java. Once you add the ET/400 feature, the Toolbox classes will be added into the workbench, without downloading.

Features

VisualAge for Java offers these functions:

- Create Java graphical user interface (GUI) for existing 5250 displays.
- Use the Convert Display File SmartGuide feature of OS/400 to convert the Data Description Specifications (DDS) display files of your current RPG or COBOL program to Java Swing files.
- Call your iSeries program in Java programs.

  With the Create iSeries Program Call SmartGuide, the code is generated for you. Data conversion between iSeries server and the Java data type is also handled for you.
- Deploy your Java program to the iSeries server. Develop Java code using VisualAge for Java then export the files to the iSeries Integrated File System and compile them for better performance. Use the Export Java Files, compile iSeries Java Class, Run iSeries Java Class Actions and Distributed Debugger to deploy and test your Java program remotely.
- iSeries specific JavaBeans that enable easy access to iSeries resources. DFU beans extend the support of code to access iSeries database files. You can use them to map GUI forms, tables, and lists to iSeries databases, and manipulate database records.

Visual Age for Java: New in Version 2.0

In Version 2.0 of VisualAge for Java, all the iSeries SmartGuides are fully integrated with the IDE. SmartGuides are launched from within IDE and generated classes are placed automatically inside the repository.

- JDK 1.1.6 and JFC support
- Team capability
- Data Access Beans
- High performance compiler for Java

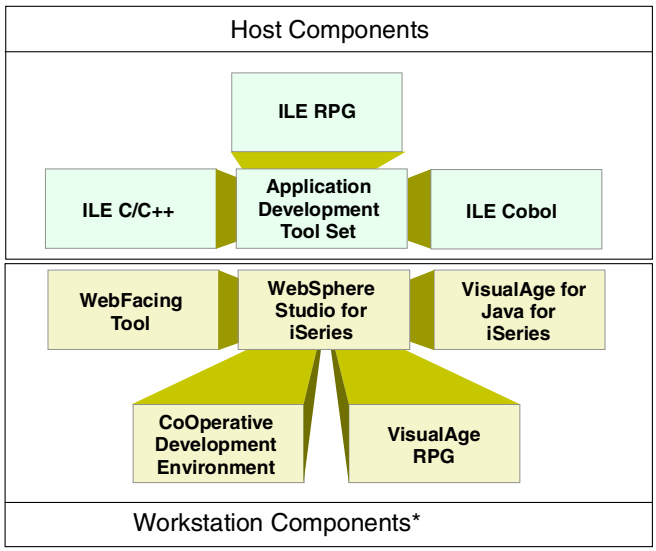
Suggested Reading

For additional JDK support information, including service requirements, refer to the online publication iSeries Developer Kit for Java, which is available through the following iSeries Information Center at: `http://publib.boulder.ibm.com/html/as400/infocenter.htm`

WebSphere Development Studio for iSeries (5722-WDS)

IBM WebSphere Development Studio for iSeries	
Product number	5722-WDS
Replaces product	5769-PW1 Application Development ToolSet for AS/400 (ADTS) 5769-RG1 ILE RPG for AS/400 5769-CB1 ILE COBOL for AS/400 5769-CX2 ILE C for AS/400 5769-CX5 VisualAge for C++ for AS/400 5769-CL2 VA RPG and CODE/400 5769-CL3 WebSphere Development Tools for AS/400 5799-GDW ILE C++ for AS/400 PRPQ **Note:** Except for 5799-GDW, customers who have any of the existing language compilers or ADTS receive 5722-WDS if they have Software Subscription. New customers must buy 5722-WDS.
Minimum OS/400 level	V5R1
Installation prerequisites	See the end of this section
Related products	IBM WebSphere Development Tools for iSeries (5724-A81) IBM WebSphere Application Server Standard or Advanced Edition

WebSphere Development Studio for iSeries is an attractively-priced, integrated, comprehensive suite of application development tools for both e-business and traditional iSeries development. This new suite of tools contains both server and workstation components that have been optimized for iSeries development. WebSphere Development for iSeries can be used to create new e-business applications and to quickly and easily convert existing business applications to Web-enabled solutions.



* The workstation components are shipped automatically with the 5722-WDS order.

Features

This solution combines many of the IBM AD tools for iSeries into one comprehensive package.

Host Tools includes:

- ILE RPG
- ILE COBOL
- ILE C
- ILE C++
- Application Development ToolSet

The Workstation Tools (with the entitlement of WebSphere Development Tools for iSeries, unlimited workstation licenses per server) are:

- WebFacing Tool (First Edition)
- WebSphere Studio for iSeries (Professional Edition)
- VisualAge for Java for iSeries (Professional Edition)
- Cooperative Development Environment (CODE)
- VisualAge RPG

There is a no-charge upgrade from existing iSeries tools with Software Subscription.

Benefits

Customers and Solution Providers who need to move existing iSeries applications to the Web, the WebFacing Tool component can be used to help convert 5250 interfaces to Web interfaces. The conversion is simple and requires minimal Java and Web development skills.

Customers and Solution Providers who need to create new Web Applications that access iSeries resources like data and applications, the WebSphere Studio for iSeries component of WebSphere Development Studio for iSeries can be used to support Web Development.

ILE RPG and ILE COBOL are equally good choices for business logic for e-business application development. Both compilers are part of WebSphere Development Studio for iSeries and have added Java inter operability enhancements.

Solution Providers can port e-business applications from other platforms to the iSeries easier than before. WebSphere Development Studio for iSeries includes new C and C++ compilers.

ILE RPG (Component of 5722-WDS)

RPG is the most popular language for writing iSeries business logic because of its ease of use and tight integration with the server. This is the largest release of RPG IV since the introduction of ILE RPG in V3R1. V5R1 enhancements include totally free-form C-specs, improved RPG-calling-Java support, improved data structure support, LIKE support for data structures, qualified names and more built-in functions.

ILE COBOL (Component of 5722-WDS)

COBOL is also a very popular language for writing iSeries business logic because of its ease of use and integration with the system. V5R1enhancements include COBOL-calling-Java support (along with the appropriate documentation), UCS-2 (UNICODE) support, and three new *process* options to enable developers port applications from the mainframe platform to the iSeries server.

ILE C (Component of 5722-WDS)

The ILE C compiler has been updated this release to the most current C compiler that IBM offers on any platform. This new compiler has added more ANSI support and significant improvement for cross-platform portability. Portability is further enhanced with the new Teraspace support, which allows for pointer usage and memory management that is more consistent with other platforms. This new compiler retains all of the iSeries-specific functionality that it had in previous releases.

ILE C++ (Component of 5722-WDS)

In this release, the C++ compiler has also been updated to the most current C++ compiler that IBM has to offer. This iSeries native compiler replaces both the VisualAge C++ cross-compiler and the native C++ PRPQ compiler. It includes support for the latest C++ language features such as namespaces, improved template support, bool data type, etc. It also includes an improved AT&T class library, a complete ANSI Standard Template Library, and the very latest version of IBM Open Class library.

Improvements to the stream classes in these libraries include 64-bit indexing and explicit control on CCSID-translation. The compiler can now read source from and produce listings to either the integrated file system or the native file system. This new compiler also features excellent cross-platform portability, which is again enhanced with new support for the Teraspace memory management model. The compiler retains all of the iSeries-specific functionality that it had in previous releases. The C++ PRPQ compiler is included for previous release support and to ease migration to the latest ANSI standard.

ADTS (Component of 5722-WDS)

This is the traditional tool suite for AS/400 application development programmers. These tools are included in the package in order that existing AS/400 programmers can more easily make the shift to the new development tools and environment.

In this release, SEU has been updated to support the latest enhancements in the newest languages compilers. Support for physical file triggers and constraint violation rollback information processing has been added to DFU. The limit on the number of libraries supported under ADM has been increased to 250.

WebFacing Tool (First Edition)

- Helps build a Web interface to existing 5250 applications by converting at development time, the display file source into JavaServer Pages and Java data beans
- JSPs and beans are deployed to the WebSphere Application Server (WAS)
- Requires little change to the application's business logic
- Easy and cost-effective to convert; no separate tool costs or runtime charges

WebSphere Studio for iSeries (Professional Edition)

- Provides easy access to iSeries data and applications
- Contains Web palette parts to generate standard HTML and Java Script
  - Includes entry field with validity checking and edit code support
  - Includes subfile parts
- Includes a wizard to generate a functional Web user interface

VisualAge for Java for iSeries (Professional Edition)

- Provides easy access to iSeries functions
- Generates code to access data and applications

CoOperative Development Environment (CODE)

- Next-generation classic host tools SEU, SDA, RLU, PDM, and the system debugger
- Includes Windows-based versions of these tools for seamless access to iSeries source and objects
- More efficient development and management of OPM/ILE RPG, OPM/ILE COBOL, OPM/ILE CL, ILE C, ILE C++, DDS, and Java
- Helps attract, retain, and grow key iSeries development skills

VisualAge RPG

- Creates GUI applications running on Windows or any Java GUI-capable client or browser
- Provides seamless access to iSeries data and applications

Planning Information

The IBM Open Class Library that is shipped as part of Websphere Development Studio for iSeries (5722-WDS) and Operating System/400 for iSeries (5722-SS1) will be provided for one additional release beyond V5R1, after which it will be discontinued. The I/O Stream and Complex Library will continue to be shipped and supported as part of Operating System/400.

All applications that use the IBM Open Class Headers and Service Programs need to be refreshed using the C++ Standard Library provided with 5722-WDS and 5722-SS1.

When discontinued, IBM Open Class Headers shipped in library QSYSINC with a descriptive text of “IOC HEADER”, and the IBM Open Class Service Programs, QYPPOC370 and QYPPOC510, shipped in library QSYS will be removed.

Documentation will be available by the end of September 2001 to assist migration from IBM Open Class to the C++ Standard Library. This documentation will be available as a link from the iSeries Planning page located at:
`http://www-1.ibm.com/servers/eserver/iseries/support/planning/nav.html`

IBM Integrated Languages Environment RPG for iSeries (Component of 5722-WDS)

ILE RPG/400 consists of the RPG compilers listed in the following table.

RPG Compiler Option	Install Option in 5722-WDS
ILE RPG IV	31
IBM System/36-Compatible RPG II	32
IBM System/38-Compatible RPG III	33
RPG/400	34
ILE RPG-IV *PRV	35

ILE RPG for iSeries is designed for writing various types of application programs. This language is easy to learn, yet offers many advanced functions for experienced programmers.

ILE RPG for iSeries delivers RPG IV, the next evolution of the programming language. The RPG IV compiler offers improved programmer productivity and application growth and quality.

RPG IV – New in V5R1

- Java enablement to simplify coding of calls to Java classes and methods
- More granular exception monitoring (MONITOR operation code)
- New built-in functions: %ALLOC, %REALLOC, %CHECK, %CHECKR, %LOOKUPxx, %TLOOKUPxx, %OCCUR, %SHTDN, %SQRT, %XLATE
- Date, time and timestamp operations are allowed in expressions
- Free-form calculation specifications
- Runtime control of the file to be opened
- LICOPT support to pass options directly to the translator

- Qualified names in data structures
- ELSEIF operation code
- New predefined /DEFINE names
- New compiler directive /INCLUDE

IBM Integrated Language Environment COBOL for iSeries (Component of 5722-WDS)

ILE COBOL for iSeries consists of the COBOL components listed in the following table.

Cobol Compiler Option	Install Option in 5722-WDS
ILE COBOL	41
System/36-Compatible COBOL	42
System/38-Compatible COBOL	43
OPM COBOL	44
ILE COBOL *PRV	45

ILE COBOL for iSeries is a programming language that is used in the processing of business problems. COBOL can be used to manipulate DB2 for OS/400 database files in a relatively simple way. COBOL uses English-like syntax to assist the programmer in generating self-documenting, structured programming constructs.

Through ANSI-85 high-level functions of ILE COBOL for iSeries, such as nested source programs, it is easier to port code to the iSeries server from other platforms. Programmer productivity is increased with ILE COBOL for iSeries, through its extensive database and workstation support, static, inter-language calls, interactive syntax checking, debug facilities, and a full complement of compile-time error diagnostics.

In this release, we have introduced the first release of COBOL-calling-Java and vice versa support (along with the appropriate documentation), provided UCS-2 (UNICODE) support, and introduced three new *process* options to enable developers port applications from the mainframe platform to the iSeries server.

ILE COBOL – New in V5R1

- UCS-2 (Unicode) support
  - National data, a new type of data item, is added to provide support for the coded character set specified in ISO/IEC 10646-1 as UCS-2. The code set is the basic set defined in the Unicode standard.
  - NTLPADCHAR compiler option and PROCESS statement option
- Java interoperability support

  QCBLLESRC.JNI file which provides the same definitions and prototypes that are provided in the JNI.j file, but written in COBOL rather than C.
- iSeries portability support
  - PROCESS statement option NOCOMPASBIN/COMPASBIN
  - PROCESS statement option NOLSPTRALIGN/LSPTRALIGN
  - Complex OCCURS DEPENDING ON (ODO) support
- The LICOPT parameter is added to the CRTCBLMOD and CRTBNDCBL commands to allow advanced users to specify Licensed Internal Code options

Integrated Language Environment C for iSeries (Component of 5722-WDS)

ILE C and C++ for iSeries consists of the C components in the following table.

C and C++ Compiler Options	Install Option in 5722-WDS
ILE C	51
ILE C++	52
ILE C *PRV	53
ILE C++ *PRV	54

The ILE C compiler has been updated this release to the most current C compiler that IBM offers on any platform. This new compiler has added more ANSI support, and significant improvement for cross-platform portability. Portability is further enhanced with the new Teraspace support which allows for pointer usage and memory management that is more consistent with other platforms. This new compiler retains all of the iSeries-specific functionality that it had in previous releases.

ILE C – New in V5R1

- Completely refreshed compiler from latest AIX compiler
- Compliant with the ANSI ISO/IEC 9899-1990(1992) C standard

- Read source and includes from IFS or native, but still produces *MODULEs in native file system
- Produce native or IFS spool file listings
- Teraspace Phase 2 support
- A third parameter for main() contains current set of environment variables
- Target V4R4, V4R5, and V5R1
- A wider variety of source file CCSIDs
- Preprocessor output targeting specified file
- A Qshell command for compiling
- New LICOPT and CSOPT command keywords
- Asynchronous signals
- More in-synch with ILE C++

In this release, the C++ compiler has also been updated to the most current C++ compiler that IBM has to offer. This iSeries native compiler replaces both the VisualAge C++ cross-compiler and the native C++ PRPQ compiler. It includes support for the latest C++ language features such as namespaces, improved template support, bool data type, etc. It also includes an improved AT&T class library, a complete ANSI Standard Template Library, and the very latest version of IBM Open Class library.

Improvements to the stream classes in these libraries include 64-bit indexing and explicit control on CCSID-translation. The compiler can now read source from and produce listings to either the integrated file system or the native file system. This new compiler also features excellent cross-platform portability, which is again enhanced with new support for the Teraspace memory management model. The compiler retains all of the iSeries-specific functionality that it had in previous releases. The C++ PRPQ compiler is included for previous release support and to ease migration to the latest ANSI standard.

ILE C++ V5R1 enhancements include:

- Completely refreshed compiler from latest AIX compiler
- More ANSI support
- Compliant with the latest ANSI ISO/IEC 14882-1998 C++ standard
- Template Library, and namespace support
- Replaces VAC++ cross compiler and native PRPQ compiler
- New release (V5) of IBM Open Class class libraries bool data type
- Read source and includes from IFS or native
- Produce native or IFS spooled file listings
- 64-bit file indexing for stream classes
- Teraspace Addressing support (improves portability/perf)
- More explicit control on CCSID-translation for stream classes
- A third parameter for main() for current environment vars
- Target V4R4, V4R5, and V5R1
- Preprocessor output targeting specified file

- A Qshell command for compiling
- New LICOPT and CSOPT command keywords
- More in-synch with ILE C

ADTS – New in V5R1

- Source Entry Utility (SEU):
  - Supports the new RPGLE CF Format and Prompt
  - Supports the OPCODE of ELSEIF and FOR to use the CX Prompt instead of the C Prompt in RPGLE
  - Supports the source type CPP to have a default of lower case input
  - Supports expanding the spool number size from Bin (16) to Bin (31)
- Report Layout Utility (RLU): Printer File DDS Keywords Support
- SUPC: Support of expanding the spool number size from Bin (16) to Bin(31)
- PDM: Added new functions FNDSTRPDM2 and FNDSTRPAR2 commands to search by using a list of members to search
- DFU: Trigger and constraint violation rollback information processing and messaging to inform user
- ADM: Expansion to 250 libraries support and backup of user data for new release installation

The Application Development ToolSet (ADT) contains five utilities:

- **Programming Development Manager (PDM)**

  The Programming Development Manager (PDM) provides the focal point of this integrated application development environment by managing lists of items to be developed or maintained. By easily subsetting and selecting from lists, the user can manipulate any number of objects. This enhances the productivity of analysts, programmers, and support personnel in managing programs, data and systems information, by focusing activities on a grouping of objects or items to be worked on. The other tools are fully integrated; the user always returns to the PDM list when use of a tool is complete. Also, by automatically invoking the appropriate command with correct parameters and syntax, keying and errors are reduced.

  This integration is further enhanced by user-definable options to extend this environment with the user's own tools.

- **Source Entry Utility (SEU)**

  SEU is a full-screen editor providing syntax checking of compiler source statements. Commands have a strong affinity with those provided by the System/370 Program Development Facility (PDF) editor as well as the System/36 Development Support Utility (DSU) editor, and the System/38 SEU.

- **Screen Design Aid (SDA)**

  SDA is used to interactively design, create, and maintain customer application screens (displays and menus).

  Changes to the attributes and colors of fields can be made and immediately displayed using the testing facility of SDA. This also provides a useful application prototyping capability to allow application end users of the application to participate in the design phase.

  SDA allows the programmer to:

  – Define fields and constants for the screen format
  – Select a database file and fields from that database file
  – Add or remove attributes and colors to or from the fields and constants
  – Change positions (move, copy, or shift) of, or remove, a field
  – Display or change work display field conditioning
  – Display or change ruler where the cursor is positioned

  In addition to testing the display being worked on, a print facility is also provided to assist with the documentation of an application.

  Screen Design Aid also provides support in System/36 and System/38 environments.

- **Report Layout Utility (RLU)**

  The Report Layout Utility (RLU) allows a programmer to define the layout of a printed report on the screen. RLU has a full-screen editing capability and allows the programmer to review report prototypes easily. After the report image is final, the programmer uses RLU line commands and function keys to define record formats and fields.

- **Data File Utility/Application Development (DFU/AD)**

  Data File Utility/Application Development can be used to define, create, and maintain database applications that are primarily oriented to data entry, inquiry, or file maintenance. It is especially useful for creating test data for an application being developed.

  DFU/AD can use any of three file definitions:

  – RPG II File and Input specifications (F & I specs)
  – Interactive Data Definition Utility (IDDU) definitions
  – File definition stored with a database file

  All iSeries system file access methods are supported (sequential, indexed, and direct). The applications that are created take advantage of the Data File Utility/Application Execution (DFU/AE) support provided within the IBM OS/400 to allow validation of database fields and additional fields as well as scrolling forward and backward when browsing database records.

Two additional components in ADTS/400 are:

- **File Compose and Merge Utility (FCMU)**

  FCMU is a compare function that performs a comparison on two or more source physical files and locates the differences. When synchronization of multiple versions of a source file is required, the merge function takes the output of the compare and integrates it into the base file automatically. This can also be done through the interactive session with a split-screen merge facility similar to the browse and copy split screen in SEU.

- **Interactive Source Debugger (ISDB)**

  ISDB helps in testing and debugging the programs. It is a tool that displays the source of the program while the program is under the debug mode. Problems and program bugs can be easily identified by displaying variables and reviewing the source statements. Interactive Source Debugger speeds debugging and moves the applications into production faster.

The two features of ADTS/400 are:

- **Application Dictionary Services**

  The IBM Application Dictionary Services feature is a programmer development tool to assist in program development and maintenance. It is a dictionary on the iSeries server that provides references and cross-references of data on the system. It can generate a complete inventory of all the software components on the iSeries server, regardless of programming language. This inventory is stored in the dictionary and can be updated while an application is being modified.

  Application Dictionary Services can analyze impacts due to changes. It provides lists of files and programs that will be affected by a potential change to a field. This reduces the time spent in identifying and understanding all of the components of an application.

  A synchronization capability, known as the Notify function, allows Application Dictionary Services to monitor for user domain object changes (create, delete, rename, and so on) to keep its dictionary and the system synchronized. This is based on a centralized system facility (the System Audit Journal) that can be set to record any operation on an object in the user's domain of the system.

  Application Dictionary Services can be accessed from CODE/400.

- **Application Development Manager**

  The IBM Application Development Manager feature provides version control and software configuration management functions. It allows a group of application developers to create, manage, and organize multiple versions of their application. The application manager maintains the integrity of the application by not allowing one developer to overwrite another developer's source changes. Application Development Manager helps to automate the process of building, or compiling, source code. Application developers no longer have to analyze relationships between pieces of code. The build process does it for

them. Application Development Manager provides developers with a mechanism for efficiently managing application objects throughout the life of an application.

Application Development Manager supports applications written in these programming languages:

- ILE C for iSeries
- ILE COBOL for iSeries
- ILE RPG for iSeries

It also supports CL, SQL, and Data Description Specifications (DDS).

Application Development Manager contains security, auditability, and administrative functions, which facilitate the management of an application development environment:

- *Application Development Manager security functions*: Limits access to appropriate users
- *Audit trail*: Keeps the dates and times of changes and user IDs of the person making changes
- *Report facility*: Shows the impact of the change to an application component
- *Administrative functions*: For enrolling users to a project or application, defining projects, and defining a project hierarchy

These Application Development Manager facilities help developers to work efficiently and effectively in a well-organized and controlled application development environment. ADM functions are available through CODE/400.

WebSphere Development Tools for iSeries V5.1 (Entitled with 5722-WDS)

Note: IBM VisualAge RPG and CoOperative Development Environment for AS/400 was renamed to IBM WebSphere Development Tools for AS/400 in October 2000. This latest version is now named WebSphere Development Tools for iSeries V5.1.

WebSphere Development Tools for iSeries consolidates the workstation tools (client side) for developing Web applications for the iSeries. This package does not contain the host components such as ILE RPG, ILE C, ILE C++, ILE Cobol compilers or the Application Development tool set.

WebSphere Development Tools for iSeries V5.1 consists of these five workstation components:

- WebFacing Tool (First Edition)
- WebSphere Studio for iSeries (Professional Edition)
- VisualAge for Java for iSeries (Professional Edition)
- CODE
- VisualAge RPG

The WebFacing Tool helps customers build a Web interface to existing 5250 applications. The WebFacing Tool creates the Web interface by converting, at development time, the display file source into JavaServer Pages and Java data beans. These Java components are deployed to the WebSphere Application Server. In combination with the WebFacing runtime, the WebFacing Tool provides a Web interface to existing 5250 applications. The benefits include:

- Little or no change is required to the application's business logic
- The same logic supports both a 5250 and Web interface
- No dual maintenance
- The conversion process is easy and cost effective
- No separate tool costs or run time charges

WebSphere Studio is the IBM premier Web development tool. To WebSphere Studio, we added display file-like Web palette parts including entry fields with validity checking and editcode support and subfile parts. These generate standard HTML and JavaScript. There is also a wizard for generating a functional Web user interface to existing programs, and a wizard to simplify publishing on the iSeries. It is easier to create Web applications that access iSeries data and applications with this version of WebSphere Studio than with any other Web development tool.

VisualAge for Java is recognized by the industry as the best development environment for creating Java applications for the iSeries server. The Enterprise Toolkit for iSeries has been added to the Professional Edition. The Toolkit provides easy access to iSeries server functions as well as wizards to generate code to access iSeries data and applications.

CODE is the next generation of the classic host tools SEU, SDA, RLU, PDM and the system debugger. CODE contains highly productive Windows-based versions of these tools and more to offer seamless access to iSeries source and objects, as a robust offline work-environment. The CODE tools make developing and maintaining OPM/ILE RPG, OPM/ILE COBOL, OPM/ILE CL, ILE C, ILE C++, DDS, and Java more efficient and fun. They also help attract, retain, and grow key iSeries development skills.

VisualAge RPG is the IBM premier development tool, compiler, and runtime for creating GUI applications to run on Windows or any Java GUI capable client or browser. VisualAge RPG provides seamless access to iSeries data and applications

This package of workstation tools assists customers who move into the world of e-business to:

- Create new e-business applications
- Port e-business applications from other sources
- Web enable existing host applications

WebFacing Tool (First Edition)

The new WebFacing Tool helps convert existing 5250 interfaces to Web Interfaces with small changes to the host application. The conversion process is simple and cost effective for many 5250 applications. This first edition of the WebFacing Tool supports the conversion of many common DDS keywords.

DDS keyword support will be enhanced over time through additional editions of the WebFacing Tool. For more information on these enhancements and the timeframe for the planned implementation of specific DDS keyword support, see the Web site at:
`http://www.ibm.com\software\ad\wds400`

The ultimate IBM goal is to make the conversion process simple and easy for all customers. At development time, the WebFacing Tool creates industry-standard JavaServer Pages and JavaBeans based on the 5250 display file source code. At runtime, there is a low-level switch in OS/400 that determines if the user is using a Web or a 5250 interface. If the input originated from a browser, then the output data from the application is directed through a data bean to the generated JSP.

This results in HTML forms being displayed in a browser. No 5250 datastream is ever created. If the input originates from a 5250 display, then the switch directs the 5250 data to be incorporated into a 5250 datastream and then shipped to a 5250 display. The same application can support both a 5250 and Web interface.

There is no separate development tool charge or run-time charges with WebFacing an application. Web-enabling an existing 5250 application is typically a multi-step process. The WebFacing Tool and its associated environment allow the customer to customize the Web interface in a pre-conversion step to ensure that the base application will support both the Web and 5250 interface. Since the conversion process generates JSPs and JavaBeans, these components can be further enhanced with standard Java development tools like WebSphere Studio and VisualAge for Java. Caution should be taken in this post-conversation customizing to ensure that the connection to the base application is not severed. This would create a new application.

WebFacing is not a stopgap exercise. The customer can leverage and extend the components created by the WebFacing Tool as part of the evolutionary strategy to sophisticated e-business solutions.

The WebFacing Tool is a compelling Web-enabling strategy because:

- “WebFaced” applications can support both 5250 and Web interfaces with no dual maintenance.
- There are no separate development or run-time charges.
- The development time conversion and thin client implementation avoid typical performance penalties associated with Web-enabled 5250 applications.

- There are no proprietary interfaces with the WebFacing Tool. It generates standard Java components that can be leveraged and extended.

The major difference of the WebFacing Tool from the competition is that the WebFacing Tool is a development-time conversion tool while most of the other tools are run-time, conversion tools.

5250 intercept products are preferred when:

- The application is stabilized.
- Zero change to the application is desired.
- You can't change the application source.
- Preference is to enhance runtime output versus development time source.

The WebFacing Tool is preferred when:

- The business is still actively evolving the application.
- The developer is able to change the code to improve Web rendering.
- Preference is to enhance source versus 5250 data stream.
- Web application is performance sensitive.
- Web application is cost sensitive.

The WebFacing Tool (First Edition) supports display file DDS and does not support:

- UIM help or panels
- Office help
- OS/400 operating system screens or panels

WebFaced applications continue to run in interactive mode.

WebSphere Studio for iSeries (Professional Edition)

- **IDE environment**: WebSphere Studio Professional Edition comes with a full integrated development environment for creating and managing Web development projects. The IDE groups all of the files related to a Web site into a project and provides check-in and check-out capabilities for the files. The IDE also provides a wizard to publish a project to a Web server. The IDE can register any tool for any particular file type.
- **What-You-See-Is-What-You-Get editing**: The Page Designer provides “What-You-See-Is-What-You-Get” (WYSIWYG) editing of HTML pages and JavaServer Pages (JSP). The IDE provides wizards for creating SQL statements, JSPs and servlets from SQL statements and JSPs and servlets from JavaBeans.
- **Improved integration**: WebSphere Studio has improved its integration with VisualAge for Java. Now the customer can read classes, beans and servlets from VisualAge for Java and write classes, beans and servlets to VisualAge for Java. The customer can

publish a Web site to VisualAge for Java for testing purposes. Both WebSphere Studio and VisualAge for Java support the Java 2 standard.

- **iSeries Affinity enhancement**: Added to WebSphere Studio to make it easier to access iSeries data and applications than any other Web development tool. To generate JSP code to set attributes, we added:
  - Display-file-like palette parts in Page Designer
  - HTML and JavaScript controls
  - Smart entry fields
  - Labels, buttons, subfiles, and wizards
- **SmartGuide Framework**: We added a program-call SmartGuide framework for putting program and service program APIs on the Web. Get to the Web easily by describing the program and service program inputs and outputs and then generating the outputs. An HTML form is provided for prompting for the inputs and a JSP is used to display the output. We use a JavaBean to call a program or service program using the Common Connector Framework, which is the new standard for Java-to-existing connections. Then a servlet is used to glue all of the components together. The Page Designer is used to iterate the generated output.

  We simplified iSeries deployment by providing a SmartGuide to easily publish a Web site to the WebSphere Application Server on the iSeries. We provided auto-configuration support for the WebSphere Application Server. We also provided lots of documentation and testing to ensure that WebSphere Studio and WebSphere Application Server are the preferred choices for Web development and deployment for iSeries customers. Web interfaces can and will be used for in-house applications and Internet applications. WebSphere Studio may become the defacto standard tool for creating end-user interfaces for all iSeries applications. There are four possible reasons that developers may want to use WebSphere Studio Advanced Edition from the version that is shipped with WebSphere Development Tools for iSeries. The Advanced Edition provides the following enhancements:
  - Version Control Support for third-party Source Control Management Tools
  - Distributed debugger support for adding breakpoints to JSPs running on Windows NT
  - Tooling to support the WebSphere Personalization Server
  - Page Detailer, which is a performance analyzer in a browser that details the performance characteristics of all of the components that are downloaded

IBM designed WebSphere Development Tools for iSeries so that WebSphere Studio Advanced Edition could be installed over your version of WebSphere Studio. Take advantage of the extra capabilities offered by the Advanced Edition and yet still maintain the iSeries Affinity enhancements that were shipped with WebSphere Development Tools for iSeries.

VisualAge for Java for iSeries (Professional Edition)

VisualAge for Java includes the Enterprise Toolkit for iSeries. This tool kit includes:

- Toolbox for Java to provide access to iSeries data, applications, and system functions.
- Remote export, compile, run, and debug support to make it easier to deploy Java applications on the iSeries server.
- Display file to Swing import tool to make it easier to create a Java, GUI front end to an existing 5250 application.
- SmartGuide or wizard to generate the JavaBean for calling an existing iSeries program.
- Formatting beans that have capabilities similar to those in a display file for entry fields, labels, comboBoxes, and Jtable columns.
- iSeries attributes such as edit codes and error checking are provided.
- DFU-like beans: These beans with SmartGuides or wizards provide direct record level access to DB2 UDB for iSeries via the classes in the Toolbox for Java. The wizard connects to servlets for the HTML output or to Java's Jtable widget for GUI output. This wizard replaces the Subfile SmartGuide.
- PDM-like beans to retrieve lists of iSeries object information and information from the integrated file system. The beans support PDM's subsetting capabilities.

VisualAge for Java, Professional Edition plus iSeries Enterprise Toolkit addresses most of the tool requirements for building portable, cross-platform, OO, and e-business applications.

The version of VisualAge for Java that is shipped with WebSphere Development Tools for iSeries may not address all the Java development environments. There are two key reasons for using VisualAge for Java Enterprise Edition:

- The customer may want to build Java applications that access IMS, Encina, MQSeries, CICS, HOD, or SAP and, therefore, use the connectors that are part of the Enterprise Edition.
- Support for Enterprise JavaBean development is not supported by the version of VisualAge for Java that is included in WebSphere Development Tools for iSeries V5.1.

Developers require VisualAge for Java Enterprise Edition for EJB development. However, our solution has been designed so that VisualAge for Java Enterprise Edition can be installed over top of our version of VisualAge for Java. VisualAge for Java Enterprise Edition can be purchased and installed for any developers who need to do EJB development.

Note: VisualAge for Java Enterprise Edition, a workstation-based offering, is priced per workstation.

CODE

CODE is the Windows-based, IBM follow-on product set to PDM, SEU, SDA, RLU, and the system debugger. It is a modern, integrated and comprehensive toolset optimized for creating and maintaining iSeries applications or application fragments written in OPM/ILE RPG, OPM/ILE COBOL, OPM/ILE CL, ILE C, ILE C++, DDS or Java. CODE consists of:

- **CODE Designer**: A compelling What-You-See-Is-What-You-Get (WYSIWYG) designer for screens, reports, and database files.
- **CODE Editor**: A flexible editor for editing any Windows or iSeries source, but with extraordinary support for RPG, COBOL, CL, C, C++, Java and DDS. This includes built-in language reference help, built-in syntax checking, built-in prompting for RPG and DDS, and a built-in Program Verifier for RPG, COBOL, and DDS. This verifier is effectively the host compiler ported and built-in to the editor, for the purpose of error checking. CODE guarantees a clean compile every time if the verify is used first to find and fix all errors. The editor also supports a command shell for issuing Windows or iSeries commands. Further. the editor has single button launch of the host compiler and of the distributed debugger.
- **CODE Project Organizer**: A tool for organizing Windows and iSeries objects into projects for easy and productive access. From the list of objects, all of the CODE tools can be launched from the context menu, as well as user-defined actions.
- **IBM Distributed Debugger**: A debugger for iSeries OPM/ILE RPG/COBOL/CL, ILE C/C++ and Java. This debugger runs on Windows while debugging your application running on iSeries. Supports source and listing views, interactive and batch programs, and all flavors of server Java including applications, servlets, and EJBs.

There are other miscellaneous tools inside CODE as well, all of which add up to significant productivity and morale gains over the classic set of tools. CODE offers a great first step in the necessary migration of skills to new e-business world, starting with the use of modern tools for traditional work. It also offers a more attractive environment for exciting and retaining new staff.

V5R1 CODE enhancements include:

- Incorporated all RPG IV V5R1 enhancements in the Program verifier and syntax checker of CODE
- Conversion of Fixed for C specification to Free form
- Many minor customer enhancements

VisualAge RPG

VisualAge RPG allows the customer to write or port RPG IV applications to a Windows client. A GUI Builder is provided to visually layout the graphical user interface of the client application. The event logic is then written in RPG IV. VisualAge RPG uses the CODE Editor

for writing applications. The VisualAge RPG debugger, used to debug the RPG IV client applications, is also similar to the CODE Debugger. The customer can also write non-visual projects and portable business logic in RPG IV with VisualAge RPG. Furthermore, the customer can generate Java applications or applets from VisualAge RPG source.

System/36 Migration Aid

System/36 Migration Aid	
Product number	5727-MG1
Replaces product	None
Minimum OS/400 level	N/A
Installation prerequisites	None
Related products	None

System/36 Migration Aid provides the facilities on System/36 to analyze data, libraries, files and programs prior to saving them for migration to the iSeries server. Files and data providing system-related information, for example, security, configuration information, and document folders, can also be migrated. Once saved using a choice of media, facilities are provided on the iSeries server to load and reformat the data as required. These facilities are part of OS/400.

The migration process is clearly defined by a menu-driven interface. For further details, see *System/36 Migration Planning Guide,* SC21-4152.

System/38 Migration Aid

System/38 Migration Aid	
Product number	5714-MG1
Replaces product	None
Minimum OS/400 level	N/A
Installation prerequisites	None
Related products	None

System/38 Migration Aid provides facilities and functions to select and migrate System/38 objects to the iSeries server. System/38 programs can be transported in object format and re-encapsulated automatically on the iSeries server.

For further details, see *System/38 Migration Planning Guide*, SC21-4153.

Lotus

Lotus

IBM Licensed Programs: Lotus Products

Product Name	Product Number	Refer to
Lotus Domino Server for iSeries	5769-LNT	page 619
Lotus Domino R5 Mail Server	Licensing Option	page 622
Lotus Domino R5 Application Server	Licensing Option	page 626
Lotus Domino R5 Enterprise Server	Licensing Option	page 629
Lotus Domino R5 Advanced Enterprise Server	Licensing Option	page 631

Domino for iSeries is the leading groupware solution available for the iSeries server. It provides unparalleled capability for iSeries customers to use their business data in collaborative e-business solutions, both within their organizations and with their partners over the Internet. Domino for iSeries provides a critical foundation as companies begin to move from “information overload” into organizational learning and knowledge management. No competitive product offers the ease of use, low cost of ownership, tight integration, and positioning for the future that Domino for iSeries delivers. Domino for iSeries is offered with familiar iSeries terms and conditions for purchase, services, and support.

Note: Domino is not OS/400 release dependent. For example, OS/400 V4R4 supports R5 or later versions of the Lotus Domino Server for AS/400.

Lotus Domino Server for iSeries (5769-LNT)

Lotus Domino Server for AS/400	
Product number	5769-LNT
Replaces product	None
Minimum OS/400 level	V4R4
Installation prerequisites	• http://www.ibm.com/servers/eserver/iseries/domino • http://www.ibm.com/servers/eserver/iseries/quickplace
Related products	Lotus Quick Place for iSeries 5733-LQP Lotus Sametime for iSeries 5733-LST IBM Integrated Domino Fax for iSeries 5733-FXD

Lotus Domino Server for AS/400 offers you a choice of Domino servers and clients for your iSeries server. You can select the function and capability you need in the Domino server without paying for something you don't need.

Incremental installers are now available for Lotus Domino and Lotus QuickPlace for iSeries. Incremental installers are downloadable from the Domino for iSeries support Web site:
`http://www.ibm.com/servers/eserver/iseries/domino/support/`

Incremental installers provide the ability to upgrade from one Quarterly Maintenance Release (QMR) to the next release without installing the full QMR. They are available beginning with Domino Release 5.0.5 and QuickPlace Release 2.0.6a.

Lotus Domino Server for iSeries – New with V5R1

Enhancements for V5R1 include:

- Enabling simultaneous execution of Domino SMTP and iSeries SMTP:

  There are two types of SMTP support available in Domino R5: iSeries SMTP support with AnyMail/400 Mail Server Framework and Domino R5 SMTP support.

  Using a specific TCP/IP address for iSeries SMTP support allows you to link to a specific TCP/IP address based on a new OS/400 SMTP configuration setting. This allows for simultaneous execution of both Domino SMTP and AS/400 SMTP. which means you can access your Domino mail and OS/400 mail at the same time on the same system.

- Autostart of Domino and QuickPlace:

  OS/400 provides the capability to automatically start TCP/IP servers when TCP/IP is started. Beginning with Release 5.0.7 of Domino and 2.0.7 of QuickPlace, these servers can be included in the list of TCP/IP servers to autostart.

- 128-character password support:

  OS/400 provides the capability for 128-character passwords. Beginning with Domino Release 5.0.7 and QuickPlace Release 2.0.7, server functions which query for OS/400 passwords also allow 128-character passwords to be input.

- EZ-Setup of Domino:

  EZ-Setup now includes a setup wizard for Domino for iSeries. The GUI setup wizard, provided on the Domino for iSeries CD-ROM, guides the user through the first configuration of a Domino server. Version R5.0.7 or later of the Domino for iSeries product (5769-LNT) is required when configuring Domino servers with EZ-Setup.

- Domino as a ClusterProven application:

  Beginning with Release 5.0.7, Domino servers may now be managed as ClusterProven applications. By managing the Domino data from a single storage source that can be

switched between systems or logical partitions, the availability of Domino is further improved.

- BRMS enhancement for Domino:

  BRMS support of Domino includes incremental backup and restore of Domino server files. This allows only changes since the previous backup or restore to be managed.

- Domino and WebSphere integration enhancements:

  Several enhancements are introduced in Domino to better integrate with IBM WebSphere software. In particular is a single signon with WebSphere Application Server 3.5 level.

- Support for Ichitaro Filter:

  In Domino for iSeries release 5.0.8, Full Text Search supports attachments in the Ichitaro file format.

- C++ API Toolkit Updated to Version 2.1:

  The Lotus C++ API Release 2.1 Toolkit for Domino and Notes is available with Domino for iSeries 5.0.8 (option 4) and electronically at the Lotus Developer network.

  `http://www.lotus.com/home.nsf/welcome/techzone`

- Web applications support attachments larger than 16 MB:

  In previous releases of Domino and Quickplace for iSeries, Web browser users could not send mail or use other save functions with attachments that contain a total of more than 16 MB of data. This restriction applied to sending or saving one attachment that contains more than 16 MB of data or multiple attachments that total more than 16 MB from the Web browser interface. With Domino for iSeries 5.0.7a and Quickplace for iSeries 2.0.7, this restriction has been removed. Web users can send mail and use other save functions with attachments exceeding 16 MB.

  Domino allows you to limit the attachment size via the Maximum Post Data setting in the Internet Protocols, Domino Web Engine page of the server document. The default is 0, which means no limit is defined. The new upper limit must be less than 2 GB.

  Attachments greater than 16 MB have been, and continue to be, supported using the Lotus Notes client.

For additional information on Domino for iSeries Release 5.0.8, refer to:
`http://www.ibm.com/eserver/iseries/domino`

Domino Server Choices	Description
Mail Server	The Mail Server license gives you the right to use a Domino server for mail on systems with up to four CPUs with no Domino partitioning.
Application Server	The Application Server license gives you the same functions as the Mail Server plus the ability to host custom applications including: - Lotus Quick Place - IBM WebSphere Application Server - Domino Enterprise Connection Services on systems with up to four CPUs with no Domino partitioning
Enterprise Server	The Enterprise Server license gives you the same functions as the Application Server plus: - Notes clustering - Browser clustering - Partitioning - SMP on systems with one to nine CPUs with Domino partitioning
Advanced Enterprise Server	The Advanced Enterprise Server license gives you Enterprise Server capabilities on systems with more than eight CPUs with Domino partitioning.

These server choices are discussed in the following sections.

Lotus Domino R5 Mail Server (Licensing Option of 5769-LNT)

The Domino Server Family is an integrated messaging and Web application software platform that can help you:

- Improve customer responsiveness
- Streamline business processes

Rely on the top-rated, global service and support of Lotus, IBM, and the IBM worldwide network of Business Partners to help you maximize the return on your Domino infrastructure investment.

The Domino Mail Server is supported on OS/400 V4R4, or later. It can be licensed for deployment on systems with one to four CPUs with no Domino Partitioning. For larger systems, see “Lotus Domino R5 Application Server (Licensing Option of 5769-LNT)” on page 626, “Lotus Domino R5 Enterprise Server (Licensing Option of 5769-LNT)” on page 629, and “Lotus Domino R5 Advanced Enterprise Server” on page 631.

Domino offers simple, flexible administration, and Web-based administration. With Domino Administrator, you can manage every aspect of your entire Domino deployment (even across domains) with one intuitive, task-oriented interface. Authorized administrators can perform tasks like creating users and groups and monitoring mail from anywhere, via a Web browser.

Domino Mail enables a smooth upgrade path to other servers in the Domino family, with complete investment protection.

Features

- **Go home on time**: Unequaled reliability, manageability, and performance
- **Integrated, collaborative services**:
  - World-class e-mail
  - Web access
  - Calendaring
  - Group scheduling
  - Bulletin boards
  - News groups
- **Internet messaging, only better**:
  - Native Internet addressing
  - SMTP routing
  - MIME content
  - S/MIME
  - SSL
  - POP3
  - IMAP4
  - LDAP
  - HTTP
  - HTML
- **Built-in upgrade tools**: Automatically upgrade users without disrupting service or losing valuable data:
  - Lotus cc:Mail
  - Microsoft Exchange
  - Lotus Organizer
  - Other systems
- **Pick a client, any client**: Access Domino mail with the industry leading Lotus Notes client, or use single-purpose clients like:
  - Eudora
  - Microsoft Outlook Express
  - Microsoft Outlook (using DOLS on Domino 5.05)
  - Netscape Mail

- **Message tracking and monitoring**:
  - Track all messages, even across Domino domains
  - Check the status of any message
  - Proactively monitor the status of mail server tasks such as SMTP, IMAP, and LDAP
- **Automated mail server usage reporting**:

  Proactively manage the messaging environment via direct statistical analysis of server performance and connectivity (for example, track the number of mail users versus HTTP users connected to a server).
- **Expert analysis tools**:

  Analyze server functions over time, for performance tuning, capacity planning, and trend prediction. Set and track service level agreements, correlate performance statistics, and more.
- **ISpy**:

  Obtain service level statistics on any IP service running on a Domino server. Automatically probe your entire mail infrastructure to proactively isolate potential problems.
- **An enterprise-scale, LDAP directory**:

  The LDAP directory supports a multi-enterprise infrastructure of any size. It integrates with other directories with full support for LDAP V3, the open standard for directory access. You can store any information with extensible schema. Synchronizes user accounts with the Windows NT directory.
- **Flexible security model**:

  Integrated X.509 support lets you register new users with Notes or X.509 certificates. S/MIME support ensures message integrity for all client types. SSL V3 is available for IIOP and LDAP clients. Authentication via trusted third-party directories reduces complexity and duplication of information.

Benefits

Domino Mail offer the industry's leading messaging services. Domino Mail leads the industry in reliability and manageability. World-class qualities extend your business in the form of benefits, such as:

- Power to connect people easily, securely, and reliably:

  The Lotus Domino Mail Server is a powerful messaging server for corporate intranets and the Internet. Its integrated services deliver proven reliability, superior administration capabilities, and unbeatable performance for any size organization.

- One infrastructure to deploy and manage:

  Domino Mail provides a unified architecture for e-mail, Web access, online calendaring and group scheduling, collaborative work spaces, bulletin boards, and news groups. Unmatched mobile capabilities and support for the widest array of clients, from Lotus Notes clients to Web browsers, gives users secure messaging anytime, anywhere.

- More choices, less cost:

  Domino Mail runs on your existing hardware, software, and networks. It operates seamlessly with other messaging systems using open standards. Centralized desktop control, message tracking and monitoring, and remote server management enable consistent IT support for field offices, further reducing cost of ownership. Optimized add-on products, such as desktop fax and integrated document management, make it easy to add value and extend your messaging infrastructure.

- Easy installation and configuration:

  Default settings let you get Domino Mail up and running in minutes.

- Cross-domain administration:

  Centrally administer all servers in the organization, for example:

  - Change user names
  - Add and delete users
  - Move users
  - Upgrade servers

- Centralized control of Notes Desktops:

  Organizations that use the powerful Lotus Notes client for mail can centrally configure desktop settings like home server and UI preferences.

- More control over routing:

  Domino Mail provides the flexibility you need to increase performance and reduce transmission costs, thwart spammers, filter junk e-mail, and easily enforce quotas on message and mail file size.

- Mobile support:

  Just-in-time encryption enhances mobile security. The highly compressed Directory Catalog lets you put the entire corporate directory on mobile desktops.

- Integrated Collaborative Services:

  Access the Web, integrated calendar, and group scheduling features, newsgroups, bulletin boards, and shared online work areas with any standards-based mail client.

- Easy to extend:

  Other Lotus products that extend and add value to your Domino Mail investment include:

  – Lotus Fax for Domino for network-based fax capabilities from Notes

  – Lotus mobile and wireless products for data synchronizing, wireless messaging, and remote access

  – Lotus Domino.Doc for integrated document management

Suggested Reading
To find out more about the Domino Mail Server Messaging Solution, visit the Lotus Web sites:

- http://www.lotus.com/domino
- http://www.lotus.com/messaging

Lotus Domino R5 Application Server (Licensing Option of 5769-LNT)

The Lotus Domino R5 Application Server is a world-class Web Application Server. It provides an open, secure platform optimized to support rapid delivery of collaborative Web applications to integrate your enterprise systems with dynamic business processes. Create high value application. Connect people reliably, securely and easily. Considering its comprehensive development environment, the Domino Application Server lets you move beyond static Web sites to create high-value business solutions that include workflow, content management, and highly flexible security. No platform makes it easier to create self-service applications, such as e-commerce and customer care, and connect them to backend systems.

The Domino Application Server is supported on OS/400 V4R4 or later. It can be licensed for deployment on systems with one to four CPUs with no Domino Partitioning. For larger systems, see “Lotus Domino R5 Enterprise Server (Licensing Option of 5769-LNT)” on page 629 and “Lotus Domino R5 Advanced Enterprise Server” on page 631.

With an enhanced HTTP stack, the Domino R5 HTTP engine delivers outstanding performance and Java servlet support.

Domino Enterprise Connection Services (DECS) provides rapid connectivity to enterprise data. DECS supports a wide range of enterprise systems, including DB2, ODBC, EDA/SQL, SAP, and more. The connectors for relational databases are included with Domino. Connectors for ERP applications and transaction processing monitors are sold separately.

CORBA/IIOP support lets you integrate Domino with your applications architecture.

As the industry standard for reliable data storage, Domino logs database transactions. This ensures complete data integrity for updates, facilitates incremental database backup, enables a fast restart after system failures.

Convenient and consistent IT support for field offices is provided with remote server management using the Domino Administrator, optimized administrative tools, Web-based administration, batch console commands and more.

Features

- Integration with Enterprise Systems:

  Leverage current information assets with built-in connection services for live access to relational databases, transaction systems, and ERP applications.

- Optimized for collaboration:

  Lotus Domino R5 Application Server provides comprehensive application services, such as workflow and messaging, so you can easily build and manage integrated, collaborative solutions.

- Simplified deployment and maintenance:

  Integrated development tools, standards support, and unmatched server-to-server replication simplify rollout, maintenance, and rollback of applications.

- Open for more choices:

  Use your favorite HTML authoring tools, Java IDEs, and scripting tools to create Domino applications.

- The most flexible security model:

  Use Integrated X.509 and/or X.509 certificates support to register new Notes users. S/MIME support ensures message integrity for all client types. SSL V3 for IIOP and LDAP clients. Authentication via trusted third-party directories reduces complexity and duplication of information.

- An enterprise-scale, LDAP directory:

  The LDAP directory supports a multi-enterprise infrastructure of any size. It integrates with other directories via full support for LDAP V3, the open standard for directory access. Extensible schema allow you to store any information you choose. LDAP lets you synchronizes user accounts with the Windows NT directory.

- An Integrated Development Environment (IDE):

  Domino Designer is optimized to work with Domino. The Designer features a complete set of visual tools for rapid development and deployment of secure, e-business solutions. It supports your favorite tools for HTML authoring, Java development, and scripting.

- Comprehensive connectivity:

  With DECS, you have the most efficient integration available. Access or update enterprise data from your Web applications in real-time, via persistent, parallel, pooled connections.

- Choice of development options:

  Connect to enterprise data non-programmatically via the easy-to-use DECS interface or programmatically from Java or LotusScript.

- Mail server capabilities:

  The Domino Application Server also delivers powerful administration and the unmatched Internet messaging functionality found in the Domino Mail Server such as e-mail, calendaring and group scheduling, bulletin board, and news groups.

Benefits

- Serve Lotus Notes clients and Web browsers with the same applications:

  CORBA/IIOP support extends Domino application services to Web clients for integration with your existing applications architecture. Serve Lotus Notes clients and Web browsers with the same applications.

- Personalized access to data and applications:

  With flexible and pervasive security, you can personalize access to data and applications based on individual and group roles. Extend Domino security to HTML files and other data for pervasive security, no matter how or where Web content is stored.

- Comprehensive array of Services
- The world's best workflow:

  Easily define processes to route and track documents and to coordinate activities both within and beyond your organization.

- Enhanced search services:

  Search domain-wide across all your Domino applications and the file system using built-in search security, universal filters, and more.

- Unmatched reliability and manageability
- Centralized control:

  Organizations that use the powerful Lotus Notes client for mail and applications can centrally configure desktop settings such as home server and UI preferences.

Suggested Reading

To find out more about the Domino Application Server and other Domino server products, visit the Lotus Web site: `http://www.lotus.com/domino`

Lotus Domino R5 Enterprise Server (Licensing Option of 5769-LNT)

The Domino Enterprise Server is supported on OS/400 V4R4 or later. It can be licensed for deployment on systems with one to eight CPUs with Domino Partitioning. For larger systems, see “Lotus Domino R5 Advanced Enterprise Server” on page 631.

Features

- Failover for mail and applications:

  Ensure continuous access to your Domino messaging system and applications. If a system fails, users can keep working with minimal disruption, from the point of their last replicated transaction.

- Highest availability for applications:

  If a server or application goes down, users are immediately redirected to another server in the cluster. Domino replication synchronizes application replicas up to the last transaction performed. Events are cached for later delivery to unavailable servers.

- Dynamic load balancing:

  Automatically maximize performance and scalability, even at times of peak usage.

- Server consolidation:

  Consolidate servers enterprise-wide, while distributing ownership of server resources through unlimited partitioning. Cluster any combination of Domino platforms, across any LAN or high-speed WAN. Use a built-in analysis tool to consolidate systems easily.

- Billing services:

  Track, report, and analyze system usage for billing, charge back, and capacity planning.

- Efficient use of server resources:

  Within a cluster, dynamic load balancing guarantees optimal resource usage and optimal response times under all load conditions.

- Disaster recovery:

  Keep an emergency backup server up-to-date with your production mail and application environment. You can even cluster Domino Enterprise Servers across multiple locations over a WAN.

- Support for consolidation and upgrading:

  Cluster new Domino Enterprise Servers in parallel with systems to be replaced, and then “fail over” to the new servers with no disruption of service. Cluster Domino R4.6 and R5 servers together to maximize reliability during your upgrade.

- Web clustering:

  The new Internet Cluster Manager (ICM) extends failover and load balancing capabilities to Web browsers, offering enhanced reliability for Web applications.

- Integration with enterprise management frameworks:

  The Domino Enterprise Server integrates with a wide range of industry-leading management frameworks, including all products that support SNMP. It is certified as Tivoli-Ready.

- Support for multinational deployments:

  Native SMTP routing supports all major languages, simplifying the configuration of multilingual mail routing environments. The Domino Directory implements LDAP V3, which supports a multilingual directory implementation.

- Comprehensive functionality and services:

  The Domino Enterprise Server delivers all the unmatched Internet messaging functionality and robust application services found in the Domino Mail and Domino Application Servers.

Benefits

- Maximum up-time for applications

  The Domino Enterprise Server delivers the industry's highest level of availability for applications. Within a Domino cluster, replicas of applications, including Web applications, remain continuously synchronized on a per-transaction basis. If a clustered server goes down, users are immediately transferred to another, fully updated instance of the application.

- Server consolidation flexibility

  Configure Domino clusters independent of the hardware platform, operating system, or location of individual servers. Partition individual systems to support an unlimited number of Domino servers. This unparalleled flexibility lowers cost of ownership and maximizes utilization of resources, across any size deployment.

- Maximum scalability

  To increase capacity, simply add servers to the cluster as workload increases. Use partitioning to deliver hosting capabilities by running an unlimited number of Domino servers on a single system.

- Flexibility to meet your requirements

  Domino Enterprise Server offers total flexibility to meet any organization's requirements, for example:

  - Cluster up to six servers, even mix Domino platforms
  - Cluster any combination of Domino R5 and Domino R4.6 servers
  - Deploy multiple clusters in a Domino domain
  - Include partitioned servers within clusters
  - Span multiple LAN segments to create campus-wide clusters
- Transactional logging for Domino databases

  The industry standard for reliable data storage. Ensures complete data integrity for updates and facilitates incremental database backup and fast restart after system failures.
- Enhanced backup support

  APIs allow tight integration with third-party backup tools on all Domino platforms.
- Enterprise-scale manageability

  Administration is simple and flexible. Intuitive, task-oriented support for remote server administration, cross-domain administration, security management, and much more.
- Centralized control

  Organizations that use the powerful Lotus Notes client can centrally configure Notes desktop settings, like home server and UI preferences.

Suggested Reading
To find out more about the Domino Enterprise Server, visit the Lotus Web site:
`http://www.lotus.com/dominoenterpriseserver`

Lotus Domino R5 Advanced Enterprise Server

The Domino Advanced Enterprise Server is supported on OS/400 V4R3 or later. It can be licensed for deployment on systems with eight or more CPUs with Domino partitioning.

The Domino R5 Advanced Enterprise Server is functionally the same as the Domino Enterprise Server. For features and details, please refer to “Lotus Domino R5 Enterprise Server (Licensing Option of 5769-LNT)” on page 629.

Suggested Reading
To find out more about the Domino R5 Advanced Enterprise Server, visit the Lotus Web site:
`http://www.lotus.com/dominoenterpriseserver`

Lotus Enterprise Integrator (5769-LNP)

Lotus Enterprise Integrator	
Product number	5769-LNP
Replaces product	None
Minimum OS/400 level	V4R4
Installation prerequisites	None
Related products	Lotus Domino Enterprise Server for iSeries (5769-LNT)

The Lotus Enterprise Integrator (LEI) is a server-based product providing data movement between DB2 Universal Database (UDB) for iSeries and Domino, with no programming required. LEI allows the exchange of data with the integrated file system of the iSeries and ERP applications. Domino forms-based interfaces are used to map fields in a Domino database to columns in a DB2 table. Lotus Enterprise Integrator takes care of the movement and conversion of data between the data sources.

The iSeries implementation of the Enterprise Integrator adds unique capabilities to LEI. iSeries access rights are mapped to Domino access rights for an unprecedented security implementation. An exclusive of the iSeries implementation of LEI is the propagation of deleted records so that any operations (update, insert, or delete) can be synchronized between your Domino databases and DB2 UDB for iSeries tables.

Suggested Reading
To find out more about the Lotus Enterprise Integrator product, refer to these Web sites:

- `http://www.edge.lotus.com`
- `http://www.iSeries.ibm.com/domino`

Changes to Lotus Notes/Domino Maintenance Strategy

Lotus has announced a change to their Notes/Domino Maintenance Strategy. The development and delivery of Maintenance Releases is being changed from a three month cycle to a four month cycle. This new four month cycle will continue throughout the rest of the R5.0.x codestream and be followed in future releases. The policy of delivering two Maintenance Releases past the next major or minor release will remain unchanged. To coincide with the change to the delivery schedule, the following names changes will occur. The Quarterly in Quarterly Maintenance Release (QMR) no longer applies. These releases will now be called Maintenance Releases (MR). This will be effective starting with Release 5.0.8. Quarterly Maintenance Updates (QMU) will undergo a name change to

Maintenance Updated (MU), but will otherwise be unaffected. For more information, including a Notes/Domino Maintenance Release Q&A and the Maintenance Release (MR) Status Page, go to: `http://Notes.net`

Support for Domino for AS/400 4.6

Domino for AS/400 R4.6 is supported on OS/400 V4R4 until 31 January 2002. Domino for AS/400 R4.6 is not supported on OS/400 V4R5 and later releases.

Domino Client Choices

There are several choices for a Domino Client solution, which are discussed in this section.

Domino Client Choices	Description
iNotes	The iNotes Client allows you to have one Mail Client Access License (CAL) license
iNotes Web Access	This client is a next-generation Web client that delivers leading Domino messaging, collaberation, and PIM capabilities to Web browsers.
Notes for Collaboration	The Notes for Collaboration Client gives you access to iNotes and Collaboration, CALs for mail, and on-mail usage.
Domino Designer	The Domino Designer Client includes a development environment for building rapid applications, Notes client, and Client Access Licenses.

Lotus iNotes Access for Microsoft Outlook

Many customers are looking to replace their *many* Microsoft Exchange Servers (server farms) with the Domino 5.05 Server on iSeries. Microsoft Outlook is a client you can keep. iNotes is a license for each workstation that allows authenticated access to the Domino server and the use of iNotes Access for Microsoft Outlook and iNotes Sync Manager. Sync Manager is provided with DOLS and downloaded from the Domino server.

iNotes Access for microsoft Outlook now allows Microsoft Outlook 98 and Outlook 2000 users to access their mail, calendering, and scheduling information using a Domino server instead of Exchange. Take advantage of the reliability and scalability of Lotus Domino for iSeries for the messaging infrastructure without changing your client. Of note are:

- iNotes (generic) works with any browser open (usually free) mail client such as Outlook Express, Netscape mail, Eudora mail, and more.
- Lotus iNotes Access for Microsoft Outlook works with Microsoft's full Outlook Client. There are over 78 million out there, and over 60 million Notes Clients.

iNotes provides the opportunity to eliminate expensive server farms and have a reliable scalable server that replicates like Notes, yet *looks* and *feels* like what you know (Outlook), with a more scalable, reliable server.

Lotus iNotes Web Access

Lotus iNotes Web Access is a next-generation Web client that delivers leading Domino messaging, collaboration and Personal Information Management (PIM) capabilities to Web browsers. For the first time ever, browser users will be able to take full advantage of Domino services through an intuitive, easy-to-use interface, both on-line and off-line, seamlessly.

iNotes Web Access offers:

- *A leading-edge Web client*: iNotes Web Access combines the simplicity and universality of a Web browser with the power of an enterprise-class, full-featured application.
- *All the advantages of Domino*: Extend your enterprise or e-business by delivering Domino to customers, business partners, and end users through a sophisticated Web client.
- *On-line and off-line access*: For the first time, give Web browser users access to e-mail, calendar, group scheduling, to do list and personal contacts, whether they're on-line or disconnected.
- *Rapid, no-touch deployment*: Instantly deliver Domino collaborative services to all your browser users.
- *Instant messaging and collaboration*: iNotes Web Access integrates with Lotus Sametime and Quickplace, letting browser users see who's on-line, send instant messages, chat with colleagues in real time, and collaborate over the Web.

For information on the Lotus iNotes Web Access and other Domino for iSeries Release 5.0.8 information, refer to: `http://www.ibm.com/eserver/iseries/domino`

Notes for Collaboration Client

Lotus Notes is an innovative and integrated e-mail and document collaboration client for the Internet. This latest release of Notes is enhanced. Perhaps most significantly, it is an easier-to-use environment and can be customized and easily personalized. You can work the way you want and retain all the power of Notes. You will find that the user experience in Notes R5 is like using a simple Web browser that allows you to group links to Web pages, news group discussions, and Notes documents all in one location.

In R5, the power of Notes is combined with the ease of the Internet. Enhancements are built on features from previous releases such as Portfolios in Notes R4.6. Notes R5 combines Internet-standards support with the features of other Lotus products like cc:Mail and

Organizer in a single, integrated state-of-the-art e-mail, calendar, group scheduling, and Web information management tool. All of this is offered without the requirement of a Domino-based infrastructure. The enhancements are reflected in the design goals for Notes R5.

- Works with any server
- Easiest Internet client to use
- Industry-leading applications
- Mobile support and ease of deployment
- Innovation in collaboration, knowledge management

Features

- Notes R5 works with any server

  Users with ISP-hosted mail accounts can use Notes R5 to send, receive, and manage their Internet mail. Notes R5 can also access other Web servers, for full-fidelity access to intranet or Internet applications.

  Native image formats, Java, JavaScript, X.509 certificates.

- Full standards support of protocols
  - *Mail*: POP3, IMAP4, SMTP
  - *Discussion*: NNTP
  - *Directory*: LDAP v3
  - *Content*: MIME, S/MIME, HTML

  For years, Notes has delivered a superior Public Key Infrastructure (PKI) much like that provided by S/MIME security. S/MIME extends Notes native security to include secure messaging to non-Notes mail recipients.

- Fully-integrated X.509 certificates

  X.509 is the open-standard certificate format for inter-application authentication. Notes users can now take advantage of either the traditional Notes certificates or X.509 v3 certificates.

- LDAP support

- Native address support

  Native address support means that Notes R5 users can address mail using either the Internet address format or the Notes hierarchical address format. It also means that both the Internet and Notes hierarchical address of senders and recipients is included in an R5 mail message.

The goal for Notes R5 was to create an environment that increases productivity by providing one consistent environment for access to all of the sources of information you need to do your job. Unlike some competing products, Notes R5 is not a bundle of products; it stands alone.

The tightest-integrated Internet client in the industry benefits you with the combination of the best features in one seamless, easy-to-use mail, calendar, and Web client.

Productivity features – New in R5

- The Welcome page

  Notes R5 introduces the concept of a Welcome page – the first page you see when you start the client. The default welcome page for the client is a basic page with a simple, easy-to-learn user interface. Users can access mail, a calendar, and their personal contacts. You can change the Welcome page to one of the styles provided by the client or customize your own Welcome page.

- The Headlines page

  This provides a user-customizing environment to navigate, filter, access and act on information, regardless of where that information originates: your inbox, a Web site, or a news group.

- Subscriptions

  The ability to monitor Domino databases for documents that match your specific criteria is a major innovation in R5.

- The navigation bar

  This contains tools very similar to the “forward” and “back” buttons browser users would recognize. In addition, there is a stop and refresh button (works to refresh all applications including mail), a search button, and the ability to enter a URL address to invoke Web browsing in Notes.

- Bookmark bar with bookmark buttons

  Using these buttons, you can access such core Notes applications as Mail and Calendar that were previously located on the R4 Notes desktop. These new Notes R5 bookmark buttons and folders allow you to create links to a wide variety of information whether they are part of a Domino application or from some other source.

- Window tabs

  This way of working adds to the Web-like feel of the Notes R5 client and provides a much richer information management tool than simple browsers can provide.

- HTML editing

  With support for HTML 4, the Notes editor becomes an excellent Web content creation source. With control over items like images and tables, users can instantly create great-looking pages, in full-fidelity HTML, with support for native formats such as animated GIFs and JPEGs.

- Enhanced table features

  An enhanced properties box provides access to all these additional controls over tables:

  - Paragraph-like alignment
  - Style templates
  - “Shadow” effect
  - “Stackable” tables
  - Recursive tables (tables within tables)
  - Tabs in tables
  - Multicolumn text (text flows from one column to the next)
  - Table cell backgrounds
  - Fixed- and variable-width columns in the same table

- Print preview: From the print dialog, you can preview your documents before printing.

Since Notes R4, more and more cc:Mail features are built into Notes. The new mail application in Notes R5 includes a separate address header in messages, type-down addressing, faster type-ahead addressing, an inbox view that can display new messages at the top, and a simple setup of mail rules.

IBM has incorporated many of the enhanced PIM features of Lotus Organizer into the Lotus Notes calendar, scheduling, and task management functions. The addition of a group calendar view makes it easier than ever for you to stay on top of multiple schedules, and to plan your time and work so that individuals and groups are more productive.

Mail Features and Enhancements – New in R5

- Separation of message header

  Message recipients are now kept in a separate pane from the message body.

- Type-ahead addressing performance increase
- Type-down addressing

  As type-ahead addressing begins to match names in the address dialog, you can use the up and down arrows on your keyboard to cycle through “like” names.

- Mail rules

  English language syntax for developing automated tasks with multiple conditions for filtering mail automatically.

- MAPI support

  Notes now registers itself as the default mail application.

- Notes Minder

  This utility loads automatically into the Windows 95, 98, and NT system tray and informs via flashing icon, sound, or dialog of the arrival of new items.

- Notification of sent view behavior

  Users are notified that messages deleted from the Sent view will be deleted from every folder as well.

- Mail preferences

  Option for automatic spell check on send, delivery priority, automatic message signature and signature files, message content options (HTML only, plain text only, or both), message importance, security options, delegation options, and reply separator definition.

- Inbox sorting

  A new preference option allows users to choose to have new mail arrive at either the top or bottom of the inbox.

Calendar and Scheduling Features

- Enhanced Calendar printing with multiple styles
- Group Calendar View showing multiple colleagues' free and busy time
- International holiday support
- Improved invitation form and invitation management
- Resource management

  Resources are an important part of how meetings are scheduled. With the ability to schedule resources across domains and greater access control for resources, you can be sure you'll have everything you need for your important meetings.

- Enhanced alarm support

  Support sound (such as .WAV files) for alarms. Alarms can now be set for tasks as well as appointments and alarms can be sent to invitees.

- Owner actions and participant actions buttons
- Enhanced integrated task management

Mobile Support and Ease of Deployment

Notes has always offered superior offline use. Wherever you are, you can access and control a wide variety of information. With Notes R5, additional offline capabilities give you greater control over the information you're working with and sharing, whether it's Internet mail or Web pages that can be updated from a site to reflect changes when you reconnect.

In addition, mobile enhancements such as the Mobile Directory Catalog, a single database that contains all of the directories in an enterprise, were created for the road warrior. It contains partial replica information in a compressed form, with each user entry measuring about 100 bytes in size, instead of the 10 Kb per user in earlier versions of Notes. There is

enough data in this compressed “catalog” of directories to yield information about the entire directory object if needed, automatically and invisibly to the user. This new directory occupies minimal disk space, so that mobile users can easily maintain a copy on their local hard disks.

- Disconnected use

  Offline browsing and management of mail, Web pages, and news. Simplified mobile configuration and setup. Easier replica management with bookmarks.

- Remote, connected use

  Use Notes with your existing Internet Service Provider.

- Mobile directory catalog

  Storing an optimized local copy of your enterprise directory means fast response time as you access critical information about the people in your company, regardless of whether you are connected and the size of your organization.

- Mobile location enhancements

  Connection documents and Dialup Networking entries are created for new users automatically as they complete the Location document dialog. We now provide end-users with a Connection Configuration Wizard to facilitate setting up Remote Access Connection documents.

- Native PDA support
- User input during asynchronous script execution

  A scripting command, Promptuser, allows Notes to pop up a password dialog box during a connection call, so that users do not have to redial when their passwords expire.

- Passwords hidden in connection documents and dial dialogs

  Passwords (such as HTTP) are now hidden in the Server Connection documents and dial dialog boxes, which provides users with an additional level of security.

- Network dial-up connection document enhancements

  Users can enter area codes, country codes, and calling card numbers in network dial-up connection documents. This leverages the extensive dialing support for network dial-up currently available for X.PC.

Innovations in Collaboration: Knowledge Management

In Notes R5, enhancements such as the headlines page, bookmarks, and enhanced search capabilities are examples of the knowledge management applications possible with Notes and Domino. Some of the new R5 features that support the analysis and discovery of important information to do your job include:

- Search engine and UI changes

  The engine is the Global Text Retriever from IBM Japan and includes many new enhancements, such as a fuzzy search.

- Full-text index of the file system
- Summarization of the search results

  Each document returned can have several sentences displayed describing its contents selected by a special algorithm that finds the most meaningful sentences.

R5 Domino Designer

Designer is an integrated application development environment that lets developers and Web site designers create, manage, and deploy secure, interactive applications for the Domino Application Server.

Domino applications let people share, collect, track, and organize information, using Lotus Notes or the Web. Domino applications can cover a wide range of business solutions, including:

- **Workflow**: Route information
- **Tracking**: Monitor processes, projects, performance, or tasks
- **Collaboration**: Create a forum for discussion and collaboration
- **Data integration**: Integrate with relational databases and transactional systems
- **Personalized**: Produce dynamic content based on, for example, user name, user profile, access rights, or time of day
- **Globalization**: Use Domino Global Workbench to produce global sites

Domino Designer, with the Domino Application Server, is optimized to enable developers to build applications that facilitate the flow of information between an organization's enterprise systems and front-end business processes.

Improvements to Development Environment

- Comprehensive development environment
- Intuitive visual environment

  The new Designer look-and-feel lets developers optimize their work environment by creating project bookmarks.

- Improved programming environment

  The Programmer's pane provides access to all application objects and reference information on the Domino objects and languages. New and updated tools enable easier access, use, and reuse of code and objects.

- Multiple-browser preview

  Preview your work in all of the browsers that your end-users demand, including Notes, the Notes browser, Microsoft Internet Explorer, and Netscape Navigator.

- Context-sensitive Help on integrated tools and highlighted functions

New Site Layout and Presentation Tools

- **Outline Designer**

  The Outline Designer is a visual tool for designing the structure and navigation of an application. You can design and display links to URLs, design elements, and actions in a hierarchical layout. The Outline is fully programmable, enabling a customized navigational structure based on user, time, or other criteria. You can embed the outline in pages or forms and add graphics and mouseover effects.

- **Frameset Designer**

  The Frameset Designer allows developers to create multipane interfaces to their applications. It includes a step-by-step process to allow developers to start designing Web sites with frames quickly with no HTML knowledge required.

- **Page Designer**

  Page designer is a WYSIWYG HTML authoring tool allowing designers to add styled text, images, image maps, tables, HTML, Java, ActiveX components, and multimedia objects to applications.

- **Domino applets**

  You can use these Java-based components to add unique features to your Web site not previously available to browsers. Applets included are View, Action bar, Outline, and Text Editor.

- **HTML 4 support**

- **Table enhancements**

  Enhancements include style templates, nested tables, fixed- and variable-width columns in the same table, and cell background images, among many others. The improvements enable more control over page layout. You no longer have to work with raw HTML code to obtain necessary control over the page layout and table characteristics.

- **Shared resources**

  Images, applets, shared actions, and Java libraries are added to existing shared code resources.

- **Image maps**

  You can create image maps by adding in-line hotspots to pictures.

- **Picture properties**

  HTML attributes, such as vertical alignment, text wrap, and float options, are available in the properties box.

Enterprise Integration

- **Domino Enterprise Connection Services (DECS)**

  Domino Enterprise Connection Services (DECS) is a visual tool and high performance server environment you can use to create Web applications that provide live, native access to enterprise data and applications. The visual tool includes an application wizard and online help to assist you to define external data source connections, for example, DB2, Oracle, Sybase, File directory, EDA/SQL, or ODBC, and fields within your application that automatically update with external connector data.

- **Lotus Connector LSX classes (LC LSX)**

  Lotus Connector LSX Classes (LC LSX) allow for programmatic access via LotusScript to Lotus Domino Connectors' native connectivity to relational databases, transaction processing systems, and enterprise resource planning (ERP) applications. Lotus Domino Connectors supplied with this release include: DB2/UDB, EDA/SQL, ODBC, Oracle, Sybase, and Text and File. Additional Lotus Domino Connectors for ERP and Transaction System Connectors are available separately from Lotus. For product information, visit the Lotus Domino Enterprise Integration Web page at:
  `http://www.lotus.com/home.nsf/welcome/eizone`

- **DB2 LSX Classes**

  Native Programmatic access via LotusScript to DB2 UDB on Windows 95, 98, and NT platforms.

- **Java Database Connectivity (JDBC)**

  Access from Java agents to relational data via industry-standard JDBC. A JDBC-to-ODBC bridge is also part of Domino.

Support for Web-standard Languages

- Support HTML 4

  Designer supports features defined in the W3C HTML specification.

- Mix-and-match Coded HTML on pages and forms

  You can mix and match WYSIWYG and native HTML code.

- Import HTML pages

  Import existing HTML pages that are automatically rendered as pages in Designer.

- Upgrade existing HTML

  Import existing HTML files into Designer so you can take advantage of Domino features.

- Leverage Web programmability and scripting option

  Web standards (Java, JavaScript, HTML 4.0) are supported in Designer R5 so you can use standard Web design languages and tools in Designer.

- CORBA/IIOP support

  The Common Object Request Broker Architecture and Internet InterORB Protocol permits remote access to Domino services. CORBA/IIOP enables the creation of applets and applications that communicate with the server more efficiently than HTTP alone.

- Additional Domino objects

  An integrated set of application objects that can be accessed from a number of industry-standard languages. New application objects are added to one of the richest object models for application development.

- Java enhancements

  Designer supports Java as an alternative to other programming options. Compile and edit Java code directly in the Agent Builder. There is support for shared Java libraries.

- JavaScript

  Direct support in Designer for JavaScript development. JavaScript events, such as onMouseOver and onBlur, are added to the event list for Domino Form and Page elements. Enables client-side scripting for both Notes and browsers.

Localization Features

- Domino Global Workbench

  Create the design of an application in more than one language with the Domino Global WorkBench. Developers can quickly localize applications into multiple languages and keep them up-to-date as the structure and content of the application changes.

- Multiple language support

  Generate and maintain different language versions of design elements and documents via database and design properties. Allows the creation of local, global and translatable content in any supported language. Facilitate review and approval of localized documents through workflow process. “Switchbar” lets Web users switch between languages across synchronized pages in a multilingual Web site. Content appears accurately and simultaneously to all users worldwide. Access to appropriate information in appropriate and respective language in a timely fashion. Developers can build the translation process into applications to facilitate the rapid translation of Web content.

- Multiple currency support

  Ability to store and use calculations involving multiple currencies within a form or view. The currency indicator is stored with the field so that it remains consistent and doesn't change based on the user's local computer system preferences. Developers can more easily create applications that involve calculation and display of different currencies. Users can immediately understand the currency being used by the symbol and no longer need to do mental calculations to determine whether financial figures are correct.

- Euro support

  Full euro support including euro symbol input and display and rounding. Developers can easily create applications that use the new euro currency. Users can immediately view financial figures calculated into euros without doing mental or manual calculations. Combined with the multiple currency support feature listed above, developers have all the tools they need to develop truly global applications.

- Long dates

  Ability to specify a long-date format in a date field: for example, 01-January-2000. Developers can use long-date format to remove the ambiguity between the MM/DD/YY and DD/MM/YY date formats.

Networking

Networking

IBM Licensed Programs: Networking Products

IBM NetVista Thin Client Manager, Version 2 Release 1 (5638-C07, C08)

IBM NetVista Thin Client Manager V2.1	
Product number	5648-C07 / 5648-C08
Replaces product	IBM Network Station Manager V2.1 (name change)
Minimum OS/400 level	V4R4
Installation prerequisites	None
Related products	None

The IBM NetVista Thin Client Manager (5648-C07) is available on CD-ROM from IBM Publications. An IBM NetVista Client Manager with 128-bit encryption (5648-C08) is available in the U.S. and Canada.

Cross-platform network connectivity is supported using the IBM NetVista Thin Client Browser and Java applets. Applets are similar to applications. They are small applications that load and execute quickly.

The configuration and administration of IBM NetVista Thin Clients Web browser-based, so that a central site administrator can configure and manage all IBM NetVista Thin Clients. A client data and program repository is maintained on the iSeries. The iSeries and file system supports all data management and storage through normal server mechanisms.

Printing support is controlled by the server. The user has a choice of printing on a printer directly attached to an IBM NetVista Thin Client or on a system printer using supported iSeries and printer transforms. The IBM NetVista Thin Client Manager uses the OS/400 Host Print Transform (HPT) to print to ASCII parallel-interface-attached printers connected to the IBM NetVista Thin Client. Over 100 printers support the Host Print Transform as selected from the configuration option of the IBM NetVista Thin Client.

The IBM NetVista Thin Client operates without local disk storage. When powered on, IBM NetVista Thin Client performs initial diagnostics. The IBM NetVista Thin Client Manager downloads the IBM NetVista Thin Client's program from the server. After the server connection and successful entry of the user ID and password, predefined user preferences are returned to the IBM NetVista Thin Client. Software environments (3270 or 5250 terminal sessions, NC Navigator for NetVista Thin Client browser, Java, and applets) are downloaded and initiated. User preferences are stored on the IBM NetVista Thin Client server.

The IBM NetVista Thin Client can also act as an X-Windows terminal, permitting AIX and other UNIX applications to use the IBM NetVista Thin Client. The IBM NetVista Thin Client is X11 Release 6 compliant.

NetVista Thin Client Manager V2R1 can be used on NetVista Thin Client Series 300, 1000, 2200, or 2800, with 32 MB RAM or higher, connected to the iSeries server running OS/400. For more information on NetVista Thin Clients, see “IBM NetVista Thin Clients” on page 390.

The IBM NetVista Thin Client Manager allows the IBM NetVista Thin Client to execute Windows applications on an Intel-based server, with third-party software such as WinCenter Pro for IBM NetVista Thin Client, available from Network Computing Devices, Inc. The entire program runs on the Intel server. However, the monitor, keyboard, and mouse functions are redirected across the network to an IBM NetVista Thin Client. Users access the entire suite of Windows personal productivity applications, which eliminates the demand for occasional users to install Windows-based clients at their desktop. It is not expected that a large number of concurrent users would be supported on an Intel server in this manner. Contact the

third-party software supplier with questions regarding Windows applications. IBM NetVista Thin Client Manager V2R1 can co-exist with earlier versions Network Station Manager on the same server.

For a list of devices supported by client serial port mapping, refer to:
`http://www.pc.ibm.com/ww/netvista/thinclient/choose_country.html`

Navio NC Navigator for IBM Network Station V1.0 (5648-B10, B20)

Navio NC Navigator for IBM Network Station Summary	
Product number	5648-B10 / 5648-B20
Replaces product	None
Minimum OS/400 level	N/A
Installation prerequisites	Network Station Manager (5648-C05)
Related products	None

NC Navigator for IBM Network Station (5648-B10) with 40-bit encryption is a fully compatible subset of the popular Netscape Navigator 3.0 browser.

NC Navigator for Network Station 5648-B20 (128-bit) can be used to replace the browser included with Network Station Manager (5648-C05) to support the stronger 128-bit encryption. All other functions of the browser are identical to those provided with Network Station Manager.

The key features of NC Navigator are:

- User interface compatible with Netscape Navigator 3.0
- Ability to display Web pages that contain text, HTML, GIF images (including animated GIFS), and JPEG images in a manner compatible with Netscape Navigator 3.0
- JavaScript 1. 1 (same as in Navigator 3.0)
- SSL 2 and SSL 3 encryption at 40-bit level (128-bit available in NC Navigator for Network Station (5648-B20) for the U.S. and Canada or for export), with server and client certificates
- Ability to run Java applets using the Network Station's Java Virtual Machine (JVM), including those that require authentication. The auto-proxy feature can be used when JVM runs applets from the browser
- Mail client function enables a user to send and receive e-mail using a Post Office Protocol (POP3) server

- News Reader function enables a user to read news items on a NetNews Transfer Protocol (NNTP) server
- Print can be directed to remote printers
- Localized versions in French, German, Japanese, and other languages (in addition to English)
- Ability to invoke the 3270 emulator and Telnet applications from the browser.

IBM Cryptographic Access Provider for iSeries

IBM Cryptographic Access Provider 56-bit for iSeries (5722-AC2)

IBM Cryptographic Access Provider 128-bit for iSeries (5722-AC3)

IBM Cryptographic Access Provider Summary	
Product number	5722-AC2 / 5722-AC3
Replaces product	None
Minimum OS/400 level	V5R1
Installation prerequisites	None
Related products	IBM iSeries Client Encryption 56 bit (572-CE2) IBM iSeries Client Encryption 128 bit (5722-CE3)

The Cryptographic Access Provider products provide the support to secure e-business transactions by implementing the security needed to send proprietary or confidential information over the Internet and corporate intranets. They enable encryption in the iSeries server for use by other products such as HTTP Server for iSeries. Install one of these Cryptographic Access Provider products on the iSeries server to enable the secure sockets layer (SSL) function of the HTTP Server for iSeries.

SSL protocol is widely used to enable secure communications between servers and clients on the World Wide Web. Data transferred between the server and client is encrypted to ensure the data remains private. In addition, the identity of the server is authenticated by the client, through the use of a certificate (or digital ID). Most popular Web browsers support SSL. This means that SSL-enabled Web browsers can establish a secure communications session with the iSeries server, where the browser authenticates the identity of the iSeries server and the data transferred is encrypted.

IBM Cryptographic Access Provider 56-bit for iSeries (5722-AC2) supports 56-bit data encryption. IBM Cryptographic Access Provider 128-bit for iSeries (5722-AC3) supports 128-bit data encryption.

Note

IBM Cryptographic Access Provider 56-bit for iSeries (5722-AC2) and IBM Cryptographic Access Provider 128-bit for iSeries (5722-AC3) are not chargeable features. These features usually support e-business applications on iSeries.

IBM iSeries Client Encryption

IBM iSeries Client Encryption 56-bit (5722-CE2)

IBM iSeries Client Encryption 128-bit (5722-CE3)

IBM iSeries Client Encryption Summary	
Product number	5769-CE2 / 5769-CE3
Replaces product	None
Minimum OS/400 level	V5R1 on server
Installation prerequisites	IBM Cryptographic Access Provider 56 bit for iSeries 5722-AC2 IBM Cryptographic Access Provider 128bit for iSeries 5722-AC3
Related products	IBM Cryptographic Access Provider 56 bit for iSeries 5722-AC2 IBM Cryptographic Access Provider 128bit for iSeries 5722-AC3

Client Encryption provides Secure Socket Layer (SSL) for use by Client Access Express for Windows clients (5722-XE1) and the IBM Toolbox for Java (5722-JC1). The Client Encryption products include an SSL for Windows 95, 98, Me, 2000 and NT and an SSL for Java. 5722-CE2 provides 56-bit encryption, 5722-CE3 provides 128-bit encryption. Neither 5722-CE2 nor 5722-CE3 are restricted to the U.S. or Canada.

Note

IBM iSeries Client Encryption 56-bit (5722-CE2) and IBM iSeries Client Encryption 128-bit (5722-CE3) are not chargeable features. These features usually support e-business applications on iSeries.

IBM Cryptographic Support for iSeries (5722-CR1)

IBM Cryptographic Support for iSeries Summary	
Product number	5722-CR1
Replaces product	None
Minimum OS/400 level	V5R1
Installation prerequisites	None
Related products	None

The main purpose of Cryptographic Support for iSeries is to provide a means to protect information that is moved outside the perimeter of the protection already provided by the IBM iSeries server and your physical security measures. Additionally, Cryptographic Support for iSeries can be used to add a level of protection to sensitive data stored within your system's protected environment.

The encryption/decrypting function is performed in accordance with ANSI X3.92. The application-level cryptographic functions include:

- Data Encryption/Decrypting
- Message Authentication Code Generation and Verification
- Key Management
- Personal Identification Number Management

Cryptographic Support for iSeries is used to protect information travelling across a communication line or stored in a file on tape, diskette, or other recorded media. It also provides enhanced protection for data in the system’s database.

A main focus for Cryptographic Support for iSeries is communications security within a financial environment. To accomplish this, Cryptographic Support for iSeries is compatible with the 4700 Finance Communications Subsystem. The Cryptographic Support for iSeries licensed program includes the Data Encryption Algorithm microcode for the system.

IBM Corepoint Telephony Version 6 Release 2 (5648-C69)

IBM Corepoint Telephony Version 6 Release 2 Summary	
Product number	5648-C69
Replaces product	CallPath Server for AS/400 (5769-CP4)
Minimum OS/400 level	V4R3
Installation prerequisites	Windows NT on Integrated xSeries Server
Related products	None

Corepoint Telephony provides a comprehensive Computer Telephony Integration (CTI) solution to allow communication between an iSeries server and a telephone switch. Corepoint Telephony provides the following features:

- Inbound Call Processing using customer information from business applications, agent information (such as skills and availability), and load balancing information (such as call center volumes) to route an incoming call to an agent that is best able to serve the caller
- Information to allow managers to measure the effectiveness of their call centers
- Desktop Tools that include a softphone integrated with the PBX/ACD system and integration tools such as JavaBeans and Dynamic Data Exchange (DDE)
- Access Channels that provide computer telephony features such as screen pop, linking calls with data, and intelligent call routing across different customer access channels, including PBX/ACD systems, voice response units (VRU), and Web self-service systems
- Outbound Call Processing to automate the placement of outbound calls by preview, power, or predictive dialing from customer lists

The Corepoint Telephony Base Option for iSeries provides an API to the iSeries and application developer and end user, integrating the power of the iSeries server with a telephone system.

Corepoint Telephony Base Option for iSeries consists of two major components:

- The Telephony API, which installs on the iSeries server as program ID 5769-CP4
- The Corepoint Telephony Base Version 6 Release 2, which installs on the Integrated xSeries Server for iSeries (Integrated Netfinity Server) running Windows NT, or optionally installed on a network attached Personal Computer running OS/2 or Windows NT, or on an pSeries (RS/6000) running AIX.

The Corepoint Telephony Base Option for iSeries program is based on the IBM Corepoint Telephony Services Base Architecture (CSA). CSA provides an API that defines a set of platform-independent services.

Note: The program ID is available in V4R5 as 5648-C69. When ordering 5648-C69, you receive the iSeries server component (identical to 5769-CP4), along with the PC-based product.

For further information, refer to the *Corepoint Telephony Base Option for AS/400 Planning, Installation and Migration Guide,* GC34-5347.

IBM Communications Utilities for iSeries 5722-CM1

IBM Communications Utilities for iSeries Summary	
Product number	5722-CM1
Replaces product	None
Minimum OS/400 level	V5R1
Installation prerequisites	None
Related products	None

The Communications Utilities for iSeries comprises the MVS/VM bridge and Remote Job Entry (RJE) functions. These capabilities provide interchange of mail and files and the submitting or receiving jobs between connected systems.

The MVS/VM bridge provides support to allow the movement of mail and files to and from a System/370 host system (VM PROFS and RSCS) using the BSC protocol or SNA over SDLC lines, over an X.25 network, or over an IBM Token-Ring Network. The SDLC and X.25 lines can connect through an X.21 interface. This support also includes direct connection to VM/RSCS or MVS using JES2 or JES3. Other operating systems can be reached indirectly through the RSCS or JES network including DOS/VSE using VSE/POWER. Other iSeries, System/36s, and System/38s that are connected to an iSeries MVS/VM bridge system using SNADS can also exchange mail and files with systems in the network.

The MVS/VM bridge capability enables the iSeries server to exchange RSCS files, spooled output, and messages generated using SNA Distribution Services (SNADS) on the iSeries server, the System/36, or the System/38 with VM systems. Other files, such as job streams, generated on an iSeries server, a System/36, or a System/38 can be stored on the VM system and forwarded to the appropriate iSeries, System/36, or System/38 using the MVS/VM bridge.

The RJE portion of the Communications Utilities for iSeries allows the iSeries server to function as an RJE workstation for the submission of jobs or receipt of output from a host IBM 308x, 3090, 937x, or 43xx using BSC, SNA over SDLC lines, over an X.25 network, or over IBM Token-Ring Network. The SDLC and X.25 lines can connect through an X.21 interface. RJE supports communication with host systems running MVS/SP JES2, MVS/SP JES3, VM RSCS Networking, and VSE/AF POWER.

IBM Distributed Computing Environment Base Srvcs for AS/400 (5769-DC1)

IBM Distributed Computing Environment (DCE) Base Services for AS/400	
Product number	5769-DC1
Replaces product	None
Minimum OS/400 level	V4R3
Installation prerequisites	None
Related products	None

Distributed Computing Environment (DCE) Base Services for OS/400 increases distributed computing in the open systems environment for the iSeries server. It includes these basic DCE services:

- Remote Procedure Call
- Cell Directory Client function
- Security Client function
- Time Services

DCE is an integrated set of distributed computing technologies provided by the Open Software Foundation (OSF) Specification Version 1.2.2. The components of DCE form a layer that lies between the operating system and network and the distributed application. DCE enables application programmers to implement an open distributed computing environment, to allow interoperability among distributed applications within a network of multi-vendor systems.

Support of these functions on the iSeries server enables OS/400 to participate in a heterogeneous distributed environment by interoperating with other systems that also support the OSF/DCE standard. OSF/DCE has its origins in UNIX. It is enhanced by the DCE Base Services for OS/400 product to provide the familiar look and feel of the iSeries server with support for system messages, menus, prompts, and help text. iSeries customers can comfortably proceed along a familiar path that leads ultimately into the world of open systems.

IBM Distributed Computing Environment DES Library Routine (5769-DC3)

IBM Distributed Computing Environment (DCE) DES Library Routine	
Product number	5769-DC3
Replaces product	None
Minimum OS/400 level	V4R3
Installation prerequisites	None
Related products	None

The DCE DES Library Routine provides data encryption support for the Distributed Computing Environment (DCE) Base Services on the iSeries. If secure communications are required when using DCE services on the iSeries, this product must be installed on the system.

IBM MQSeries for iSeries, V5.2 (5733-A38)

IBM MQSeries for iSeries	
Product number	5733-A38
Replaces product	None
Minimum OS/400 level	V4R4
Installation prerequisites	None
Related products	MQSeries Integrator for iSeries and DB2 V1.1 (5697-F49)

The IBM MQSeries family provides an open, scalable, industrial-strength messaging and information infrastructure, enabling tighter integration of business processes, dynamic workload distribution to form an efficient enterprise- or community-wide system. The MQSeries family consists of three products:

- **MQSeries messaging**: Provides robust middleware for secure and reliable communications across over 35 platforms (5733-A38)
- **MQSeries Integrator**: Centralizes and applies the rules for transformation and routing of application messaging contents as transmitted by MQSeries (5697-F49)
- **MQSeries Workflow**: Enables the capture, visualization, and automation business processes using predefined workflow modules (5801-AAR, #3604)

Business Integration with the MQSeries Family

Business integration means that different computer systems, employees, business partners, and suppliers work together to provide the best and most innovative service to the enterprise and its customers. The barriers of diverse computer systems, geographic boundaries, time differences, language and format differences, and different methods of working can all be overcome with the MQSeries family.

Business integration means that it is possible to:

- Connect customers, suppliers, partners, and service providers, while maintaining security and control, to enable newly built and re-engineered applications for more effective business processes (for example, supply-chain management).
- Make mergers and acquisitions a success by integrating dissimilar IT infrastructures from two or more companies so they can work as a single entity.
- React more quickly to market trends and opportunities because IT systems are flexible and dependable, and no longer constraining.

Different hardware and software platforms can behave as if they were designed to work together.

Features

- Heterogeneous any-to-any connectivity from desktop to mainframe (over 35 platforms supported)
- A single consistent API, shielding developers from networking complexity
- Allows a business to integrate disparate islands of automation
- Time-independent communication
- Guaranteed one-time delivery
- Retains close integration with OS/400
- Makes full use of built-in iSeries features (for example, journaling and CL command interface)
- Enhances work management and security for greater ease-of-use
- An interactive interface to MQ commands to make administration easier for users familiar with other MQSeries platforms
- Support for remote administration through the MQ Explorer, an element of MQSeries for Windows NT, V5.1
- Improved scalability of MQSeries applications on the iSeries server by increased maximum message and message queue sizes (100 MB and 2 GB respectively)

- MQSeries Bindings for Java and support for multithreaded programs to assist in integrating MQSeries into advanced e-business applications
- The most widely used message-queuing software on the market, with more than 66% market share
- A copy of Candle Command Center Admin Pac for MQSeries is included with MQSeries at no additional charge. Candle Command Center Admin Pac for MQSeries is a selection of Candle Corporation solutions for testing MQSeries applications, configuring MQSeries networks, and managing MQ-based computing enterprises.
- Used by more than 5,000 customers to solve their business integration issues, operating in two-thirds of the top 100 North American and European banks, and installed in 350 out of the top 500 IBM customers.
- EuroReady and Year 2000 ready

The Basics of MQSeries

Supported programming languages and compilers for application development include:

- ILE C/400
- ILE COBOL/400
- ILE RPG/400
- ILE C ++ for iSeries
- IBM Developer Kit for Java
- Visual Age for C++ for iSeries

Application Programs and Messaging

The IBM MQSeries range of products provides application programming services that enable application programs to communicate with each other using messages and queues. This form of communication is referred to as *commercial messaging*. It provides assured, one-time-only delivery of messages. Using MQSeries means application programs can be, so that the program sending a message continues processing without having to wait for a reply from the receiver. If the receiver, or the communication channel to it, is temporarily unavailable, the message can be forwarded at a later time. MQSeries also provides mechanisms for providing acknowledgements of messages received.

The programs that comprise an MQSeries application can be running on different computers, on different operating systems, and at different locations. The applications are written using a common programming interface known as the Message Queue Interface (MQI), so that applications developed on one platform can be transferred to another. When two applications communicate using messages and queues, one application puts a message on a queue, and the other application retrieves that message from the queue.

Queue Managers

In MQSeries, queues are managed by a component called a *queue manager*. The queue manager provides messaging services for the applications and processes that the MQI calls and the programs issue. The queue manager ensures that messages are put on the correct queue or that they are routed to another queue manager.

Before applications can send any messages, you create a queue manager and queues. MQSeries for Windows provides the utilities to assist with this and to create other MQSeries objects that are needed by applications.

Supported Platforms

MQSeries for iSeries supports a message exchange with other users of the MQSeries on over 35 IBM and non-IBM platforms. A complete list of supported platforms can be found on the Web at: `http://www.ibm.com/software/ts/mqseries/platforms/`

Client software provides a remote interface to a MQSeries server. There is no MQSeries client of iSeries currently available. If CICS for OS/400 is installed, MQSeries can interoperate with CICS transactions and can link them with non-CICS environments.

For more information on MQSeries, go to:
`http://www.ibm.com/software/ts/mqseries/plstforms/os400/`

Migration and Upgrade

Technical guidance on migrating from downlevel MQSeries for iSeries to the V5.2 offering is provided by an Instruction Document SupportPac, obtainable prior to new product availability. Download it free from the MQSeries SupportPac library at:
`http://www.ibm.com/software/ts/mqseries/txppacs`

A valid Software Subscription entitles the user to new level MQSeries products at no charge.

IBM MQSeries Integrator for iSeries and DB2 Version 1.1 (5697-F49)

IBM MQSeries Integrator for iSeries and DB2	
Product number	5697-F49
Replaces product	None
Minimum OS/400 level	V4R3
Installation prerequisites	None
Related products	MQSeries for iSeries (5733-A38)

MQSeries Integrator is a powerful message-brokering software product. It provides real-time, intelligent rules-based message routing, and content transformation and formatting. It seamlessly integrates applications, databases, and networks. MQSeries Integrator is optimized for high volume, in-storage transformation of messages.

The iSeries platform joins the other key platforms on which MQSeries Integrator is available. The refresh level of product at V1.1 is consistent across the MQSeries Integrator offerings on all distributed platforms and is available concurrently for all platforms. Usability, serviceability, and GUI improvements help the user:

- Be more selective when viewing the components that make up a format
- Use a find option
- Browse relationships between components at different levels
- Use import or export functions to extract from a database into a file to edit or import into other systems
- Try out formats and definitions using a visual tester

MQSeries Integrator offers these advantages:

- Makes it easier to integrate applications and data enterprise-wide
- Provides faster access to information
- Shortens time to market
- Improves customer service and reduces overall costs
- Opens up the information in IT systems to suppliers and customers
- Helps leverage the value chain to improve quality and accelerate responsiveness to change
- Relieves the burden of modifying applications every time they are integrated, that is, connected in new ways
- Transforms and routes data outside the application, without the need for valuable programming and communications skills

Messages pass through a central connection point, the hub, that acts as the core for holding enterprise intelligence. It is designed to handle any volume of traffic, no matter how heavy or complex. The hub maintains two types of knowledge:

- Knowledge of the applications to enable transformation of message formats. If packaged applications are involved, application templates enable a quick start to integrating those applications with the rest of the enterprise.
- Knowledge of business rules and information requirements to enable intelligent routing of information to where it is needed. Rules, whether complex or simple, can be defined to tailor information flow.

Transformation

The knowledge of each application is stored once in the hub, while intelligent routing (see the following section) decides where each message is to go. It is translated into the appropriate format. Supplied with the information definition of each application, the transformation engine supplies data in the right format to any receiving application, without the sending application being modified.

Intelligent Routing

Intelligent routing encapsulates business knowledge of how information should be distributed between message-sending and receiving applications throughout the enterprise. This knowledge is stored in the hub as a set of rules that are applied to each message that passes through the hub. Messages are distributed according to criteria applied to the values of fields within the message.

Supported Platforms

MQSeries Integrator supports message exchange with other users of the MQSeries on over 35 IBM and non-IBM platforms. A complete list of supported platforms can be found on the Web at: `http://www.ibm.com/software/ts/mqseries/platforms/`

Additional information on MQSeries is available on the Web at:
`http://www.ibm.com/software/ts/mqseries`

IBM Wireless Connection for AS/400 (5798-TBW)

IBM Wireless Connection for AS/400	
Product number	5798-TBW
Replaces product	None
Minimum OS/400 level	V4R4
Installation prerequisites	Ethernet or token-ring LAN
Related products	None

IBM Wireless Connection for AS/400 connects iSeries Wireless LAN barcode scanning devices to the iSeries server through a wireless LAN network. This allows support of wireless data collection and wireless barcode scanning applications among others. Wireless Connection for AS/400 eliminates the need for a separate controller for wireless barcode scanning applications.

Functions provided with 5798-TBW include wireless network management, centralized configuration of radio frequency (RF) data collection devices, and direct connection to Ethernet and Token-Ring LANs. IBM Wireless Connection for AS/400 supports the IBM 2480 family of wireless LAN products.

A separate feature supports multiple instances of 5798-TBW running on the same server. This is useful to consolidate smaller iSeries servers into one or more larger iSeries data centers. With multiple instances of 5798-TBW, you can manage 5250 mobile devices anywhere in the world. Improved user interface panels, messages, and menus make it simple for IT administrators to manage 5798-TBW.

IBM 2480 Portable Transaction Computers (PTCs) configured with 5250 emulation and communications technology. Data transmitted by the PTCs is routed using IP.

Note

OS/400 V4R5 is the final release to support Wireless Connection. V5R1 customers with critical dependencies on Wireless Connection have these options:

- Use LPAR with one or more partitions running OS/400 V4R5 and Wireless Connection.
- Use a separate entry-level size iSeries or AS/400e server with V4R5 and Wireless Connection. The entry level system with V4R5 handles wireless network requests from Portable Transaction Computers (PTCs). Data to be returned to the users of the PTC can be routed to any AS/400e or iSeries in the customer's network.

iSeries Client Access Products

In today's business environment, personal computers prevail as stand-alone solutions providing networking to a host. As such, the iSeries Client Access products are closely affiliated with OS/400 operating system functions. In fact, some components of Client Access are provided at no additional charge with OS/400. The Client Access product content is described here.

For more information on Client Access, refer to this Web site:
`http://www.ibm.com/servers/eserver/iseries/clientaccess`

IBM iSeries Client Access Family for Windows (5722-XW1)

iSeries Client Access Family	
Product number	5722-XW1
Replaces product	None
Minimum OS/400 level	V4R5
Installation prerequisites	None
Related products	Client Access Express (5722-XE1) iSeries access for Web (5722-XH1)

The iSeries Client Access Family is a product designed for customers accessing iSeries systems. The focus of iSeries Client Access is to bring all the power of the iSeries to the end-user desktop and to tightly integrate its software into the desktop environment it is running on. The iSeries Client Access Family includes the following functions:

- IBM iSeries Client Access Express for Windows Client
- iSeries Access for Web
- Websphere Host Publisher

Note

Client Access Express also ships with OS/400. The PC5250 display and printer emulation and Data Transfer functions of Express require the iSeries Client Access Family (Product 5722-XW1). All other functions can be used without acquiring the iSeries Client Access Family (Product 5722-XW1).

iSeries Access for Web (5722-XH1)

iSeries Access for Web is a new member of the Client Access Family that provides end users a Web browser (Netscape, Internet Explorer) interface to access iSeries servers. iSeries Access for Web is a set of servlets that run on OS/400 Java Virtual Machine (JVM) and generate HTML output to a browser (such as Netscape or Internet Explorer). iSeries Access for Web provides a subset of the capabilities provided in Client Access Express for Windows. Its advantage is ease of deployment (no code to install or maintain on the end workstation). It is designed for application users:

- That need either quick or infrequent 5250 access to application running on the iSeries
- Need to access DB2/400 data
- Work with OS/400 printer output
- Send/receive messages

iSeries Access for Web provides end users with a zero client footprint for working with data stored in DB2 Universal Database (UDB) for OS/400 databases, accessing files stored in the Integrated File System, working with their printer output, and running host applications through a 5250 interface for a Web look and feel. Streamline user access to information in the enterprise and customize the way users work with the iSeries servers, so those not familiar with OS/400 operating environment can easily and productively work with its database and applications. iSeries Access for Web provides key capabilities such as:

- The ability to run host applications through the iSeries Access for Web integrated 5250 interface. Enhance host application screens by using the Host Publisher Studio capabilities to have a Web look and feel. Then be run directly from the browser.
- Easy access to DB2 UDB for iSeries database information through a powerful and easy-to-use SQL interface. Users can enter and run free-form SQL statements, or use the graphical query builder to help generate various types of SQL statements. Additionally, users may import transfer request files from Client Access Data Transfer. Data Transfer requests are converted to an SQL request usable by iSeries Access for Web (restrictions apply). Users may save iSeries for Web SQL statements for later use.
- A simple interface to work with information in the Integrated File System, including download and view capabilities.
- The ability to work with iSeries printers and printer output.
- Object level security is used to validate access to OS/400 resources. Users and groups have access only to authorized resources.
- Fully customizable Web page so OS/400 administrators can configure what users will see and can access when connecting to iSeries servers.
- Industry-standard protocols, HTTP and HTTPS, are used by iSeries Access for Web. Since it needs no proprietary TCP/IP ports or protocols, considerations surrounding firewall usage are easily manageable.
- No client code to install or manage. Simply install and configure on the server through Operations Navigator and access from any Web browser.
- The ability to run non-interactive CL commands, prompt support is available.
- Displaying and sending iSeries messages and managing message queues.

iSeries Access for Web requires 190 MB on the server. iSeries Access for the Web runs as servlets under OS/400. The Host Publisher Studio component of iSeries Access for Web installs as option 1 and requires 216 MB on the server for the install image. Once installed on the iSeries, Host Publisher Studio must then be installed to a PC to use the Studio portion. In addition, the following tools must be installed on your iSeries:

- IBM HTTP Server for iSeries
- iSeries Developer Kit for Java

- Toolbox for Java
- TCP/IP Connectivity Utilities for iSeries
- IBM WebSphere Application Server, for iSeries (standard or advanced editions at V3.0.02, or later)

Note

V5R1 iSeries Access for the Web is only available in English. IBM intends to provide national language support for iSeries Access for Web functions in a future release.

WebSphere Host Publisher

WebSphere Host Publisher enables 5250 applications to run unchanged on the iSeries in the WebSphere Application Server (standard or advanced) environment. Using the Host Publisher Studio portion of WebSphere Host Publisher, a programmer can work with selected portions of an application and consolidate pieces of multiple 5250 host application screens without needing access to the source code, and then externalize these to the Web as a single HTML Web page. This solution provides customers with a simple way to move their applications to the Web with minimal effort, and allows the iSeries to easily play a powerful role in Web serving.

Host Publisher allows you to integrate multiple sources of data, including host and database applications, as a single Web page with no change to backend applications. Server Secure Sockets Layer (SSL) encryption and authentication is provided for the high level of security that you need for your Web-based environment. Virtually any user with a standard Web browser can run iSeries applications from the Web without seeing those traditional green screens. WebSphere Host Publisher consists of two major components: Host Publisher Studio and Host Publisher server.

- **Host Publisher Studio**: Provides an easy-to-use customization environment that runs on Microsoft Windows 95, 98, NT 4.0, and 2000, and is used to create Integration Objects that can be used to dynamically access back-end data sources. The studio generates fully customizable HTML output with embedded JavaServer Pages (JSP) tags. Point-and-click features allow Web administrators to map specific fields on a Web page using the HTML tags to point to specific fields on the host emulation screen or database table. This bidirectional implementation allows information to be updated from the Web interface, making it simple to connect users to backend systems across the enterprise. Host Publisher Studio is a separately installable option of iSeries Access for Web.
- **Host Publisher server**: Provides the run-time environment to execute Integration Objects, reusable beans for Java applications, created with Host Publisher Studio. To support the run-time environment for applications that use Integration Objects created by Host Publisher Studio, the Host Publisher server runs on the WebSphere

Application Server (Standard Edition) on iSeries servers. Host Publisher server also provides the 5250 interface when applications are used without Integration Objects.

iSeries Access for Web Access can be used from any desktop that has a browser (such as Netscape and Internet Explorer). These browsers are available on Windows, Linux, and Network Stations.

The Host Publisher Studio portion of iSeries Access for Web runs on Microsoft Windows 95, 98, NT 4.0, and 2000. It requires at least an Intel Pentium 166 processor, 128 MB of RAM, and 90 MB of available disk space.

For more information, refer to the WebSphere Host Publisher Web site at:
`http://www.ibm.com/software/webservers/hostpublisher/`

Key functions that are included in Client Access are:

- 5250 display emulation for working with iSeries programs (such as RPG applications, OS/400 screens, using the command line, etc.)
- 5250 print emulation so iSeries output can be directed and printed on PC printers upload PC data to iSeries database
- Download iSeries database information to PC file
- Ability to print PC output on iSeries printers
- Ability to save and share PC files in the iSeries Integrated File System
- ODBC driver for iSeries database access from PC program
- Other middleware (such as remote commands, data queues, etc.)
- Operations Navigator for working with OS/400 resources

WebSphere Host Publisher (V3.5) has been released. For a description of Websphere Host Publisher (V3.5), refer to Software Announcement 201-185, dated 26 June 2001.

Enhancements relative to iSeries include:

- Enterprise JavaBeans (EJB) support for building EJB-based applications that require existing application access.
- New and enhanced Host Publisher Studio application navigation capabilities.
- Websphere Application Server's Work Load Manager (WLM) support for load balancing and fail-over protection.
- Distributed administration allowing one browser to administer multiple cloned Host Publisher Servers.

Shipments of V5R1 Client Access Family (5722-XW1) as of 28 September 2001, or later, will include the new iSeries Access for Web and Host Publisher products. For installed V5R1 Client Access Family customers who want the products, order a refresh of 5722-XW1.

Note: Client Access Family for Windows (5769-XW1) customers running OS/400 V4R5 and have software subscription can acquire and use the V5R1 versions of the following products by ordering the Client Access Family for Windows refresh:

- iSeries Client Access Express for Windows
- iSeries Access for Web
- WebSphere Host Publisher and Host Publisher Studio (V3.5)
- iSeries Client Encryption, 56-bit (5722-CE2)
- iSeries Client Encryption, 128-bit (5722-CE3)

Important

- IBM iSeries Client Access Family is now on keyed stamped media.
- Client Access for Windows 95/NT (XD1) is not available with V5R1.
- Client Access Enhanced for Windows 3.1 (XK1) is not available with V5R1.

IBM iSeries Client Access Express for Windows (5722-XE1)

IBM iSeries Client Access Express for Windows	
Product number	5722-XE1
Replaces product	5763-XD1, 5763-XK1
Minimum OS/400 level	V4R5
Installation prerequisites	None
Related products	IBM iSeries Client Access Family (5722-XW1) iSeries Access for Web (5722-XH1)

This 32-bit Windows client is designed to take advantage of the latest technologies in the iSeries server and Microsoft operating systems. Client Access Express uses the built-in functions of the Windows desktop to enable users to quickly and easily connect to iSeries servers. It also uses recent iSeries advancements, such as NetServer, to provide PC users network print and file serving capabilities. Some highlights of the Express client content are:

- Runs on PCs having Microsoft Windows 2000, NT 4.0 (Workstation or Server), Me, 98, 95, and Terminal Server Edition (TSE) operating systems installed. See Information APAR II11853 on the Client Access Web page for details on Windows 2000 support.

- Supports TCP/IP connectivity.
- Provides enhanced network security through Secure Sockets Layer (SSL) for client functions.
- Utilizes iSeries NetServer for PC file serving and network print support.
- Contains 32-bit client/server application enablers for iSeries (such as OLE DB provider, ODBC driver, ActiveX Automation Objects, Remote Command, and Data Queues).
- Delivers the latest GUI for new OS/400 V5R1 functions through its Operations Navigator function.
- Improves administration of PC users from a central iSeries through improvements to Microsoft System Policy support and Operations Navigator Application Administration.

Customers are beginning to take a closer look at PC alternatives that are easy to administer centrally (such as something that can be downloaded into a browser or JVM at each use, but can be maintained on the iSeries server). Client Access Express has central administration built into its design. When customers installed the previous Client Access clients, they probably did this by getting the Client Access PC CD-ROM (or creating diskettes) and going to each PC and installing the client code. Since the Express client is exploiting the capabilities of the iSeries NetServer, any PC running TCP/IP can directly connect to the iSeries NetServer folder where the Express client is installed and start the installation/migration from there. Furthermore, by combining the use of Client Access options (such as, Silent Install, CWBBACK, CWBREST), iSeries administrators can set up the Express client, selecting only those functions they want their users to have. Then users simply make a TCP/IP connection to the system, start a command, and go the Express client installed on their PCs. Once Express is installed on a PC, it periodically checks the system to see if newer code (service packs or new releases) is in the Express NetServer folder. If there is, it automatically updates the end user's PC. Although Client Access still ships a PC CD-ROM with the family, you will have little use for it when installing the Express client.

The Express client has evolved from the iSeries Client Access for Windows 95/NT client. A built-in Migration Wizard makes it easy to replace the Windows 95/NT client with the Express client. The following sections describe the additional capabilities the Express client provides to desktop users.

Note

PC5250 and Data Transfer are significantly enhanced in this release. To use these functions, you must be connected to an iSeries server that has 5769-XW1 or 5722-XW1 installed.

Connectivity

The Express client supports TCP/IP connectivity and uses the standard TCP/IP program shipped with the Microsoft 32-bit operating systems (other Winsock-compatible stacks can also be used). Communications program improvements (significant streamlining and more efficient use of buffers) result in increased stability and better performance. Additionally, the Express client provides:

- Easier communications setup since configuration of your communications link is no longer required. Simply select the Express client application you want to run and then enter the iSeries server name you want to connect to and your user ID and password. The Express client then initiates a TCP/IP session, and the application is connected to the system.
- Multiple user ID support using a single copy of Client Access. This is valuable when using the Windows NT 4.0 server in a multiuser environment, where each is using a different application.
- The following environments, which do not actually need Client Access installed on the user desktop, are also supported:
  - *Microsoft Windows NT 4.0 Terminal Server Edition (TSE)*: This environment enables the Windows NT server to be used as a gateway between end users and the system. This capability is particularly advantageous to Network Station users who want to use Client Access functions such as PC5250 and ODBC. For detailed information on environments and functions supported, refer to Information APAR II11373 on the Client Access Web page.
  - *Microsoft Windows NT 4.0 Server with Microsoft Internet Information Server (IIS) and Microsoft NT 4.0 Workstation* with a version of IIS called *Peer Web Services*: This support provides iSeries database access from Web pages. Refer to “Web Publishing with the Client Access ODBC Driver and IIS” in the Developers Corner of the Client Access Web page for examples on how to access an iSeries database using the Internet Data Connection (IDC) component of IIS or by using Active Server Pages (ASP) scripts.

Security

The iSeries servers are designed to protect their resources and data by requiring users to provide a valid user ID and password. The Express client uses TCP/IP Secure Sockets Layer (SSL) Version 3.0 to encrypt information sent between the system and the desktop. It also uses iSeries Server Authentication to assure connection to the intended iSeries server, therefore, diminishing the risk of unauthorized access in an Internet environment. SSL encrypts the user ID and password plus any other information sent between the iSeries desktop. The Express client offers the flexibility to choose what is encrypted. For example, you may want to encrypt data transmitted via Data Transfer but find it unnecessary to encrypt

data sent to your PC printer via PC5250 printer emulation. SSL requires connection to OS/400 V4R5 or later.

Client Access Express Security – New with V5R1

Client Access Express supports new password rules, allowing case-sensitive user profile passwords up to 128 characters in length with a larger character set.

Network File and Print Serving

iSeries NetServer is being used to satisfy file and print serving needs for end users. NetServer unites integrated file system and iSeries printers into the Microsoft Network Neighborhood. User benefits include increased stability at startup and shutdown of the PC and better control of user visibility to resources. The only directories or printers that can be seen by end users are those set up as “shared” by an administrator or resource owner. NetServer brings the following additional benefits versus using built-in PC file and print serving functions, including:

- No background tasks (such as cwbuitsk, cwbnpred, cwbsvd, cwbbs), which previously used extra battery power on laptops.
- When using network drives to access integrated file system information or Network Printers to use iSeries Network Printers, these resources were visible to all end users on the iSeries server. NetServer allows the administrator or owner of a resource to control its visibility to end users. Creating a “share” enables viewing of that resource. If no share exists, users will not see the directories or printers.

Desktop users can now fully satisfy their file and print serving needs through the iSeries NetServer function. Therefore, all the file and print serving functions currently existing in the other iSeries Client Access clients have been removed from the Express client. To use the iSeries NetServer, only the Client for Microsoft Networks (shipped with Microsoft 32-bit operating systems) with file sharing enabled needs to be installed on the PC.

iSeries NetServer file and printer “shares” are easy to create, locate, and manage by using the Operations Navigator printer list and IFS list. The current file shares can be listed separately to make it easy to quickly explore the contents of a file share or map a drive to it. File shares now support EBCDIC to ASCII conversion.

The AFP Workbench Viewer is also provided so iSeries spooled files (AFP and SCS) or PC files (such as GIF, TIFF, and JPEG formats) can be viewed directly by a PC user. The AFP Viewer provides many end-user productivity aids such as the ability to zoom in or search for specific portions of a stored document.

PC5250 Emulation

PC5250 enables users to run iSeries programs, work with OS/400 screens, and send system output to PC printers. PC5250 display emulation provides many capabilities, such as customizable keyboard and display support, hotspots, keypad, playback recording, and customizable toolbar, to name a few. The Express client contains PC5250 Version 5.0 has many enhancements that were not available in the previous Client Access clients, such as:

- Compatibility improvements to the Express client and eNetwork Communications Suite (Version 5.0) so that 5250 emulation uses the Express client functions (such as Data Transfer and configuration) while 3270 emulation uses the Personal Communications functions. These enhancements are handled by the installation programs and do not require user intervention to set up.
- Connection status messages are displayed on a Windows status bar to provide better visual feedback of the activities occurring when the emulator is connecting, such as establishing a link, connection, and logging on.
- To enable more flexibility and ease-of-use, PC5250 can be started via many options such as from the Start or Configure Session icon, Multiple Session icon, New Menu option from a single click on Client Access desktop, Operations Navigator option, PC5250 icon, and the Client Access System icon.
- The Copy/Cut function now includes a ClipOnlyWhenMarked parameter. Previously, if no area was marked when the copy icon was selected, the entire screen contents would be saved to the clipboard. When ClipOnlyWhenMarked is set to “Y”, PC5250 will ignore the copy/cut operation of the unmarked area.
- To handle scaling and COR, parameters previously had to be set in the .WS or .INI file. Now the Printer Control Panel, under the file menu, is enhanced to give users an easier interface for customizing.
- Configuration options have been added to the Column Separator function to enable non-display and non-print options. This provides consistency to system users doing print screen functions from either color terminals or PCs.
- Euro currency support: Eleven new host code pages (924, 1140 to 1149) and two new PC code pages (923 and 858) are added to support the euro currency sign.
- Code pages were added for ANSI 1252 (Latin 1), ANSI 1254 (Turkish), and Japanese 943 (New JIS support). Support has also been added for Polish 457 keyboards.
- Japan recently implemented a new postal bar code to include an enhanced ZIP code that enables customers to get discounts on bulk mailing. The iSeries SCS and AFP datastreams are enhanced to support the Japanese postal barcode, and PC5250 print emulation is enhanced to support this for PC-attached printers.

PC5250 – New with V5R1

Many requested changes have been provided in PC5250 V5R1, such as:

- Additional key mappings
- The ability to enter hex characters (for characters not on the keyboard)
- Eliminate think time in macros
- Displaying the device name on the window
- Support for Secure Sockets Layer (SSL) server authentication throughout its functions. With this release, PC5250 emulation additionally supports SSL client authentication. Client authentication enables the iSeries server to verify the identity of the client using digital certificates.
- PC5250 recently added the ability to configure specific workstation IDs (Auto Device Name Generation). However, setting it up requires editing of the workstation profile. A GUI dialog is provided on the Configuration panel to set up workstation IDs.

Other enhancements to PC5250 include:

- Display emulation:
  - The Undo function keeps a list of all the changes a user is making in the Color Remap screen and undo just the most recent change.
  - Buttons were added to control the attributes that blink.
  - A user can click an area of the screen to change colors of a field type.
  - An option is provided to prevent recording/playback of hidden fields.
  - A new radio button was added to the Edit->Preferences-> Edit... Panel, the Menu Bar terminology has been renamed to make it more consistent with other Windows applications.
  - The Connection dialog now allows the user to specify if a default user ID is to be used.
- Printer emulation: Users can now use different files (.ws profile -> pcspd.dat) with certain printer drivers. This option also allows users to have a font mapping table (iSeries to PC) on a per session basis.
- Administration: 5250 policies were added so administrators can limit end user's ability to perform:
  - Menu configuration
  - Multiple session configuration
  - Toolbar configuration
  - Keyboard configuration
  - Mouse configuration
  - Automatically add applications to the active menu

  - Use Macro Play/Record
  - Use File Transfer
- An option was added to configuration to allow a prompt when exiting a session so the user can select to “Save Changes”. Current configuration options allow “Always save” or “Never save” session changes on exit.
- Application enablement: VBScript was upgraded to Version 5 to make it consistent with Internet Explorer 5.
- National Language Support
  - DBCS printer sessions can now use Enhanced Computer Output Reduction (COR) to adjust the width and depth of print output to fit on a page
  - New DBCS Euro code pages for “1364 Korean”, “1371 Taiwan”, “1390 Japan Katakana Extended”, and “1399 Japan Latin Extended”
  - PC5250 supports multiple NLVs in the same manner as other functions in Express

Note

The PC5250 emulation included in this release of Client Access Express (V5R1M0) is not compatible with any version of the screen Customizer. If the screen Customizer functionality is needed order Host Access Client Package V1.1 (5648-E09). This product contains both the Screen Customizer 2.0.3 and a compatible Personal Communications V5.0.1.

The PC5250 emulation included in this release of Client Access Express is compatible with Personal Communications 5.0. There may be coexistence problems if the V5R1M0 Express client is used with Personal Communications 4.3.

Data Transfer

Data Transfer provides an extensive array of graphical interfaces for desktop users and programming enablers for application programmers to retrieve data from an iSeries database or to quickly store PC file data in the iSeries database. Up to 32 iSeries files can be selected and data transferred with one request to a desktop display, PC printer, PC file, HTML file, or directly into an Excel spreadsheet. Specified records or fields of records can also be selected and transferred. Wizards are provided so users can create, modify, and run transfer requests, then save them for later use. Batch transfers are also supported (via the RTOPCB and RFROMPCB commands). The following options are available only in the Express client:

- Users no longer need to set up a system connection through a Client Access connection program because the system name or TCP/IP address can be entered directly into the Data Transfer GUI.

- The Data Transfer GUI now supports an “auto-run” option. This enables a user to create a transfer request, and perhaps place an icon on the desktop for this request. Then they can simply double-click the icon, and the transfer will “auto-run” without additional user intervention. This transfer can also be placed in a start-up session.
- For PC file upload requests, a wizard (on the toolbar icon and on the Data Transfer Tools menu) can be used to interrogate the PC file layout, present the user with a recommended iSeries and file layout (that the user can modify), and create the new iSeries database file definition to receive the uploaded file. Previously, users had to determine and create the iSeries database file definitions on the iSeries before using Data Transfer.
- Database information can now be inserted directly into a section of an existing HTML file. This enables a user who has a Web page of text containing a section with database data to “update” the data while leaving the rest of the Web page text intact. Previously, the entire HTML file was replaced with a table containing the database data.
- The ability to control truncation of trailing spaces when transferring ASCII text files is now provided. Previously, Data Transfer truncated automatically trailing spaces.
- Support for new iSeries DATALINK commands for linking to HTML tables is now available.
- New transfer profile types (.DTF and .DTT) have been created that are .INI file-based and easier to use and service. The previous file types (.TTO, .TFR, .DT, and .RTO) are also supported.

Data Transfer – New in V5R1

The features that have been added to Data Transfer are:

- For Microsoft Excel users:
  - Support for Excel 2000 file types (8.0). These file types were also added to the Create iSeries Database File wizard. This enables users to read and write records to multiple sheets within a single workbook.
  - An upload option (in addition to already available download option) was added. The upload can be selected via a new icon/button on the Client Access toolbar, a new menu option on the Excel “Data” pull-down menu called “Transfer Data To iSeries...” and a new dialog similar to the current download dialog, which allows the user to specify what data to upload and where to upload it.
  - Support for numeric formula cells in Excel sheets. Previously the formula cells were ignored, and the default value of the field type was used. Data Transfer now determines if the formula is for a numeric value. If so, it pulls the result of the formula from the cell and passes it to the iSeries database file. If the formula does not resolve to a numeric value, Data Transfer continues to pass the default value for the cell type.

- For Lotus users:
  - Support for 97 Edition file types .123 is added. The .WK4 file type was previously supported. Both of these Lotus file types include the capability to read and write records to multiple sheets within a single workbook. These file types are also included in the Create iSeries Database File wizard.
  - Support for numeric formula cells in Excel and Lotus sheets. Previously the formula cells were ignored and the default value of the field type was used. Data Transfer now determines if the formula is for a numeric value, and if so, pulls the result of the formula from the cell and passes it to the iSeries database file. If the formula does not resolve to a numeric value, Data Transfer will continue to pass the default value for the cell type.
- Data Transfer changes:
  - Additional support for e-business (Web serving). Default autosize for HTML downloads is 128 KB. Now users can change this value. HTML details panel now includes support for writing to a UTF-8 file (used by Netscape Navigator and Internet Explorer). This allows Web pages to contain characters from many different character sets.
  - APIs provided for Data Transfer. In response to customer requests for a way to have programmatic control over transfer requests, ActiveX automation objects have been added to meet these requests. Both high-level and low-level interfaces are provided. The high-level interface provides a fast path approach for running database transfers. It requires minimal input and defaults many behaviors. The low-level interface provides programmatic access to most aspects of the Data Transfer GUI application, including the ability to create and save transfer requests.
  - Support of BIGINT data types. Data Transfer now supports this new column type for upload and download. For some files types (such as BIFF and WK4 where double is the largest numeric value supported), rounding may occur. Users will be warned when this happens. The BIGINT data type is not supported when using DOS Random, DOS Random2, and BASIC Random file types.
  - Support of floating point. Data Transfer now supports float and double columns for upload and download. Floating point data types are not supported when using DOS Random, DOS Random2, and BASIC Random file types.
  - An option was added to Data Transfer Properties, Connections page, to allow users to configure which User ID to use with a specific transfer request when it connects to an iSeries.
- Other usability improvements include:
  - A Status Bar added to the main Data Transfer windows and an SSL icon will appears if Data Transfer is connected over SSL

  - When the cursor is positioned over menu items on the toolbar, extended tool tip information will be provided
  - In the Properties panel, you can now set to “display or not display” warnings that occur while transferring data

Application Enablers: Middleware

To assist programmers in the development of client/server applications, Client Access provides significant middleware to enable application development for PC-to-iSeries programming. A variety of key enablers is provided for accessing iSeries resources, such as:

- **iSeries ODBC Driver**: ODBC is a widely accepted application programming interface (API) for database access. You can use the iSeries Client Access Express ODBC driver to access database information from programs like Excel, Access, and 1-2-3. It is based on the Call Level Interface (CLI) specifications from X/Open and ISO/IEC for database APIs and uses Structured Query Language (SQL) as its database access language. Client Access Express has enhanced its Open Database Connectivity (ODBC) driver to:
  - Support the Microsoft ODBC 3.5 Specification.
  - Support Microsoft Transaction Server (MTS). MTS support enables DB2 UDB for iSeries to participate in transactions involving two-phase commit coordinated through MTS (requires connectivity to OS/400 V5R1).
  - Support the BIGINT data type.
  - Support direct conversion of data to the column CCSID for parameter markers in SQL statements.
  - Support the thread-safety ODBC driver.
  - Enhanced diagnostic support.
  - Improved support for Unicode ODBC applications. Unicode ODBC applications will be able to use Unicode database fields to store and retrieve multilingual data. Also, OS/400 V5R1 accepts SQL statements in Unicode, so multilingual literals can be used.
- **iSeries OLE DB Provider**: OLE DB is Microsoft's component database architecture that provides universal data integration over an enterprise's network regardless of the data type. OLE DB is a fundamental Component Object Model (COM) building block for storing and retrieving records and for accessing and manipulating all types of data. Client Access Express has enhanced its OLE DB Provider (driver) to support the V2.5 definition of OLE DB. Therefore, it will work with ADO 2.1 (this ships with Microsoft Internet Explorer 5.0 and Office/2000 products), ADO 2.5 (this ships with Microsoft Windows/2000), and Visual Basic 6.0 OLE DB controls and wizards. The OLE DB Provider includes enhancements such as:

  - Forward-only cursor types
  - Optimistic lock type
  - Record set seek
  - Support for Big Integers and Large Objects (LOBs) data types (requires connectivity to OS/400 V5R1 or later)
  - Custom properties that were added to CCSID 65535 data to enable functions such as Force Translate, Default Collection, Catalog Library List, and Convert Date Time To Char
  - Improved support for Unicode applications

- **ActiveX automation objects**: Designed for developing client/server applications between the PC and the iSeries server. Objects are provided for working with iSeries servers using Client Access data queues, remote commands, and distributed program calls. Many popular client languages, such as Visual Basic, Delphi, PowerBuilder, and Visual C++ support ActiveX automation objects. Data manipulation objects are also included to make it easy to handle code page conversions. Online help (including example code) is provided and can be accessed from object browsers.
- **PC5250**: Enables programmers to add a PC interface to existing iSeries applications. PC5250 enablers include:
  - Industry-standard emulation EHLLAPI enables programmers to add a graphical interface to applications written to a 5250 interface to perform functions such as host data access, screen scraping, and host automation. This 32-bit support also enables applications currently written to the EHLLAPI of another emulation product to migrate and run unchanged using PC5250.
  - WinHLLAPI support is implemented so customers who have WOSA-compliant applications can migrate to PC5250.
  - PC5250 DDE now includes code conversion support. This provides a more consistent set of DDE APIs, therefore, making it easier to migrate applications across different platforms.
  - Enhanced Non-Programmable Terminal User Interface (ENPTUI) provides 5250 datastream functions such as the ability to show radio buttons and check boxes on end-user desktops that can support these functions (such as a PC versus a 5250 terminal). Users have requested the ability to enable and disable this function to complete certain actions. The PC5250 workstation profile now enables ENPTUI to be turned on or off.
  - PC5250 ActiveX Controls have been added and can be used in any application that supports ActiveX controls (such as Visual Basic and C++). These controls enable host applications to use a list box or button.

  - Recording can now be done in Visual Basic (VB) scripts or a macro. A tool or utility is also included that can convert a macro to VB Script.

- **iSeries Toolbox for Java**: Includes a series of low-level APIs for accessing iSeries data and resources from a Java program. It also includes a set of GUI classes to present iSeries data to the user from a Java program. The GUI classes use the Java Swing 1.0 (JFC 1.1) framework. The iSeries Toolbox for Java is a separately installed option of Client Access install. Once installed through Client Access, future updates to the Java Toolbox will be delivered to PC users through the Client Access directory update function
- **Client Access Express Toolkit**: The Express Toolkit contains links to header files, sample programs, and other helpful information, providing a single interface to assist in developing applications using Client Access Express middleware. The toolkit now includes the following new information:
  - Data Transfer ActiveX Automation objects that provide a programming interface for the Data Transfer functionality.
  - Two new Java tools, GUI Builder and Resource Script Converter, are included in Client Access Express. The GUI Builder is a visual editor for creating Java dialogs, property sheets, and wizards. The Resource Script Converter converts Windows user interface elements into a form usable by Java programs. These tools are an optionally installed component of the Toolkit, and require the current JRE and Java Toolbox.
  - The wizards for use with Visual Basic now support the new OS/400 Data types (BigInt, Large Objects (LOBs)).
  - Set cursor type and lock type properties. Can generate record-set seek code for tables record level access.

Central Administration of PC Users

Client Access Express was designed with administration in mind. iSeries administrators want to make PC installation easier, control which functions users may install, control which functions users may run, and be able to pre-configure Client Access connections so unskilled users do not need to do configuration. Client Access Express meets these needs by delivering:

- **Microsoft System Policy Support**: Each time a PC is started, system policies are downloaded from a server to the PC and enforced through Microsoft System Policies. Client Access provides policy templates for use with the Microsoft System Policy Editor. The Client Access for Windows 95/NT added support for Microsoft policies in its last refresh (V3R2M0). The Express client has built onto this support to enable system administrators more control over which Client Access functions are available to PC users. Administrators can create, edit, and change policy information and could, for example:

- Prevent a specific user from running the Client Access Data Transfer to upload or download data. Users can be restricted from creating a new file but allowing them to append data to an existing file, or they can use only predefined transfer requests. Additionally you could restrict users from running batch uploads/downloads, GUI uploads/downloads, autostart uploads/downloads, use of the Excel add-in, or restrict which iSeries a request may be run against in networks with multiple iSeries servers.
- Restrict the use of Operations Navigator.
- Limit the number of PC5250 sessions a user can start on a per-system basis.
- Restrict iSeries and iSeries ODBC driver or OLE DB usage on a per-system basis.
- Disable users from changing their passwords or modifying the password expiration warning time frame.
- Pre-configure a user's system connectivity; then when the user starts a Client Access function, only pre-configured systems would be available for use.
- Define policies by connection environment. For example, when a user is connecting from the "home" environment, SSL is required. However when using an "office" environment, SSL is not needed.

Each time a PC is started, the system policies are downloaded from the server to the PC. Policy restrictions can be enforced on a per-user or per-PC basis. This function can be used with any supported OS/400 release.

New with V5R1

With Service Pack Installation, Client Access Express service pack PTFs can be applied to the Client Access Express installation image. Then when users install Client Access Express from the iSeries server to the PC using iSeries NetServer, the Client Access Express product including the latest service pack will be installed in one step, rather than having the two-step install process of the client install followed by the service pack install.

One way that administrators can improve the security of their environment is by limiting user access to their Windows 2000 or Windows NT PCs. This can be done by using the Windows NT file system (NTFS), and then restricting specific users from being able to write to selected directories. Client Access Express now has enhanced support for these environments, ensuring that user-writable files are stored in user-writable locations in most cases. Previous versions of Client Access Express required users to perform extensive workarounds for these environments.

iSeries Administration and Operations

Operations Navigator is the graphical interface for administering and operating iSeries systems and is packaged with Client Access Express for Windows.

These features are new with V5R1 of Operations Navigator GUI:

- Work management (active jobs, subsystems, job queues, memory pools)
- Backup and Recovery (BRMS GUI plug-in)
- Logical Partitioning (LPAR) management is enhanced to support scheduled movement of resources such as processing units, interactive percentage allocation, and main memory between OS/400 partitions
- System values, including system comparison and update via Management Central
- Distributed user/group administration via Management Central
- Licensed program and fix creation, distribution, and installation via Management Central
- Enhancements to performance monitors and collection services to graph extended time periods
- New monitors and events for managing jobs and messages
- Complete DASD management: Disk balancing, compression, management of disk pools, and units
- Simple two-node cluster configuration
- Integrated Netfinity Server: Windows user/group and disk administration
- Database Navigator, provides a pictorial view of the database showing the relationships between objects
- Graphical command prompting
- TaskPads, a user interface extension, allows easy access to key administrative tasks

Operations Console

Operations Console enables PC workstations to locally or remotely perform iSeries server operations and services (system console functions). It is packaged with Client Access Express for Windows.

Summary

With the new Express client, iSeries Client Access continues to provide desktop users with highly functional frameworks and easy-to-use interfaces to:

- Access network printers
- Work with DB2 Universal Database or other data stored on the iSeries
- Run 5250 applications
- Manage PCs connected to iSeries servers as well as providing a fully graphical interface for administrators and operators who are managing iSeries servers

All future enhancements for the 32-bit environment will be provided in this client. This client should be used if you need any of the following functions:

- TCP/IP connectivity
- Quick start-up time, better overall performance, and reduced PC disk space usage
- A secure network session (for example, encryption)
- Continued enhancements in 5250 emulation and Data Transfer
- Up-to-date Operations Navigator interfaces for administering and operating iSeries servers
- Use of the built-in iSeries NetServer function for file and print serving
- Improved middleware to make it easier to develop 32-bit client/server applications
- Connection to iSeries servers running OS/400 V4R2 or later and iSeries with V4R5 or later

You can find more information on Client Access Express at:
`http://www.ibm.com/servers/eserver/iseries/clientaccess`

iSeries Server Requirements

The Express client can be installed on the iSeries. iSeries disk storage requirements for the Express client are:

- 112 MB for base code
- Minimum of 10 MB for each national language version (NLV)

Note

Once Client Access Express is installed on the PC, the client can connect to OS/400 V4R4 or later.

Client Workstation Requirements

The Express client supports PCs compatible with Microsoft Windows 2000, NT 4.0 (Workstation or Server), 98, 95, and Me operating systems. PC memory requirements will vary depending on the workstation operating system, the amount of memory available on the PC, and the number of other Windows applications being used. Some guidelines for determining memory requirements are shown in the following table.

	Windows 95/98/Me	Windows 2000/NT 4.0
Minimum PC Memory	64 MB	96 MB [1]
Minimum PC	Pentium	Pentium
Processor	200 MHz	200 MHz
1. 128 MB is recommended.		

Note: 128 MB is the recommended minimum memory for the PC.

System Management

System Management

IBM Licensed Programs: System Management Products, Services

The management of an iSeries is handled by built-in functions and licensed programs for specific needs, each complemented by service offerings. This chapter discusses the products and services that are listed in the following table.

Product or Service Name	Product Number	Refer to
iSeries Operations and LAN Console	N/A	page 685
Extreme Support Through Personalization (ESP)	N/A	page 689
Tivoli Management Agent	N/A	page 696
IBM Backup Recovery and Media Services for iSeries	5722-BR1	page 697
IBM Advanced Job Scheduler for iSeries0	5722-JS1	page 700
IBM System Manager for iSeries	5722-SM1	page 703
IBM Managed System Services for iSeries	5722-MG1	page 702
IBM Performance Tools for iSeries	5722-PT1	page 705
IBM Content Manager OnDemand for iSeries	5722-RD1	page 706
IBM Content Manager for iSeries V5R1	5722-VI1	page 707

iSeries Operations Console: Direct Attach, LAN, and Remote

Operations Console is the evolving interface for systems management for operations.

The iSeries and AS/400e servers support integrated remote console and control panel capabilities to simplify remote systems management tasks. AS/400 Operations Console support allows a personal computer (PC) to be a local or remote console of the iSeries and AS/400e servers. This allows a system administrator to monitor the system from another location. A twinaxial connection for console functions is not required. The remote console application is a full-function 5250 PC console session. The remote control panel application complements the remote console and provides a graphical user interface that resembles its hardware counterpart. Both applications, in general, make it possible to perform the majority of system operations tasks, for example backup and recovery, when the iSeries and AS/400e servers and the operations staff are in physically separate locations.

iSeries Operations Console – New with V5R1

Operations Console has been enhanced in V5R1 to enable connections across a local area network (LAN), besides enabling directly cabled and dial-in (modem) connections. A single

PC can have multiple connections to multiple iSeries servers and can be the console for multiple iSeries servers.

An example is a logically partitioned server using the same PC as the console for all partitions. Since each partition is considered a separate iSeries server, a separate interface for each partition is required.

Operations Console on the LAN also allows multiple connections to a single iSeries server. However, only one PC can have control of the iSeries server at a given time. It also allows multiple local controlling system (LCS) connections, with only one directly cabled LCS configuration. You can use the remote control panel functions on the same PC for any connected iSeries server. You can use the remote control panel for secondary partitions through a LAN connection to the primary partition.

There is a high level of security for the connections of Operations Console on the LAN. Enhanced authentication and data encryption provide network security for console procedures. Operations Console with LAN connectivity uses a version of SSL that supports device and user authentication, without using certificates.

Note

Basic knowledge of the V5R1 Service Tools Security framework is necessary to understand how Operations Console on the LAN works. Here are the main concepts:

- **Service Device Profile**: The service device profile is a device description with an associated password (can be 128 characters long). Service device authentication assures which physical device is the console.
- **Service User Profile**: The service user profiles are not a new concept. They have always been the shipped service user profiles of QSECOFR, QSRV, 11111111, and 22222222. The service user profiles are used to access the service tools functions were this profile has been granted authorization to. New for V5R1 is that you can create service user profiles yourself and grant it authority for specific selected service tools functions.
- **Service tools security log**: A service user profile with the proper authority can work with the service tools security log and view, display, print, save, or restore service tools security log data. The service tools security log contains loggings of actions preformed against service tools security such as granting or revoking authority, creating or deleting profiles, or attempts to violate service tools security.

Note: You can specify a certain device profile security that permits only specific PC workstations to perform LAN Console (and Control Panel) functions. Multiple LAN console connections can be active per system/partition at a time. Only one can have an active

emulator with console screen data; the others would see blank screens. The emulator is activated (connection is established) on a first in, first served basis.

If concurrent standard LAN activity is desired, such as running workstation functions, configure a second LAN adapter and vary it on. Separate IP addresses are required.

Operations Console on the LAN does not need a cable (#0382) to work with the functions of the Remote Control Panel for *secondary* partitions. Select the function during setup and use the privileges granted for the Service Device Profile and the Service User Profile to get the Remote Control Panel to work on the PC.

When you select the Operations Console on the LAN for your iSeries server, IBM delivers one #0367 Operations Console cable with a new order. It is shipped with an upgrade if that cable is not yet on your configuration.

With the V5R1 Service Tools Security enhancements, the Operation Console over the LAN connection is highly secured. Only one PC can use a Service Tools Device profile once a successful connection has been established. You can also encrypt the traffic between the console and the server by installing the Client Encryption on the Operation Console PC (5722-CEx) and the Cryptographic Access Provider (5722-ACx) on the iSeries server.

Operations Console and Remote Control Panel (#0382 for direct-attach) are installed and used from PCs using the Windows NT Workstation 4.0 or Windows 2000 Professional (required for local console when remote PC access is desired) or Windows 95, 98, Me 2000 PC operating systems. The console and control panel applications can be used together or separately. Each requires its own direct cable attachment. The cables are purchased separately and are unique to the system being used.

The iSeries Model 270 and 8xx systems use a parallel interface, Enhanced Parallel Port (EPP), to connect the Remote Control Panel. The PC used must have an EPP (1.9) capable port. This is valid only when the Remote Control Panel cable is used, since the Remote Control Panel works on a LAN attached Operations Console without a separate physical connection other than the LAN cable.

Operations Navigator can be enabled from the Operations Console. These enhancements include:

- Centralizing system management functions through a single asynchronous connection to the iSeries or AS/400e server using the AS/400 console and remote AS/400 Control Panel capabilities and Operations Navigator on one PC.
- You can write Windows applications to perform AS/400 Control Panel functions with an AS/400 Control Panel sockets API.

- Dial-up local controlling system (LCS) for Operations Console allows you to remotely connect an LCS through your ECS modem. It is activated from the system control panel by an onsite operator.

  Note: There is no support for Remote Control Panel with this feature.

Operations Console is a follow-on to the AS/400 Client Access Communications console. For Windows 95/NT clients, it is packaged with the iSeries Client Access for Windows Family software. Operations Console is an AS/400 Client Access installation option, but ordering Client Access is not required to use Operations Console. It is packaged with Operations Navigator, which comes with OS/400.

Operations Console supports four types of local controlling system configurations:

- **Stand-alone local controlling system**: A PC locally attached to an iSeries or AS/400e server through the Operations Console cable. Remote users are unable to connect to this PC.
- **Local controlling system with dial-in support**: A PC locally attached to an iSeries or AS/400e server through the Operations Console cable. Remote users are able to connect to this PC, with or without the intervention of an operator.
- **Dial-up local controlling system**: A PC that dials into an iSeries or AS/400e server. This iSeries and AS/400e server runs without a locally attached console device. This locally controlling system (LCS) does not support the remote control panel. Remote controlling systems are not allowed to attach to this PC.
- **Operations Console on the LAN:** A PC that is using the Service Tools Security framework and connects to the iSeries server over the LAN. The PC can be setup to have the Console function as well as the Remote Control Panel function. Only the standard LAN cable is required. A dedicated adapter (#2744 or #4838) is required.

Remote controlling systems

Remote controlling systems are PCs that dial into a local controlled iSeries or AS/400e server for access. The PC dialing in remotely becomes the console. If the remote control panel is installed and configured on the local controlling iSeries or AS/400e server, you can also use the remote control panel as the remote control system.

Client Access Express must be installed to use AS/400 Operations Console. During the installation of Client Access Express, AS/400 Operations Console support is installed. Also during the Client Access Express installation, a 5250 emulator is installed (if PC5250 or IBM Personal Communications Version 4.2 or later is not already installed). The Operations Console Cable is required to use the console function for a direct attached Operations Console PC. The remote control panel cable is required to use the remote control panel function (a graphical control panel to operate as the iSeries and AS/400e control panel).

Note: The control panel cable part number is 04N5592 (CCIN is 0382).

AS/400 Operations Console support is available for OS/400 V4R3 and later. For V4R5, it is the only type of PC console supported by the iSeries Model 270, 820, 830, and 840 systems.

Suggested Reading
For Operations Console requirements, refer to the Redbook *AS/400e to iSeries 400 Migration*, SG24-6055, at `http://www.redbooks.ibm.com`

Setup information is found in *Operations Console Setup*, SC41-5508, and in the Information Center at: `http://www.ibm.com/eserver/iseries/infocenter`

Select the **Operations Console** topic under **Client Access Express**.

Extreme Support through Personalization (ESP): Service Offering

In our increasingly Web-based world, you need easier access to total solutions. An important aspect of technology is technical support that helps make that technology work for us as people. IBM has expanded its Extreme Support through Personalization (ESP) initiative to include more easy-to-use, proactive, and personalized tools.

ESP Registration is now simpler for access to registered iSeries and AS/400 ESP functions on the Web. Through IBM Registration (IR) services, you can now use a single user ID (name) and password on the Web for access to many registered Web functions. Registered users migrate to the new IR function through guided steps on the Web as they access registered Web functions.

The single user ID and password through IR simplifies your Web logon process. You no longer need to keep track of multiple user IDs and passwords.

An IR user ID and password are required when:

- You already have access to iSeries and AS/400 ESP registered functions
- To access registered ESP functions during the migration period using your old user ID and password
- To use the new IR user ID and password

Note that individual registered functions may require additional information for initial access to that function (for example, machine type).

To access the registration process, go to `http://www.as400service.ibm.com` and click **Register**.

ESP features and functions for the iSeries and AS/400 include:

- Management Central-Pervasive for remote management of servers
- Access to IBM e-Server technical support Web sites
- IBM Electronic Services for AS/400
- Universal Connection - ECS over TCP/IP
- PM400e Integrated with Work Load Estimator
- Physical Device Placement Assistant (PDPA)
- Software Inventory Utility (SIU)
- iSeries and AS/400 University
- Personalized Web Pages

Extreme Support through Personalization: New with V5R1

OS/400 V5R1 introduces several changes to simplify and improve PTF notification and delivery of PTF management, such as:

- The ability to electronically download Group PTFs from IBM Service.
- Two new commands to manage cover letters on the system, Copy PTF Cover Letter (CPYPTFCVR) and Display PTF Cover Letter (DSPPTFCVR). These commands allow users to copy cover letters from media without having to load the PTFs. They provide the capability to filter the list of cover letters based on a set of attributes and status, for example, to view all the cover letters with special in instructions.
- Progress indicators during PTF load and apply processing. This includes progress indicators when PTFs are being applied or removed during the IPL.
- A new attribute called preconditions for PTFs. A precondition identifies a job, subsystem, or object that cannot be active when the PTF is applied or removed immediately. The system detects this condition and prevents processing of the PTF when the precondition is active.
- Internet support gives you more flexibility FOR UNIVERSAL CONNECTION. IBM gives you more options for Electronic Customer Support (ECS) and Electronic Service Agent connectivity through Universal Connection. In addition to dial-up support over TCP/IP via ATT Global Network Services, with V5R1 the Universal Connection also supports Internet connections using a virtual private network (VPN). This can be used for Direct Internet connection through the integrated modem with an Internet Service Provider (ISP) of your own choosing or through higher speed connections (T1, T2, ethernet-attached cable or DSL, etc.)
- The iSeries and AS/400 Fix Maintenance Advisor is a simple Web tool to help you determine how often to apply fixes, cumulative packages and group fixes. The advisor helps you determine the maintenance strategy and fix maintenance that is tailored for your system. The advisor also contains useful links that direct you to information about what fixes are available and how you can get them.

The Fix Maintenance Advisor is available at:
http://as400service.ibm.com/supporthome.nsf/document/22721158

Answer seven easy questions based on your current environment and click **Finish** to submit your request.

- The On-Line Disk Arm Calculator (ODAC) is an easy-to-use “advisor”. Based on your input to a few questions, ODAC quickly gives you advice on the number of disk drives required for a specific iSeries or AS/400e configuration. ODAC frees you from manual calculations to determine the right balance between storage capacity and number of storage devices. ODAC helps you optimize performance for your particular system. It proactively helps you avoid potential bottlenecks that can be triggered by a configuration with too few disk arms. Print the results and use that information as input to the configurator to prepare for system upgrades. ODAC is available world-wide.

  Note: ODAC results are a guideline. Such factors as the amount of memory can cause variations in the appropriate number of disk required for particular system configurations.

  The ODAC is available at: http://as400service.ibm.com/supporthome.nsf/document/23122320

- Simplification of select software upgrades using the Software Upgrade Assistant (SUA), a Web-based utility. This allows eligible customers and business partners to order version/release upgrades directly based on software subscriptions.

  Note: SUA is English only. The availability of this service may vary by geography.

Suggested Reading

- http://www.ibm.com/eserver/iseries/software (for EMEA)
- http://www.ibm.com/services/electronic/ (for the US)
- http://www.as400service.ibm.com/supporthome.nsf/document/20965550

Management Central: Pervasive

Management Central Pervasive is a support function that allows network administrators remotely monitor system performance and status. Management Central Pervasive has more flexibility to manage multiple systems via an Internet-capable phone, personal digital assistant (PDA), or Web browser to access Management Central information and monitor the iSeries and AS/400e servers they support.

A Web server and WebSphere Standard Edition is setup on the system to host Management Central information.

Management Central Pervasive: New with V5R1

These additional V5R1 enhancements are available via an English-only PTF:

- Enhanced system performance monitoring
- Monitor specific jobs and servers on multiple systems

- Monitor message queues on multiple systems
- Hold, release, or end a job on any endpoint system
- Run commands on any group of systems

Suggested Reading

http://www.ibm.com/eserver/iseries/services

Easier Access to IBM Technical Support Web Sites – New with V5R1

You get what you need, whenever you need it. Interlink Technical Support Web sites with other IBM Technical Support Sites. Easy access simplifies support. You can access what you need from the site: http://www.ibm.com/eserver/iseries/services

Web links include:

- IBM installation planning for IBM servers. This lets you readily plan the physical installation of your hardware to ensure an efficient installation.
- Access to all IBM education and training, all in one place. This provides links to applicable Learning Services Offerings. Easily browse, enroll in, and pay for all the IBM education you need. Find out about certification programs and events.
- Technical support for alerts, fixes, troubleshooting information, and more collaboration sites like Services Network.
- Web-based libraries of technical information.

Access all technical information sites from iSeries Web sites. This gives you easy access to the most current versions of the information you need, regardless of the IBM platform.

Note: These services are country specific. Contact your IBM Marketing Representative for further information.

IBM Electronic Services for AS/400 – New with V5R1

IBM Electronic Services for AS/400 now supports selected European markets and the US. It is an enhancement to existing IBM hardware and software support and provides a secure Web-based electronic interface, to help you proactively manage your iSeries and AS/400e servers. Its comprehensive and customizable support includes:

- 24-hour proactive system monitoring
- Access to personalized problem status and management
- Electronic notification of required fixes, plus the actual fixes
- Performance management data
- Additional support information

Universal Connection – New with V5R1

IBM now gives you even more options for Electronic Customer Support (ECS) and Electronic Service Agent connectivity through Universal Connection. In addition to dial-up support over TCP/IP via ATT Global Network Services, with V5R1 the Universal Connection also supports Internet connections using a virtual private network (VPN). This can be used for:

- Direct Internet connection through the integrated modem with an Internet Service Provider (ISP) of your own choosing or through higher speed connections (T1, T2, Ethernet-attached cable or DSL modems).
- Connection through a firewall via your virtual private network (VPN) gateway.

IBM offers connections through VPN to provide secure connections over the Internet.

The Universal Connection enables a variety of ESP support tools that report inventories of software and hardware on your machine to IBM so you can get personalized electronic support based on your system data. This helps streamline your support process so you can spend more time running your business rather than maintaining your systems. You control the transmission of data to use (what is sent when). We secure your customer data behind a firewall and use the data exclusively to provide you our world class, personalized support. Personalized data enabled by the Universal Connection includes:

- **Electronic Service Agent Inventory**: Collects machine inventory of hardware, installed software, performance data, and fix levels. This information enables:
  - Simplified hardware and software upgrades
  - Assistance in the placement of new I/O features
  - Identification of fixes that apply to your system
  - Proactive advice on how you can avoid performance problems through an analysis of your current system performance
- **Electronic Customer Support (ECS)**: Allows you to electronically report problems and receive fixes that apply to your system from your iSeries.
- **Electronic Service Agent Problem Reporting**: Allows for real-time monitoring of system hardware to automatically report critical errors and monitor for pending errors.

The ability to configure VPN connections is enabled in Client Access Family Service Pack 1, available at: `http://www.ibm.com/servers/eserver/iseries/clientaccess/casp`

To take advantage of these capabilities, use the EZ-Setup wizard at system setup or use the ESP wizard located under Management Central in Operations Navigator.

PM/400e Integrated with Workload Estimator (Service Offering)

PM/400e is a personalized tool shipped with OS/400 that gives you easy-to-use reports about the performance of your systems. You simply turn the tool on and access your reports on the Web. These reports automate many of the functions associated with capacity planning and performance analysis. The personalized Web-based reports help identify potential resource constraints as well as help you plan future growth.

The ability to run PM/400e and Service Agent over TCP/IP using the integrated high-speed V.90 modem is added as of V4R5. In addition, the ability to inventory multiple systems hardware and software information is enabled over this connection. You can check the following Web site for the PTFs that are required to enable these functions:
`http://www.ibm.com/eserver/iseries`

The Workload Estimator currently helps you size system needs based on estimated workloads for specific workload types. The Workload Estimator and PM/400e now work with one another. Through a Web-based application, the enhancements helps you size upgrades to your existing system based on PM/400e reported utilization, performance, and growth data. Plan your future system requirements based on existing utilization data.

Sizing for additional workload types supported by the Workload Estimator (for example, Domino, WebSphere, Java, and others) can also be included in the sizing. With the flexibility to adjust growth rates and time horizons, the output will include an AS/400 and iSeries summary level recommendation for your consideration. It includes a suggested upgrade for your processor, processor features, memory, disk arms, and disk capacity.

PM/400e reports are enhanced to be even more meaningful in today's rapidly changing system environments and to better reflect usage and trends at a partition level. The enhancements include changes to:

- **The basis on which PM/400e reports are calculated (normalization)**: The basis used for all historical and predicted data is the relative Commercial Processing Workload (CPW). Using CPW to plot workload demand provides a more accurate reflection of workload changes even if a processor upgrade has taken place. The workload demand is especially useful to note in a logical partition environment, to observe the amount of processing power used across partition changes.
- **Trending**: PM/400e now includes trend lines for processor and disk utilization based on the previous three and six months of historical data. This allows you to more easily see rapid changes to utilization over a short period of time and to evaluate your growth and business needs based on your most recent information
- **Actual maximum number of observed jobs**: PM/400e now includes the maximum number of observed jobs at IPL and what level of jobs the system eventually reached. Along with the system value settings, this can help you tune your system to avoid periods of high response times immediately after an IPL.

Find out more about PM/400e at: http://www.ibm.com/eserver/iseries/pm400

Physical Device Placement Assistant (PDPA)

The Web-based Physical Device Placement Assistant (PDPA) can save time and increase accuracy of feature installations for Customer Setup (CSU) installations. PDPA helps iSeries and AS/400e customers quickly identify where to install Customer Install Features (CIFs) as features are added to the system.

The PDPA tool is available for no additional charge. To access the tool, register the tool and have a copy of Netscape Version 4.07 or higher or Internet Explorer Version 5.0 or higher. To learn more or to register, visit the site at: http://www.ibm.com/eserver/iseries/cif

Note: PDPA provides support for CSU feature placement for models 170, 270, 8xx, 7xx, 6xx, S20, S30, S40, SB2, SB3, and #5065/#5066 Storage PCI Expansion Towers.

Software Inventory Utility (SIU) (Service Offering)

This AS/400 and iSeries software upgrade tool can help IBM customers and Business Partner sales teams save time and improve the accuracy of their iSeries and AS/400e software upgrades. SIU also enables customers to easily manage their iSeries and AS/400e installed software inventory. The features of SIU include:

- “Auto-sense” of release level
- Printed report of installed software
- Categorization of installed software to indicate how the software can be updated

SIU suggests which software may be ordered based on your system and software. Responsibility for verifying entitlement of any customer installed software, for which a software upgrade (via software subscription) has been requested, remains with the marketing representative. The SIU is available only in English and can be downloaded from the Web site: http://www.ibm.com/eserver/iseries/configure

After the customer submits their request to upgrade, an appropriate ibm.com center will directly contact the customer in local language to place their order. When the ibm.com center calls the customer, the customer may be asked to verify entitlement for those software products they are requesting to be ordered.

Services Network (Service Offering)

Sales channels and customers can quickly identify Business Partners and IBM groups (for example, IBM Global Services) who can provide a broad range of services for the AS/400 and iSeries. Service providers can be found at: http://www.ibm.com/as400/service/

Select the general type of services you need, and you are presented with companies who can provide those services. For companies who provide iSeries and AS/400e services, the

Network is a forum for promoting their services capabilities on the Web site and a method to collaborate with other Network members. The Network expands continually to reflect the worldwide reach of the iSeries and AS/400e marketplace.

iSeries and AS/400 University (Service Offering)

IBM customers and Business Partners can access iSeries and AS/400e education offerings available through a single new Web site. A variety of training methods are available to accommodate individual learning styles (for example, classroom, online, shipped media, download and play, IBM Redbooks, and events). You can search by education segment, such as e-business, Domino, Java. You can find further information at:
http://www-3.ibm.com/services/learning/community/as400/

Personalize Web Page (Service Offering)

Personalized Web Page assists in facilitating e-relationships between IBM or Business Partner representatives and iSeries customers. The personalized page allows users to view information relevant to their needs and interests in a user-friendly format. Easy-to-view content abstracts and highlighted links provide a fast path to important information including:

- Offers and special promotions
- Recent news and events
- Product update information
- Industry information
- Key links to related sites

Suggested Reading

- http://www.as400.ibm.com/myas400/
- http://www.iseries.ibm.com/myiseries/

The IBM ESP initiative offers total server support that you need for today's e-business world. You get great support that is personalized, flexible, and in the form you need it. What counts is keeping your business running and helping you drive your business to the next level. We anticipate your needs with ESP. ESP is our total solutions focus for iSeries and servers. It involves voice and Web-based technical support and support that's integrated into the product. Emphasis is on a collaborative approach to technical support that helps to ensure a personal touch. You can find more information on ESP at: http://as400service.ibm.com/

Tivoli Management Agent

Tivoli Management Agent (TMA) is the enabling component of the Tivoli Enterprise product set. It now resides on the iSeries as of V4R5. When the TMA is started on your iSeries, it can report into your Tivoli Management Framework environment as an end point. TMA enables

the iSeries server to be managed by the Tivoli Enterprise product set, like any other platform in a Tivoli-based, centrally managed, heterogeneous IT environment.

Tivoli Management integrates its IT management processes across the board, creating a powerful combination that delivers superior, business-relevant services to your customers within and outside of your organization. Tivoli Enterprise-based solutions are platform-independent.

IBM Backup Recovery and Media Services for iSeries (5722-BR1)

Backup Recovery and Media Services (BRMS) is the IBM strategic solution for planning and managing the backup of your iSeries server. The BRMS product is available on the keyed stamped media shipped with every server. This product can be installed and used for 70 days, without charge. After 70 days a license key is required.

IBM Backup Recovery and Media Services for iSeries	
Product number	5722-BR1
Replaces product	None
Minimum OS/400 level	V5R1
Installation prerequisites	5722-SS1 option 18 Media and Storage Extensions
Related products	Tivoli Storage Manager (5697-TSM) Operations Navigator (5722-XE1)
Licence/keyed	IPLA/yes

BRMS for iSeries – New with V5R1

BRMS has been refreshed and updated for V5R1 to include the following enhancements:

- Graphical operations by providing an optional plug-in to Operations Navigator.
- A new Backup Control Group named *SYSTEM is shipped with the BRMS product. This control group can be used to backup the entire system including all user data.
- The STRBKUBRM command is enhanced with two new parameters that help you minimize the number of backup control groups you need to create and use.
- The target release parameters on the Save Library using BRMS (SAVLIBBRM) and Save Object using BRMS (SAVOBJBRM) commands, and the target release attribute of Backup Control Groups have been updated to support restore on systems that are N-2 from the release of the save.

- The BRMS Console Monitor has been updated to support pass phrases of up to 128 characters.
- Increased support for traditional user ASPs from 16 to 32.
- Domino now includes incremental backup and restore of Domino server files. This allows only changes since the previous backup or restore to be managed. Version R5.0.7 or later of the Lotus Domino Server for iSeries (5769-LNT) is required.

Features

BRMS provides the iSeries server with support for policy-oriented setup and execution of archive, backup, recovery, and other removable-media-related operations. BRMS uses a consistent set of intuitive concepts and operations. The user interface is menu-driven or certain functions are enabled through a GUI interface as a plug-in to Operations Navigator, with list-supported windows and cursor-sensitive help consistent with OS/400. BRMS facilitates centralized management of media by maintaining a consistent view of removable media, its contents, location, and availability across multiple iSeries servers. Available tapes are eligible for use by any participating iSeries servers that provides a common scratch pool. When a tape is used, that usage is known by all participating iSeries servers.

The *automatic database file recall (Dynamic Retrieval)* facility enables archived files to be restored automatically when they are opened by a program. This means that the user does not need to be concerned about the data being accessed, whether it is on disk or tape. *Dynamic Retrieval* can be implemented without any changes to application code.

The *fast search* facility for files on tape improves the tape performance by positioning the tape to the start block, rather than having to ship a file at a time. Fast search is supported on IBM 3480, 3490, 3490E, 3590, and 3570 tape drives.

The *archive, backup, and recovery* facilities enable the customer to establish how these operations are to be performed. Media, whether used for backup or other operations, can be managed and tracked in various ways (by volume ID, type, content, location, container, quality, and so on).

Operation planning facilities assist the customer in anticipating resources (devices, media, operational steps, and so on). Operations are guided, making them less error-prone.

Policy support enables the customer to define a hierarchical system of defaults, which makes setup fast, easy, and consistent.

Hierarchical Storage Management (HSM) provides the ability to reduce storage costs by storing objects that are infrequently accessed on less costly storage media. Some of the functions provided by HSM are:

- Automatic, transparent management of data across a storage hierarchy consisting of high-performance disk, compressed disk, tape, and TSM server storage
- Migration of user libraries, folders, and spooled files between ASPs
- Archival of database files, database file members, or documents
- Migration of stream files between various storage media
- Transparent access to migrated or archived data from applications
- Automatic movement of data, based on system policies
- Support for tape automation and TSM server storage to provide unattended operations

AS/400 Application Client for TSM allows BRMS to backup or archive low-volume iSeries AS/400 user data on any TSM server, including another iSeries, AS/400, RS/6000, S/390, or 3466 Network Storage Manager. BRMS can also be used on multiple iSeries servers with shared inventory support, which allows objects saved from one system onto TSM server storage to be restored to another iSeries or AS/400e servers managed by the same TSM server. For information related to Client to TSM, see “IBM Backup Recovery and Media Services for iSeries (5722-BR1)” on page 697.

Backup Recovery and Media Services for iSeries supports the backup, recovery, and archiving of integrated file system data. This allows users to specify directories on their PCs and other systems, as well as on their iSeries server. BRMS can recover from media-related errors while using tape automation, improving unattended operations. Hot-site recovery allows the replication of media content information on one or more systems in a BRMS shared inventory network that enables those systems to act as data recovery centers.

BRMS is structured to allow the addition of functions and features incrementally as business needs change and grow. There are three options to build a full function BRMS system:

- **BRMS Standard**

  BRMS Standard offers many of the base functions that iSeries users need to implement a fully automated, single system, backup, recovery, and media management strategy at a lower cost. The standard product offers an unlimited number of media, using shared tape devices, automated taped libraries, and TSM servers.

  The standard BRMS product backs up a single library or single QSYS.LIB object in parallel across any number of tape devices. Parallel backup with its easy-to-use interface, lets you shorten backup windows by using more tape devices. Using parallel backup, with an automated tape library device, you can save a large library, for example, to all currently available tape resources.

  The standard product does not support archive, dynamic retrieval, automated migration operations, or shared media.

- **BRMS Network Feature**

  With BRMS Network Feature, a BRMS system is interconnected using a network to other BRMS systems in the network. A BRMS network system shares the inventory and policies associated with media managed by a central BRMS system.

- **BRMS Advanced Functions Feature**

  BRMS Advanced Functions Feature enables HSM archive with HSM dynamic retrieval and automated auxiliary storage pool (ASP) data migration.

  Parallel backup also works with the BRMS Advanced Functions feature to allow for parallel archive and parallel dynamic retrieval of a single object. The ability to dynamically retrieve a large database file in parallel helps to reduce the window of the retrieval process, therefore, increase the rewards for using HSM archive and dynamic retrieval support.

  The BRMS Advanced Functions feature allows archive capabilities of database files, stream files, and documents based on a frequency of use.

Suggested Reading

http://www.ibm.com/servers/eserver/iseries/service/brms.htm

IBM Advanced Job Scheduler for iSeries (5722-JS1)

IBM Advanced Job Scheduler for iSeries	
Product number	5722-JS1
Replaces product	None
Minimum OS/400 level	V5R1
Installation prerequisites	None
Related products	IBM Managed System Services for iSeries (5722-MG1)

IBM Advanced Job Scheduler for iSeries is a part of the IBM SystemView family of offerings. It facilitates unattended operations, which can reduce the cost of ownership and help improve efficiency and accuracy in managing batch applications. It provides a highly comprehensive, full-function job scheduler and report distribution system on the iSeries server, with graphical user interface capabilities.

Advanced Job Scheduler for iSeries – New with V5R1

IBM Advanced Job Scheduler includes the following additions to the Operations Navigator Plug-in GUI:

- Job dependencies
- Active dependencies
- Resource dependencies
- Update of job defaults
- Display the IJS log
- Base periodic frequency on start time
- New DDM fields to specify device and location
- CL command prompting support

Features

Leading-edge scheduling functions include:

- Automation
- Batch Job Stream Management
- Forward Planning and Production Forecasting
- Full Calendaring of Operations
- Dependency Scheduling

Overall this allows any batch-capable function to be scheduled on a single iSeries server or across a network, allowing complete user control of how, when, and where a job is submitted.

Job Scheduler also offers the following functions:

- A full integration with Operations Navigator and specifically the Management Central functions that are part of Operations Navigator. The user interface provides a full graphical user interface and inter-operates with users choosing to continue to use the existing interfaces. The graphical interface provides:
  - An easy-to-use way to define and control batch job operations based on successor or predecessor jobs
  - A full set of multiple calendars
  - Systems and resource conditions
- Management Central adds a number of capabilities that can be scheduled using the Advanced Job Scheduler. These include cross-system group functions such as:
  - PTF distribution and management
  - Hardware, software, and PTF inventory collections
  - Distribution of objects and files
  - Schedule remote operations

  Once installed, the user interface is seamless between Management Central and the Advanced Job Scheduler.

  Easily manage your job automation across multiple systems running the Advanced Job Scheduler. For example, with the Advanced Job Scheduler on multiple systems, you can condition jobs on one system to only start when a job on another system is successful or

ends in error. Supported network environments for the Advanced Job Scheduler includes TCP/IP.

IBM Managed System Services for iSeries (5722-MG1)

IBM Managed System Services for iSeries	
Product number	5722-MG1
Replaces product	None
Minimum OS/400 level	V5R1
Installation prerequisites	None
Related products	System Manager for AS/400 (5722-SM1)

Managed System Services for iSeries – New with V5R1

Managed System Services is enhanced to send and receive remote command requests that support the new password composition rules and length to allow essentially any character and a password length of 128 characters.

Features

The Managed System Services for AS/400 (MSS) licensed program is part of Operation Center/400, which includes System Manager for OS/400. MSS enables an iSeries server to be managed from a central site running either:

- S/390 NetView Distribution Manager for MVS (Release 5 or later) for MVS-based networks
- System Manager for iSeries and AS/400-based networks

The central site defines, schedules, and tracks software distribution (change management) requests sent to an iSeries or AS/400e server with Managed System Services for iSeries installed. These change management requests include sending, receiving, and deleting iSeries system files, programs, and other objects (libraries, save files, message files, documents, folders, PTFs, and so on).

iSeries server objects can be sent directly to or received from iSeries libraries or through the local iSeries distribution repository.

Running programs, installing products, applying PTFs and re-IPLing can be scheduled to run automatically under IBM Managed System Services for iSeries (MSS) control. MSS forwards the results of all change requests to the central site for tracking.

The ability of the central site to define, schedule, and run these change requests one time or repetitively significantly enhances the unattended operation of remote iSeries or AS/400e servers. While MSS, together with central site control and tracking, provides a significant set of automated operations, it does not provide real-time monitoring and automated action for the entire iSeries operating environment.

MSS supports unscheduled running of iSeries commands issued by the central site, without having to first sign on to the iSeries or AS/400e server with MSS. Printed output from these commands can optionally be returned to the central site that issued the command.

The system manager function automates the tracking and management of co-requisite PTFs. This reduces the risks and complexities of managing such relationships.

IBM System Manager for iSeries (5722-SM1)

IBM System Manager for AS/400	
Product number	5722-SM1
Replaces product	None
Minimum OS/400 level	V5R1
Installation prerequisites	None
Related products	Managed System Services for iSeries (5722-MG1)

The System Manager for iSeries licensed program is part of the integrated offering Operations Control Center/400, which includes MSS.

System Manager for iSeries – New with V5R1

RUNSMGCMD, ADDCMDCRQA, and CHGCMDCRQA commands from System Manager for iSeries are updated to provide an option that will allow end users to select a password that exceeds 10 characters in length and does not restrict the character set allowed for password composition.

Features

SM integrates with Simple Network Management Protocol (SNMP) management products, such as NetView for AIX. An SNMP manager can monitor for alerts, obtain system information, and execute remote commands if the iSeries server is to be managed from an SNMP platform. The central site system does not need to have all software that a remote site has installed to service the remote site. This allows savings on DASD, management, and time at the central site.

System Manager for iSeries provides central site control for:

- Remote iSeries or AS/400 problem management

  This includes remote problem analysis, comparison of existing available PTFs, automatic distribution of selected PTFs, and a single connection to IBM electronic support for new problem reporting, to IBM or Independent Software Vendor (ISV) for processing.

- Central site packaging of ISV applications for iSeries or AS/400 Licensed Program management support

  This enables ISV applications to receive the same system support as IBM licensed programs.

- Central site distribution and change management support for remote iSeries servers using MSS, remote pSeries (RS/6000) systems using NetView DM/6000, remote PS/2 systems using NetView DM/2, and remote Novell NetWare Servers using NVDM for NetWare

  SM permits the central site iSeries server to define, schedule, and track software distribution (change management) requests sent to iSeries servers with Managed System Services for iSeries, NetView DM/2, or NetView DM/6000 installed or Novell NetWare. These change management requests include sending, receiving, and deleting files, programs, other iSeries objects (libraries, save files, message files, documents, folders, PTFs), and non-AS/400 (OS/2 and RISC/6000) files, programs and software. The change management functions support the integrated file system.

iSeries objects can be sent directly to or received from iSeries or AS/400 libraries or through the local iSeries distribution repository. Non-AS/400 objects can be received into, stored, and distributed from the AS/400 distribution directory.

The capability for the central site AS/400 to define, schedule, run these change requests one time or repetitively, and track their status significantly enhances unattended operation of the remote systems supported by SM.

Sending iSeries commands to remote iSeries or AS/400 servers using MSS without signing on is intended for unplanned operations to be performed on one or more remote AS/400 systems. For example, deleting a particular file or library that has been found to no longer be in use. The support is generally equivalent to the NetView Remote Operations Manager MVS support and works with either NetView Remote Operations Agent/400 or MSS.

SystemView System Manager for iSeries includes a graphical interface for a network operator to graphically monitor and manage a network of systems. The change management functions provide support for the Integrated Netfinity Server.

IBM Performance Tools for iSeries (5722-PT1)

IBM Performance Tools for iSeries	
Product number	5722-PT1
Replaces product	None
Minimum OS/400 level	V5R1
Installation prerequisites	None
Related products	None

Performance Tools for iSeries is a program product that provides a set of reporting, analysis, and modeling functions to assist an iSeries and AS/400 administrator to manage the performance of the system. It provides printed and on-line reports. These can be in graphic or tabular form. A Performance Advisor function assists the user in analyzing system performance and provides recommendations. Performance Tools for iSeries, through its modeling facility, can be used to help predict probable system performance before changes are made.

Performance Tools for iSeries – New with V5R1

- New sections have been added to System Report (PRTSYSRPT) and Component Report (PRTCPTRPT) to output the TCP/IP Activity.
- Updated sections of the GO PERFORM (STRPFRT) menu under option 2, “Collect Performance Data.” They were updated to use Collection Services. These replace sections that used the Performance Monitor (STRPFRMON).

Features

Performance Tools for iSeries uses an easy-to-use menu interface. From this menu interface, users can initiate requests for performance reports and enter the results into a capacity planning session.

The Performance Advisor component of Performance Tools for iSeries makes recommendations to improve system performance and can implement tuning recommendations, if specified by the user. The knowledge-based Advisor also provides detailed explanations of its analysis, which is of great benefit to novice and experienced users.

A capacity-planning product, the *BEST/1-400 Capacity Planner* is integrated into Performance Tools for AS/400. BEST/1-400 is written by BGS Systems.

Performance Tools for AS/400 is divided into three elements: Enabler, Manager, and Agent. The Enabler is the base code onto which you must add Manager or Agent.

- **Manager and Enabler** give full Performance Tools functionality as described above. Select Status Type, Performance Reports, Capacity Planning, Programmer Performance Utilities, System Activity, and Performance Graphics and all the functions of the Agent below.
- **Agent and Enabler** give the equivalent of Performance Tools Subset functionality for those customers who do not require all of the tools. Key functions such as Collect Performance Data, Delete/Copy/Convert Data, Display Performance Data, Work with Historical Data, and the Performance Advisor are included.

The Manager and Agent elements are mutually exclusive.

Performance Tools for iSeries includes the Performance Explorer, which is the primary detailed analysis tool for iSeries and AS/400e based systems on PowerPC technology.

IBM Content Manager OnDemand for iSeries (5722-RD1)

IBM Content Manager OnDemand for iSeries	
Product number	5722-RD1
Replaces product	EDMSuite OnDemand for AS/400 (5733-218) and Report/Data Archive and Retrieval System (R/DARS) for AS/400 (5763-RD1, 5716-RD1)
Minimum OS/400 level	V5R1
Installation prerequisites	None
Related products	IBM Content Manager (5722-VI1)

Content Manager OnDemand for iSeries – New with V5R1

Information not available at time of publication.

Features

IBM Content Manager OnDemand for iSeries provides computer output to laser disk (COLD) and extended archiving functions on disk, optical, or tape storage media.

Note: The two prior names for Content Manager were EDMSuite OnDemand for AS/400 (5733-218) and Report/Data Archive and Retrieval System (R/DARS) for AS/400 (5763-RD1, 5716-RD1).

Graphical administration functions are provided through Operations Navigator, making OnDemand easy to setup, administer, and manage. Content Connect and client-based integration with ImagePlus VisualInfo allow for a flexible, customized environment for document management.

You can use the viewer of your choice to view OnDemand documents. Additional integration is possible with the ability to launch the OnDemand client from a 5250-type application.

The functions of OnDemand include:

- **Spool File Archive**: Provides rich capture and archive management functions for large volumes of spooled print data and retrieval capability on demand.
- **Record Archive**: Allows existing applications to be enhanced to store and retrieve selected data records from optical storage for users who require occasional access to historical data.
- **Object Archive**: Allows efficient storage of versions or “generations” of AS/400 objects on tape or optical storage.
- **AnyStore**: Allows archive and retrieval of binary large objects (BLOBs) such as PC files and small scanned images. AnyStore requires that the Spool File Archive feature also be ordered.

OnDemand includes a client for Windows 3.1, Windows 95, Windows NT, and OS/2 that delivers specialized functions for report and document retrieval.

OnDemand features can be ordered separately with the exception of AnyStore, which requires the Spool File Archive feature.

IBM Content Manager for iSeries V5R1 (5722-VI1)

IBM Content Manager for iSeries V5R1	
Product number	5722-VI1
Replaces product	
Minimum OS/400 level	V5R1
Installation prerequisites	See the end of this section
Related products	Content Manger OnDemand for iSeries (5722-RD1)

IBM Content Manager for iSeries V5R1 is a client/server software product designed to replace paper document processing with image processing for greater efficiency, reliability, and security. IBM Content Manger for iSeries is IBM's document imaging and work

management system for the iSeries and a strategic member of the IBM Content Manager suite of products. The IBM Content Manager suite of products can serve the needs of a small departmental application or serve as an enterprise solution for a large corporation. Even in geographically dispersed enterprises, mission-critical information can be delivered to users when they need it, providing rapid response for employees and customers alike.

Content Manager for iSeries – New with V5R1

- Capture, Audit, and Storage Management Usability improvements include:
  - Import options provide the capability on the iSeries server to import and index an object into VI/400
  - Object Staging provides the capability to selectively retrieve items from secondary storage to DASD
  - Storage Location Indicator provides the capability to have the storage location indicator selectable as a system attribute
  - Activity Logging: The VI/400 server logs user activity
- Improved folder options:

  Recursive Auto-folder: Currently, auto-folder is a VI/400 client application function and is supported for a single level of indexing. With this enhancement, auto-folder will be a server function and will be recursive.
- Multiple workflow enhancements:
  - **Workflow Decision Point**: VI/400 will support workflow variables of the following four categories: Workflow system variables, Workflow user-defined variables, Library variables, External application variables
  - **Library variables support**: The library variables are read-only and are not explicitly maintained within the work package variable file, EKD0756.
  - **Workflow - Collection Point**: Provide the ability to obtain collection point criteria during run-time.
  - **Workflow - Multiple Suspend Criteria**: Provide the capability to specify multiple pending requests for an item.
  - **Workflow**:
    - *Ownership*: Provides ownership of work packages.
    - *History*: Provides the capability to log and view workflow history.
    - *Pro Process*: Pro Process and work package activity are logged.
    - *Variable Workbasket*: The WORK command is modified to allow a variable to be specified as the workbasket parameter.

- *Set Variable*: The Set Variable option is added to the Workflow menu within the client application.

Benefits

As an advanced document imaging and workflow system, Content Manager for iSeries provides robust document imaging and enables delivery of critical work to the right personnel at the right time. The powerful imaging technology and system controlled storage and workflow foster higher levels of employee productivity and customer service. Imaging benefits include efficient electronic capture, storage, and management of high volumes of documents, enterprise wide access to documents, and simultaneous access for multiple users.

Implementation of workflow functions can improve process consistency, control, and quality and reduce process cycle time. For further product information, please see:
`http://www-1.ibm.com/servers/eserver/iseries/software/`

Note: IBM Content Manager for iSeries V5R1 supports Workfolder Application Facility (WAF) 4.1.

Workfolder Application Facility Version 4.1 is the host-based implementation feature of Content Manager for iSeries. ImagePlus VI for AS/400 supports all the capabilities of WAF Version 4.1. WAF offers two interfaces: traditional AS/400 5250 emulation or host-based application programming interfaces.

Prerequisites

Server
OS/400 Operating System V5R1 (5722-SS1)

Clients
Windows 98 or Windows NT, Windows 2000, Windows ME for the Content Manager for iSeries Client. See the announcement details for specific configurations or the Web pages for this product.

Suggested Reading
`http://www-4.ibm.com/software/data/cm/cmgr/`

Printing and Document Handling

Printing and Document Handling

IBM Licensed Programs: Printing and Document Handling Products

Office and printing products provide the vehicle for communications both within and outside of the company. The products that are listed in the following table are discussed in this chapter.

Product Name	Product Number	Refer to
AFP Font Collection	5648-B45	page 713
IBM Content Manager for iSeries	5722-VI1	page 714
IBM Advanced Function Printing Utilities for iSeries	5722-AF1	page 715
IBM Advanced Function Printing (AFP) PrintSuite for OS/400	5798-AF2 (V3R2M1), 5798-AF3 (V3R7M1 and later releases)	page 716
IBM Advanced DBCS Printer Support for iSeries	5722-AP1	page 718
IBM Dictionary and Linguistics Tools for AS/400	5769-DL1	page 720
IBM Business Graphics Utility for iSeries	5722-DS1	page 721
IBM Advanced Function Printing (AFP) Fonts for AS/400	5769-FNT	page 721
IBM Advanced Function Printing DBCS Fonts for AS/400 V4R3	5769-FN1	page 722
IBM Facsimile Support for iSeries	5798-FAX	page 723
IBM Infoprint Designer for iSeries	5722-IP1	page 715
IBM Infoprint Services for iSeries	5722-IP1	page 715

AFP Font Collection (5648-B45)

AFP Font Collection	
Product number	5648-B45
Replaces product	None
Minimum OS/400 level	V4R5M0
Installation prerequisites	None
Related products	None

AFP Font Collection provides one-stop shopping for iSeries printer fonts, with the most popular type families – Helvetica, Times New Roman, Gothic, Courier – the fonts you need to

realize the full potential of your business communications. These fonts are provided in a full range of resolutions (240 dpi, 300 dpi, and outlines) and over 48 languages. The new outline fonts in AFP Font Collection provide the ability to change font sizes easily, to support the latest IPDS printers, and to enable full graphical document viewing, as well as offer a performance savings over raster fonts.

Type Transformer for Windows, an optional feature of AFP Font Collection, is a font design workbench that enables you to convert any Adobe Type 1 font to an AS/400 AFP font, including support for TruType. Type Transformer for Windows incorporates font design utilities to create your own font designs and font objects (code pages, coded fonts).

IBM Content Manager for iSeries (5722-VI1)

IBM Content Manager for iSeries	
Product number	5722-VI1
Replaces product	None
Minimum OS/400 level	V5R1
Installation prerequisites	None
Related products	None

IBM Content Manager for iSeries is a document imaging and work management system that can be implemented in a client/server or host environment. It changes the way paper documents are processed.

A graphical user interface is provided so the client or user can develop a customized document management solution to include library and information processing capabilities. Create image, workflow, and other applications to automate and gain control of the information the enterprise processes each day, building a work process and automatically routes documents and folders through a business.

VisualInfo for iSeries controls the capture, indexing, storage, and retrieval of documents as images. Initially, documents are stored on iSeries disk storage and can be migrated to an optical storage system. VisualInfo for iSeries also provides both production and ad-hoc work management functions.

ImagePlus VI for iSeries provides flexibility for controlling access to index classes (types of documents), workbaskets, and advanced workflow processes. With access lists, the ImagePlus VI for iSeries administrator controls access to all these resources by user or by group.

Workfolder Application Facility (WAF) is the host feature of VisualInfo for iSeries. Workfolder Application Facility offers two interfaces, either traditional iSeries 5250 emulation or application programming interfaces (APIs).

VisualInfo for iSeries can serve the needs of a small departmental organization or serve as an enterprise solution for a large corporation.

This document imaging and work management system saves you money in many ways. VisualInfo stores large quantities of documents and makes them available throughout your organization in seconds, leading to a dramatic increase in productivity. Even in geographically dispersed enterprises, mission-critical information can be delivered to users when they need it, in the form they need. And, multiple users can view the same documents simultaneously.

For additional information on VisualInfo, visit the IBM Image Web site:
`http://www.ibm.com/software/data/imageplus`

IBM Advanced Function Printing Utilities for iSeries (5722-AF1)

IBM Advanced Function Printing Utilities for iSeries	
Product number	5722-AF1
Replaces product	None
Minimum OS/400 level	V5R1
Installation prerequisites	None
Related products	None

Advanced Function Printing (AFP) Utilities consists of three integrated utilities that support AFP print applications. Included are Overlay Utility for electronic forms, Resource Management Utility for managing document resources, and Print Format Utility, a “Query/AFP” tool to help you build advanced electronic output directly from iSeries database files. Elements within a record layout can be coded to print based on certain conditions. Selection is determined by values of one to five variable fields in the database file.

- **Overlay Utility**: Enables design of AFP electronic forms through an iSeries interface. The design interface includes all elements of typical electronic forms such as lines, boxes, text, images, graphics, and barcodes. Overlay Utility provides both an interactive, near-graphical design interface and a command interface. iSeries resident and printer-resident fonts are supported. Complete facilities are included to compile, print and manage an organization's electronic forms.

- **Print Format Utility**: Enables the interactive creation of special electronic printing applications, directly from the iSeries database. PFU is well suited for producing packing lists, shipping labels, or similar applications that require graphical output. Both tumble and standard duplex are supported. Print Format Utility produces complex output that features overlays, image, and barcodes.
- **Resource Management Utility**: A “workbench” for AFP resources that enables you to create, print, copy, and maintain overlays and images.

IBM Advanced Function Printing PrintSuite for OS/400 (5798-AF2, AF3)

IBM Advanced Function Printing (AFP) PrintSuite for OS/400	
Product number	5798-AF2 (V3R2M1), 5798-AF3 (V3R7M1 and later releases)
Replaces product	None
Minimum OS/400 level	V3R2M1 / V3R7M1
Installation prerequisites	None
Related products	None

AFP PrintSuite for OS/400 is a family of products to create electronic printing applications. The AFP PrintSuite for OS/400 solutions – Advanced Print Utility, Page Printer Formatting Aid, AFP Toolbox, and SAP R/3 AFP Print – are designed to enable iSeries customers to transform application output without changes to the line-of-business application.

The AFP PrintSuite for OS/400 family of advanced printing solutions are separately orderable. Versions of all four AFP PrintSuite solutions are available for V3R2, V3R7, and later OS/400 versions.

Advanced Print Utility (APU) (Included as Part of 5798-AF3)

APU allows end users to design how existing line output is blended with new fonts, electronic forms, image, and barcode, and how each page and copy appear. When complete, the existing application is automatically monitored and transformed, using the APU design.

- End-user design of advanced electronic output.
- Application-independent, no changes to the application program are required.
- Supports complex document requirements, such as multiple page formats and copies, each with customized layouts.

- APU production monitor provides the capability to customize precisely how transformed application output is produced and distributed. User exits enable changes to output. Full control is provided over where output pages, including different copies, are directed.

Page Printer Formatting Aid (PPFA) (5798-PF3)

PPFA is a compiler for page and form definitions, formatting objects for iSeries printing applications. These definitions, a standard in electronic printing, separate the formatting of electronic documents from the application data. Once PPFA creates these formatting objects, they are referenced in the printer file. Unlike spool reformatting systems, page and form definitions are integrated within the iSeries printer file. Once created and specified in the application printer file, the application is automatically transformed and produces new electronic output in one high-performance pass:

- Programmer approach to document design (there are also graphical Windows front-ends to PPFA available)
- Application-independent, no changes to application program
- With V4R3, page and form definitions can be used in conjunction with DDS-defined output
- Consistency with page and form definitions on other systems

AFP Toolbox for OS/400

AFP Toolbox for OS/400 contains a rich set of APIs that provide complete control over the Advanced Function Printing (AFP) data stream. It is designed for applications that require documents precisely tailored to each customer, dynamic integration of image, or similar function, such as:

- A developer tool for advanced printing requirements such as variable placed boxes, images, overlays, and formatted text in customized, complex documents
- Invoked from C, COBOL, and RPG programs
- Also available for MVS, OS/2, AIX, and Windows

SAP R/3 AFP Print

SAP R/3 provides enhanced application output and support of AFP/IPDS printing for SAP R/3 customers. SAP output is transformed dynamically into AFP while adding document elements such as electronic forms, typographic fonts, and barcoding. This enhanced output can then be routed to system-managed IPDS printers.

IBM Advanced DBCS Printer Support for iSeries (5722-AP1)

IBM Advanced DBCS Printer Support for iSeries	
Product number	5722-AP1
Replaces product	None
Minimum OS/400 level	V5R1
Installation prerequisites	None
Related products	None

Advanced DBCS Printer Support for iSeries is a set of the following utilities:

- Advanced Print Writer (APW)
- Advanced Page Printer Writer (APPW)
- Kanji Print Function (KPF)
- Printer Function Control (PFC)
- System/36 Resource Migration

The difference in these utilities is the supported printers and the print functions described in the following sections.

APW

The printers supported include DBCS line impact printers (54xx, 5317. 5327), PC printers (557x, 558x), and AFP printers.

Note: 5769-AP1 option 1 is required to print on AFP DBCS printers.

The print functions include:

- Characters per inch (CPI): 10, 12, 13.4, 15, and 18
- IGCCPI (DBCS characters per inch): 5, 6, 6.7, and 7.5
- Lines per inch (LPI): 4, 6, 7.5, and 8
- Character magnification: 1/2Hx1/2V, 1Hx2V, 2Hx1V, 2Hx2V, 2Hx4V, 4Hx2V, 4Hx4V, and 3Hx3V
- Grid line: Thin solid, thick solid, pair solid, thin dotted, bold dotted, and pair thin dotted
- Character rotation
- Barcode
- Superscript and subscript
- Shade
- User-defined dot pattern image
- SBCS font selection

APPW

The printer supported is the 5337-01 printer. The print functions include:

- CPI: 10, 12, 13.4, 15, and 20
- IGCCPI: 5, 6, 6.7, 7.5, 10, and 15
- LPI: 2, 3, 4, 6, 7.5, 8, 10, and 15
- Character magnification: 1/2Hx1/2V, 1Hx2V, 2Hx1V, 2Hx2V, 2Hx4V, 4Hx2V, and 4Hx4V
- Grid line: Thin solid, thick solid, pair solid, and thin dotted
- Character rotation
- Barcode
- User defined dot pattern image
- SBCS font selection
- DBCS font selection
- Download user-defined DBCS characters

KPF

The printer supported is the 5583-200 printer. The print functions include:

- CPI: 10, 12, and 15
- IGCCPI: 5, 6, 6.7, and 7.5
- LPI: 4, 6, 7.5, 8, and 9
- Character Magnification: 2Hx1V and 2Hx2V
- Grid line: Thin solid, thick solid, and pair solid
- Character rotation

PFC

PFC supports the capability to print user-defined SBCS characters on DBCS printers configured as a 5553 type. It is mainly used to print OCR fonts on DBCS printers. Since the recent printers support OCR fonts, PFC may be required only for old printers.

System/36 Resource Migration

The equivalent functions of APW, KPF, and PFC were provided on an IBM System/36 as a PRPQ. This utility migrates the resources of those System/36 PRPQs to the iSeries servers.

Prior to OS/400 V4R5, Advanced DBCS Printer Support for iSeries was available in Asia Pacific only. It is now available in all geographies and is included on the Keyed Stamped Media.

IBM Dictionary and Linguistics Tools for AS/400 (5769-DL1)

IBM Dictionary and Linguistics Tools for AS/400	
Product number	5769-DL1
Replaces product	None
Minimum OS/400 level	V4R5
Installation prerequisites	None
Related products	None

Dictionary and Linguistics Tools provide 36 dictionaries and a set of dictionary access methods in the form of APIs to allow customers to write applications to access the dictionaries directly. This uses the advanced linguistic information built into each dictionary, such as hyphenation, synonyms, spell aid, morphological identification, and tokenization.

The following languages are available:

Afrikaans	Italian	Australian English
Brazilian Portuguese	Norwegian	Czech
Catalan	Norwegian Nynorsk	Hungarian
Danish	Portuguese	Polish
Dutch	Russian	Turkey
Dutch Modern	Spanish	Arabic
Finnish (hyphenation support only)	Swedish	Hebrew
French National	Swiss German	Simplified Chinese
French Canadian	U.K. English	Traditional Chinese
German	U.S. English	Japanese
Greek	U.S. English Legal	Korean
Icelandic	U.S. English Medical	Thai

IBM Business Graphics Utility for iSeries (5722-DS1)

IBM Business Graphics Utility for iSeries	
Product number	5722-DS1
Replaces product	None
Minimum OS/400 level	V5R1
Installation prerequisites	None
Related products	None

The Business Graphics Utility (BGU) for iSeries licensed program provides a very flexible and powerful business graphics function through a menu-driven interface. Users can create, modify, store, display, print, and plot business graphics using data from a keyboard or database file.

Extensive options provided by BGU offer users considerable flexibility in creating computer-generated charts. Font style, font size, font color, line styles, legend type, legend position, annotation, and grid line construction are a few of the many options.

Exercise and tutorial materials are supplied in the BGU User's Guide to provide the necessary familiarization.

IBM Advanced Function Printing (AFP) Fonts for AS/400 (5769-FNT)

IBM Advanced Function Printing (AFP) Fonts for AS/400	
Product number	5769-FNT
Replaces product	None
Minimum OS/400 level	V4R2
Installation prerequisites	None
Related products	None

This is a set of 240 dpi fonts that primarily are provided for compatibility with existing print applications. Unless you have applications that require these specific fonts, the standard font product on AS/400 is AFP Font Collection (5648-B45). This font product includes these font families:

Note: RPQ 8A5061 provides 300 dpi versions of the Sonoran fonts only.

Sonoran Serif	Sonoran Serif Headliner	Sonoran Sans Serif
Sonoran Sans Serif Headliner	Sonoran Sans Serif Condensed	Monotype Garamond
Sonoran Sans Serif Expanded	Century Schoolbook	Pi and Specials
ITC Avant Garde Gothic	Mathematics and Science	ITS Souvenir
OCR-A and OCR-B	DATA1	APL2

These text-type families also include characters to support various national language groups. Some of the popular uses for these families are for printing books, brochures, business plans, handbooks, magazines, manuals, operating schedules, price lists, presentation materials, headlines, subtitles, and reports.

IBM Advanced Function Printing DBCS Fonts for AS/400 (5769-FN1)

IBM Advanced Function Printing DBCS Fonts for AS/400	
Product number	5769-FN1
Replaces product	None
Minimum OS/400 level	V4R3
Installation prerequisites	None
Related products	None

IBM Advanced Function Printing (AFP) Double-Byte Character Set (DBCS) Fonts for AS/400 is a rich selection of DBCS font families for use on 240 dots-per-inch, non-impact printers supported by AFP software integrated in the OS/400. This program includes:

- Japanese fonts
- Korean fonts
- Traditional Chinese fonts
- Simplified Chinese fonts
- Thai fonts

AFP is designed to allow printing on page printers. These fonts allow customers more flexibility in printing. Some common uses for these families are for printing books, brochures, business plans, handbooks, magazines, manuals, operating schedules, price lists, presentation materials, headlines, subtitles, and reports.

Some of the features of this product are:

- Provides double-byte font library for use with 240 dots-per-inch, non-impact printers attached to an iSeries server.
- Enhances system management flexibility with AFP resources transfer.
- Allows for growth and flexibility in the use of AFP printers.
- Enhances user productivity by printing the same object on AFP printers attached to an S/370 or iSeries server.

IBM Facsimile Support for iSeries (5798-FAX)

IBM Facsimile Support for iSeries	
Product number	5798-FAX
Replaces product	Facsimile Support for AS/400 (5798-TBY)
Minimum OS/400 level	V5R1
Installation prerequisites	See the end of this section
Related products	IBM Integrated Domino Fax (5733-FXD)

Facsimile Support for iSeries enables your users and your applications to send and receive faxes. Combined with native integrated modem hardware solutions, it provides a convenient, cost efficient fax solution for your business. It provides users with direct fax capabilities, which help increase operational efficiency and productivity through rapid information dispersal. Cost savings may also be realized through reduced human intervention time, paper cost, telephone charges, postage charges, and document delivery time. Also, there is an audit trail of both inbound and outbound activity to track the flow of your business data.

Benefits

- Growth and flexibility, as it is supported on the entire range of iSeries servers and can grow as your needs grow
- Fax profiles that allow customizing according to end users' requirements including a fax phone book for storing frequently used fax dialing and cover page information
- Fax distribution lists
- DTMF routing
- Automatic routing and processing of inbound faxes based on Transmitting Subscriber Identifier (TSI) data

- View received faxes
- Detailed auditing of all outbound and inbound transactions
- Automatic retry of failed faxes
- Security for transmission of sensitive information
- Full function end-user interface
- Automated cover page generation
- Fax notes
- Capabilities to send faxes during off-shift hours when telephone rates are less expensive
- Faxing of documents from PC applications

Features

Facsimile Support for iSeries provides the base product enablers to fax iSeries or PC output (such as text, images, or graphics) and to receive incoming faxes. Integration of the product with the OS/400 Mail Server Framework allows users of various electronic mail services to exchange mail. The integration allows electronic mail to be sent to a fax machine as easily as it is sent to another computer.

Prerequisites

Facsimile Support for iSeries works with any multiple combination of the following hardware options:

- #9771 Adapter Card with integrated 56 Kbps modem (included with every iSeries)
- #2772 Adapter Card with two integrated 56 Kbps modems
- #2761 PCI Integrated Analog Modem which supports up to eight phone lines
- #2750 PCI ISDN BRI U IOA (2-wire interface)
- #2751 PCI ISDN BRI S/T IOA (4-wire interface): One not in D, AT, CH
- IBM 7852 Model 400 Modem

The #2750, #2751, and #2761 cards include the more robust fax capabilities such as error correction mode (ECM), more than two ports, two dimensional support, and fax banners.

Suggested Reading

`http://www.ibm.com/servers/eserver/iseries/fax400`

IBM Infoprint Designer for iSeries (5733-ID1)

IBM Infoprint Designer for iSeries	
Product number	5733-ID1
Replaces product	
Minimum OS/400 level	V5R1
Installation prerequisites	
Related products	

Infoprint Designer for iSeries provides a fully-graphical document composition interface to the iSeries printing and e-output system. It supports the requirements of today's complex documents and reports to produce fully electronic documents combining data, text, electronic forms, graphics, image, barcoding, and typographic fonts. Infoprint Designer for iSeries can be used for the design of new output applications or the re-engineering of existing applications.

Infoprint Designer for iSeries consists of three components:

- **Infoprint Overlay Editor**: Designs overlays (electronic forms) to be used in the print application
- **Infoprint Image Editor**: Designs the images to be used in the print application
- **Infoprint Layout Editor**: Puts all the design components together into the final document or report

With Infoprint Designer for iSeries, you can build complex print applications easily. Design image components, electronic forms, final page layout, automatically retrieve current application data or spooled files, and upload all component resources to the iSeries so the application can be put into production. The entire interface is designed for a non-technical user.

Infoprint Designer is integrated in three ways:

- Design functions are integrated with automatic retrieval of application data and automatic upload and creation of print resources
- Design iSeries page resources in native formats
- Application resources enable the print application to be put into production with a simple printer file change

Under the covers, Infoprint Designer defines the format of pages with page and form definition resource objects. These are part of the iSeries print architecture. Designing with these resources is application-independent (unlike DDS). They are also compatible with existing or new applications that define output data with DDS. With V5R1, OS/400 automatically writes these applications as full AFP (ensuring viewing and PCL support). In addition, the new Java print architecture with V5R1 uses page and form definitions as the page interface.

IBM Infoprint Server for iSeries (5722-IP1)

IBM Infoprint Server for iSeries	
Product number	5722-IP1
Replaces product	
Minimum OS/400 level	V5R1
Installation prerequisites	
Related products	

Infoprint Server for iSeries (Infoprint Server) delivers. The focus of Infoprint Server is to extend the considerable capabilities of the iSeries beyond printing to the management and dissemination of output. As business applications are re-engineered into e-business applications, the output of those applications change and can flow electronically to the consumer of that output.

For enterprise printing requirements, Infoprint Server delivers improved efficiency, improved reliability, and lowers overall printing costs. It applies the task of handling the essential printing generated across the network to iSeries print management and iSeries-attached printers.

On the e-output side, Infoprint Server provides PDF and portable AFP support for the iSeries. The PDF is text-based, fully navigable, high-performance. Any standard iSeries output format can be transformed into PDF.

In addition, enhancements to OS/400 DDS enable you to segment an output file, triggering the PDF server to create multiple PDF files; this is an “electronic burst and bind” function. e-Mail of output (via PDF) has been integrated and automated into this process. Output files can be transformed to PDF and automatically sent to any destination. Integrated e-mail also provides user exits for customizing (that is, using the trigger field, a customer number for example, to look up an e-mail ID in an address book).

AFP output can be treated similarly. The new Create AFP Data (CRTAFPDTA) command provides three critical functions:

- Converts print formatted with page definitions to AFP.
- Creates a portable file by pulling in external fonts, page segments, and overlays.
- Inserts indexing to facilitate easy navigation when viewing the print file.

Another key focus of Infoprint Server is iSeries management of network output. Infoprint Server provides transforms for PCL, Postscript, and PDF into AFP. Output generated in those formats can be brought into the iSeries and effectively managed. The PostScript and PDF transforms deliver full-function Level 3 capability.

The standard Web, e-business image formats are GIF, TIF, and JPEG. Infoprint Server provides transforms (Windows-based) to convert those formats to an iSeries image (IOCA - page segments).

Earlier Model Summary

Earlier Model Summary

Summary of Earlier AS/400, AS/400e, and iSeries Models

This chapter identifies resources such as hardware and performance characteristics for all AS/400, AS/400e, and iSeries models, including maximum capacities for main storage, disk storage, LAN, and communications.

Operating system limits, such as the maximum members in a database file, maximum objects in a library, and jobs on the system for V5R1 can be found in the Technical studio at
http://www.iseries.ibm.com/tstudio/tech-ref/syslimit/index.htm

The limits information for V4R5 and V4R4 systems, can be viewed on the Web at:
http://www.redbooks.ibm.com/redbooks/

When you arrive at this site, click the **Redbooks Online** link, then the **Additional Materials** link, and select **GA19-5486** from the list. For V4R5, select the **limitV45.pdf** file. For V4R4, select the **limitred.pdf** file.

Systems

Models P01, P02

9401 Model	P01	P02
Relative System Performance (CPW) [1]	N/A	7.3
Relative System Performance (RAMP-C) [2]	2.5	2.5
Main Storage (MB)	8	8-16
Disk Storage (GB) (Maximum)	0.98	2.06
Maximum Number of Twinax Workstations	3	7
Communication Lines (Maximum)	1	1
LAN Adapters (Maximum)	0	0
Available Card Slots (for I/O Adapters)	0	0
Number of System I/O Buses	1	1
Version 3 Processor Group	P05	P05

9401 Model P03 and 10S

Package ID	Twinax T01	Twinax T02	Twinax T03	Twinax T11	Twinax T12	LAN L01	LAN L02	LAN L03	Server S01
Relative System Performance (CPW) [1]	7.3	9.6	16.8	9.6	7.3	7.3	9.6	16.8	5.5/ 17.1[4]
Relative System Performance (RAMP-C) [2]	2.5	3.3	3.9	3.3	2.5	2.5	3.3	3.9	1.9/ 5.9[4]
Main Storage (MB)	8-24	8-40	8-56	8-40	8-24	8-24	8-40	8-56	8-56
Disk Storage (GB) (Maximum)	2.99	3.93	3.93	2.99	3.93	2.99	3.93	3.93	3.93
Maximum Number of Workstations Twinax LAN Attached	 7 --	 14 --	 14 --	 14 --	 7 --	 -- 16	 -- 16	 -- 16	 -- 16
Communication Lines (Maximum)	1	2	2	2	1	2	2	2	2
Version 3 Processor Group	P05	P05	P05	P05	P05	P05	P05	P05	P05

9402 Models C04, C06

9402 Model	C04	C06
Relative System Performance (CPW Value) [1]	3.1	3.6
Relative System Performance (RAMP-C) [2]	1.1	1.3
Main Storage (MB)	8-12	8-16
Disk Storage (GB) (Maximum)	1.28	1.28
Maximum Number of Workstations Twinax ASCII	 14 6	 54 24
Communication Lines (Maximum)	5	5
LAN Adapters (Maximum)	1	1
Available Card Slots (for I/O Adapters)	3	3
Number of System I/O Buses	1	1
Version 3 Processor Group	P10	P10

9402 Models D02, D04, D06

9402 Model	D02	D04	D06
Relative System Performance (CPW Value) [1]	3.8	4.4	5.5
Relative System Performance (RAMP-C) [2]	1.3	1.5	1.9
Main Storage (MB)	8-16	8-16	8-20
Disk Storage (GB) (Maximum)	1.20	1.60	1.60
Maximum Number of Workstations Twinax ASCII LocalTalk	 14 12 31	 28 12 31	 54 24 31
Communication Lines (Maximum)	3	8	8
LAN Adapters (Maximum)	1	1	1
Available Card Slots (for I/O Adapters)	1	3	3
Number of System I/O Buses	1	1	1
Version 3 Processor Group	P10	P10	P10

9402 Models E02, E04, E06

9402 Model	E02	E04	E06
Relative System Performance (CPW Value) [1]	4.5	5.5	7.3
Relative System Performance (RAMP-C) [2]	1.5	1.9	2.6
Main Storage (MB)	8-24	8-24	8-40
Disk Storage (GB) (Maximum)	2.01	4.08	4.08
Maximum Number of Workstations Twinax ASCII LocalTalk	 14 12 31	 42 48 31	 68 66 62
Communication Lines (Maximum)	3	8	14
LAN Adapters (Maximum)	1	1	2
Available Card Slots (for I/O Adapters)	1	3	7
Number of System I/O Buses	1	1	1-2
Version 3 Processor Group	P10	P10	P10

9402 Models F02, F04, F06

9402 Model	F02	F04	F06
Relative System Performance (CPW Value) [1]	5.5	7.3	9.6
Relative System Performance (RAMP-C) [2]	1.9	2.5	3.3
Main Storage (MB)	8-24	8-24	8-40
Disk Storage (GB) (Maximum)	2.06	4.12	8.24
Maximum Number of Workstations Twinax ASCII LocalTalk	 28 18 31	 68 66 62	 108 102 93
Communication Lines (Maximum)	8	8	14
LAN Adapters (Maximum)	1	1	2
Available Card Slots (for I/O Adapters)	1	3	7
Number of System I/O Buses	1	1	1-2
Version 3 Processor Group	P05	P10	P10

9402 Model 200

9402 Model	#2030	#2031	#2032
Relative System Performance (CPW Value) [1]	7.3	11.6	16.8
Relative System Performance (RAMP-C) [2]	2.5	4.0	6.2
Main Storage (MB)	8-24	8-56	16-128
Disk Storage (GB) (Maximum) V3R1 (Maximum) V3R2	 23.6 50.3	 23.6 50.6	 23.6 50.6
Maximum Number of Workstations Twinax ASCII LocalTalk	 280 126 217	 280 126 217	 280 126 217
Communication Lines (Maximum)	20	20	20
LAN Adapters (Maximum)	2	2	2
Available Card Slots (for I/O Adapters)	6	6	6
Number of System I/O Buses	1	1	1
Version 3 Processor Group	P05	P10	P10

9402 Model 236

9402 Model	236
Main Storage (MB)	32-96
Disk Storage (GB)	4.12
Maximum Number of Workstations Twinax	 80
Communication Lines (Maximum)	8
LAN Adapters (Maximum)	2
Available Card Slots (for I/O Adapters)	6
Number of System I/O Buses	1

9402 Model 400

9402 Model 400 Processor	#2130	#2131	#2132	#2133
Relative System Performance (CPW Value) [1] Version 3 Release 6	12.3	18.3	24.5	30.6
Relative System Performance (CPW Value) [1] Version 3 Release 7	13.8	20.6	27.0	33.3
Relative System Performance (CPW Value) [1] Version 4	13.8	20.6	27.0	35.0
Relative System Performance (RAMP-C) [2]	4.1	6.1	8.7	10.8
Main Storage (MB)	32-160	32-224	32-224	32-224
Disk Storage (GB) (Maximum) V3R6 (Maximum) V3R7 and later	 23.6 50.3	 23.6 50.3	 23.6 50.3	 23.6 50.3
Maximum Number of Workstations Twinax ASCII LocalTalk	 280 126 217	 280 126 217	 280 126 217	 280 126 217
Communication Lines (Maximum)	20	20	20	20
LAN Adapters (Maximum)	2^5	2^5	2^5	2^5
ATM Adapters (Maximum)	1	1	1	1
Available Card Slots (for I/O Adapters)	6	6	6	6
Number of System I/O Buses	1	1	1	1
Processor Group	P05	P10	P10	P10

9402 Model 436

9402 Model 436 Processor	SSP Only			SSP and OS/400		
	#2102	#2104	#2106	#2102	#2104	#2106
Relative System Performance (CPW) [1] V3R6	N/A	N/A	N/A	14.4	18.3	24.5
Relative System Performance (CPW) [1] V3R7 and later	N/A	N/A	N/A	16.3	20.6	27.4
Relative System Performance (RAMP-C) [2]	1.0	1.3	2.4	4.8	6.1	8.7
Main Storage (MB) [3]	32-224	32-224	32-256	64-224	64-224	64-256
Disk Storage (GB) [3] (Maximum) V3R6 (Maximum) V3R7 and later	 4 4	 4 4	 4 4	 23.6 50.3	 23.6 50.3	 23.6 50.3
Maximum Number of Workstations Twinax Devices ASCII Devices LocalTalk	 160 0 0	 160 0 0	 160 0 0	 280 108 0	 280 108 0	 280 108 0
Communications Lines (Maximum)	8	8	8	20	20	20
LAN Adapters (Maximum) [3, 5]	2	2	2	2	2	2
ATM Adapters (Maximum)	0	0	0	1	1	1
Available Card Slots (for I/O Adapters)	6	6	6	6	6	6
Number of System I/O Buses	1	1	1	1	1	1
Processor Group	N/A	N/A	N/A	P05	P10	P10

9404 Models B10, B20

9404 Model	B10	B20
Relative System Performance (CPW Value) [1]	2.9	5.1
Relative System Performance (RAMP-C) [2]	1.0	1.7
Main Storage (MB)	4-16	4-28
Disk Storage (GB) (Maximum)	2.40	4.80
Maximum Number of Workstations Twinax ASCII	 40 36	 80 72
Communication Lines (Maximum)	8	14
LAN Adapters (Maximum)	1	2
Available Card Slots (for I/O Adapters)	4	9
Number of System I/O Buses	1	1-2
Version 3 Processor Group	P10	P10

9404 Models C10, C20, C25

9404 Model	C10	C20	C25
Relative System Performance (CPW Value) [1]	3.9	5.3	6.1
Relative System Performance (RAMP-C) [2]	1.3	1.8	2.2
Main Storage (MB)	8-20	8-32	8-40
Disk Storage (GB) (Maximum)	2.40	4.80	6.40
Maximum Number of Workstations Twinax ASCII	 40 36	 80 72	 80 72
Communication Lines (Maximum)	8	14	14
LAN Adapters (Maximum)	1	2	2
Available Card Slots (for I/O Adapters)	4	9	9
Number of System I/O Buses	1	1-2	1-2
Version 3 Processor Group	P10	P10	P10

9404 Models D10, D20, D25

9404 Model	D10	D20	D25
Relative System Performance (CPW Value) [1]	5.3	6.8	9.7
Relative System Performance (RAMP-C) [2]	1.9	2.4	3.4
Main Storage (MB)	8-32	8-40	16-64
Disk Storage (GB) (Maximum)	9.50	9.50	15.80
Maximum Number of Workstations Twinax ASCII LocalTalk	 80 72 62	 80 72 62	 160 108 124
Communication Lines (Maximum)	14	14	14
LAN Adapters (Maximum)	2	2	2
Available Card Slots (for I/O Adapters)	9	9	9
Number of System I/O Buses	1-2	1-2	1-2
Version 3 Processor Group	P10	P10	P10

9404 Models E10, E20, E25

9404 Model	E10	E20	E25
Relative System Performance (CPW Value) [1]	7.6	9.7	11.8
Relative System Performance (RAMP-C) [2]	2.6	3.5	4.2
Main Storage (MB)	8-40	8-72	16-80
Disk Storage (GB) (Maximum)	19.67	19.67	19.67
Maximum Number Workstations Twinax ASCII LocalTalk	 160 162 124	 160 162 124	 240 162 184
Communication Lines (Maximum)	14	20	20
LAN Adapters (Maximum)	2	2	2
Available Card Slots (for I/O Adapters)	9	9	9
Number of System I/O Buses	1-2	1-2	1-2
Version 3 Processor Group	P10	P10	P20

9404 Models F10, F20, F25

9404 Model	F10	F20	F25
Relative System Performance (CPW Value) [1]	9.6	11.6	13.7
Relative System Performance (RAMP-C) [2]	3.4	4.2	4.8
Main Storage (MB)	8-72	16-80	16-80
Disk Storage (GB) (Maximum)	20.62	20.62	20.62
Maximum Number of Workstations Twinax ASCII LocalTalk	 360 162 279	 360 162 279	 360 162 279
Communication Lines (Maximum)	14	20	26
LAN Adapters (Maximum)	2	4	4
Available Card Slots (for I/O Adapters)	9	9	9
Number of System I/O Buses	1-2	1-2	1-2
Version 3 Processor Group	P10	P20	P20

9406 Models B30, B35, B40, B45, B50, B60, B70

9406 Model	B30	B35	B40	B45	B50	B60	B70
Relative System Performance (CPW Value)[1]	3.8	4.6	5.2	6.5	9.3	15.1	20.0
Relative System Performance (RAMP-C) [2]	1.4	1.6	2.0	2.3	3.2	5.2	7.0
Main Storage (MB)	4-36	8-40	8-40	8-40	16-48	32-96	32-192
Disk Storage (GB) (Maximum)	13.7	13.7	13.7	13.7	27.4	54.8	54.8
Maximum Number of Workstations Twinax ASCII	 160 72	 160 72	 240 108	 240 108	 400 180	 600 270	 800 360
Communication Lines (Maximum)	16	16	32	32	32	32	48
LAN Adapters (Maximum)	4	4	4	4	4	4	4
Main Storage Feature Card Slots	2	2	2	2	2	4	5
Available Card Slots (for I/O Adapters)	5	5	5	5	10	13	13
Maximum System I/O Card Slots	14	14	24	24	39	71	71
Number of System I/O Buses	1	1	1	1	2	3	3
Version 3 Processor Group	P10	P10	P10	P10	P10	P20	P20

9406 Models D35, D45, D50, D60, D70, D80

9406 Model	D35	D45	D50	D60	D70	D80
Relative System Performance (CPW Value) [1]	7.4	10.8	13.3	23.9	32.3	56.6
Relative System Performance (RAMP-C) [2]	2.6	3.7	4.8	8.3	11.2	19.8
Number of Processors	1	1	1	1	1	2
Main Storage (MB)	8-72	16-80	32-128	64-192	64-256	64-384
External Disk Storage (GB) (Maximum)	63.0	63.0	94.3	141.7	141.7	251.8
Maximum Number of Workstations						
Twinax	240	400	600	800	1200	2000
ASCII	108	180	270	360	540	900
LocalTalk	186	310	465	620	930	1550
Communication Lines (Maximum)	17	33	33	33	49	64
LAN Adapters (Maximum)	4	4	4	4	4	4
Main Storage Feature Card Slots	2	2	5	5	5	5
Available Card Slots (for I/O Adapters)	55	55	84	140	140	196
Number System I/O Buses	2	2	3	3-5	3-5	3-7
Version 3 Processor Group	P10	P10	P20	P20	P30	P30

9406 Models E35, E45, E50, E60, E70, E80, E90, E95

9406 Model	E35	E45	E50	E60	E70	E80	E90	E95
Relative System Performance (CPW) [1]	9.7	13.8	18.1	28.1	39.2	69.4	96.7	116.6
Relative System Performance (RAMP-C) [2]	3.4	4.8	6.4	10.2	14.2	25.2	34.4	42.1
Number of Processors	1	1	1	1	1	2	3	4
Main Storage (MB)	8-72	16-80	32-128	64-192	64-256	64-512	64-1024	64-1152
Maximum External Disk Storage (GB)	63.0	63.0	94.3	141.7	141.7	251.8	251.8	251.8
Maximum Number of Workstations								
Twinax	360	480	720	1000	1400	2400	2400	2400
ASCII	162	216	324	450	630	1080	1080	1080
LocalTalk	279	372	558	775	1085	1860	1860	1860
Maximum Communication Lines	20	33	33	33	49	64	64	64
Maximum LAN Adapters	4	4	4	4	4	6	6	6
Main Storage Feature Card Slots	2	2	5	5	5	5	5	5
Available Card Slots (for I/O Adapters)	55	55	84	140	140	196	196	196
Number of System I/O Buses	2	2	3	3-5	3-5	3-7	3-7	3-7
Version 3 Processor Group	P10	P20	P20	P30	P30	P40	P40	P40

9406 Models F35, F45, F50, F60, F70, F80, F90, F95, F97

9406 Model	F35	F45	F50	F60	F70	F80	F90	F95	F97
Relative System Performance (CPW) [1]	13.7	17.1	27.8	40.0	57.0	97.1	127.7	148.8	177.4
Relative System Performance (RAMP-C) [2]	4.8	6.0	10.2	14.7	21.0	36.5	50.5	59.0	71.5
Number of Processors	1	1	1	1	1	2	3	4	4
Main Storage (MB)	16-80	16-80	64-192	128-384	128-512	128-768	128-1024	128-1280	128-1536
Maximum External Disk Storage (GB)	63.0	63.0	110.2	141.7	251.8	251.8	251.8	251.8	251.8
Maximum Number of Workstations									
Twinax	480	720	1000	1400	2400	2400	2400	2400	4800
ASCII	216	324	450	630	1080	1080	1080	1080	2160
LocalTalk	372	558	775	1085	1860	1860	1860	1860	3720
Maximum Communication Lines	20	33	33	33	64	64	64	64	96
Maximum LAN Adapters	4	4	4	4	6	6	6	6	8
Main Storage Feature Card Slots	2	2	5	5	5	5	5	5	5
Available Card Slots (for I/O Adapters)	55	55	140	140	195	195	195	195	195
Number of System I/O Buses	2	2	3-5	3-5	3-7	3-7	3-7	3-7	3-7
Version 3 Processor Group	P20	P20	P30	P30	P30	P40	P40	P40	P40

9406 Models 300, 310, 320

9406 Models 300, 310, 320 Processor	300 #2040	300 #2041	300 #2042	310 #2043	310 #2044	320 #2050	320 #2051	320 #2052
Relative System Perf. (CPW) [1]	11.6	16.8	21.1	33.8	56.5	67.5	120.3	177.4
Relative System Perf (RAMP-C) [2]	4.2	6.0	7.5	12.0	20.2	25.7	45.8	71.5
Number of Processors	1	1	1	1	2	1	2	4
Main Storage (MB)	8-72	16-80	32-128	64-832	64-832	128-1536	128-1536	128-1536
Max External Disk Storage (GB)	117.4	117.4	117.4	159.3	159.3	259.6	259.6	259.6
Maximum Number of Workstations Twinax ASCII LocalTalk	 1000 450 775	 1000 450 775	 1000 450 775	 2400 1080 1860	 2400 1080 1860	 4800 2160 3720	 4800 2160 3720	 4800 2160 3720
Maximum Communication Lines	33	33	33	64	64	96	96	96
Maximum LAN Adapters	4	4	4	8	8	8	8	8
Available Card Slots (for I/O Adapters)	45	45	45	115	115	151	151	151
Number of System I/O Buses	1-2	1-2	1-2	1-5	1-5	1-7	1-7	1-7
Processor Group	P20	P20	P20	P30	P30	P40	P40	P40

9406 Models 500, 510, 530

9406 Models 500, 510, 530	500 #2140	500 #2141	500 #2142	510 #2143	510 #2144	530 #2150	530 #2151	530 #2152	530 #2153	530 #2162
Relative System Perf (CPW) [1] V3R6	18.7	26.9	38.3	66.7	85.0	107.1	132.5	198.7	299.0	349.8
Relative System Perf (CPW) [1] V3R7	21.4	30.7	43.9	77.7	104.2	131.1	162.7	278.8	459.3	509.9
Relative System Perf (CPW) [1] V4Rx	21.4	30.7	43.9	81.6	111.5	148.0	188.2	319.0	598.0	650.0
Relative System Perf (RAMP-C) [2]	6.4	9.3	12.6	21.6	28.5	37.4	48.9	74.0	119.2	†
Number of Processors	1	1	1	1	1	1	1	2	4	4
Main Storage (MB)	64-768	64-768	64-1024	256-1024	256-1024	512-4096	512-4096	512-4096	512-4096	512-4096
Disk Storage (GB) V3R6/V3R7 (Max) V4 (Max)	150.9 652.8	150.9 652.8	150.9 652.8	318.7 652.8	318.7 652.8	520.0 996.4	520.0 996.4	520.0 996.4	520.0 996.4	520.0 996.4
Maximum Workstations Twinax ASCII LocalTalk	1400 630 1085	1400 630 1085	1400 630 1085	2400 1080 1860	2400 1080 1860	7000 3150 5425	7000 3150 5425	7000 3150 5425	7000 3150 5425	7000 3150 5425
Max Comm. Lines	33	33	33	96	96	200	200	200	200	200
Max LAN Ports	16	16	16	16	16	32	32	32	32	32
Max ATM Ports	8	8	8	8	8	16	16	16	16	16
Available Card Slots (for I/O Adapters)	6-83	6-83	6-83	6-83	6-83	4-238	4-238	4-238	4-238	4-238
System I/O Buses	1-7	1-7	1-7	1-7	1-7	1-19	1-19	1-19	1-19	1-19
Processor Group	P20	P20	P20	P30	P30	P40	P40	P40	P40	P40

9406 Model 600

Processor Features	#2129	#2134	#2135	#2136
Relative System Performance Metric (CPW) [1]	22.7	32.5	45.4	73.1
Number of Processors	1	1	1	1
Main Storage (MB) Min/Max	64-384	64-384	64-384	128-512
Processor Group	P05	P10	P10	P20
Disk Unit Capacity (GB)				
Base	4.19	4.19	4.19	4.19
Maximum Internal				
V4R1	85.8	85.8	85.8	85.8
V4R2/V4R3	175.4	175.4	175.4	175.4
Maximum External	--	--	--	--
Total Maximum				
V4R1	85.8	85.8	85.8	85.8
V4R2/V4R3	175.4	175.4	175.4	175.4
Disk Controllers	1	1	1	1
Diskette (8 or 5 ¼ inch)	0	0	0	0
Tape Attachment [6]				
¼-inch and/or 8mm Cartridge	0-1	0-1	0-1	0-1
(Internal)	0-1	0-1	0-1	0-1
8mm Cartridge (External)	0-1	0-1	0-1	0-1
½-inch Reel 9348	0-1	0-1	0-1	0-1
½-inch Cartridge 34XX, 35XX				
Physical Packaging				
SPD I/O Bus	0	0	0	0
I/O Card Slots—SPD	0	0	0	0
I/O Card Slots—PCI	8	8	8	8
Workstation Attachment				
Controllers Min/Max	0-5	0-5	0-5	0-5
Twinax Devices	188	188	188	188
ASCII Devices	0	0	0	0
Local Talk Devices	0	0	0	0
Communications Lines [7]	1-9	1-9	1-9	1-9
Fax Adapters	0	0	0	0
Cryptographic Processor	0	0	0	0
LAN Ports	0-3	0-3	0-3	0-3
ATM Ports	0-1	0-1	0-1	0-1
Integrated PC Servers [8]	0-1	0-1	0-1	0-1
PCI LAN/ATM Adapters	0-3	0-3	0-3	0-3
Optical Libraries [9]	0-1	0-1	0-1	0-1

9406 Model 620

Processor Features	#2175	#2179	#2180	#2181	#2182
Relative System Performance (CPW) [1]	50.0	85.6	113.8	210.0	464.3
Number of Processors	1	1	1	1	2
Main Storage (MB) Min/Max	64-1856[19]	256-2048	256-2048	256-2048	256-4096
Processor Group	P20	P20	P30	P30	P40
Summary for All Processors	**Base System**	**#9364 with #9329[10]**	**#9364 with #9311[10]**	**#507x, #508x**	**System Maximum**
Disk Unit Capacity (GB)					
Base	4.19	--	--	--	4.19
Maximum Internal					
V4R1	85.8/128.81	128.8	128.8	274.8	704.3
V4R2/V4R3	1	236.2	236.2	561.5	944.8
Maximum External	175.4/236.21				
V4R1	1	--	(12)	(12)	652.8
V4R2/V4R3		--	(12)	(12)	893.3
Total Maximum	--				
V4R1	--				704.3
V4R2/V4R3					944.8
Disk Controllers	1	1	(13)	(13)	20
CD-ROM	1	0-1	0	0-1	5
Diskette (8 or 5 ¼ inch)	0	0	0-2	0-2	2
Tape Attachment [6]					
¼-inch and/or 8mm Cartridge (Internal)	0-1	0-3	0-3	0-4	17
8mm Cartridge (External)	0-1	0-2	0-4	0-4	4
½-inch Reel 9348	0-1	0-2	0-4	0-4	4
½-inch Reel 2440	0	0	0-4	0-4	4
½-inch Reel 9347	0	0	0-2	0-2	2
½-inch Cartridge 34XX, 35XX	0-1	0-2	0-4	0-4	4
Physical Packaging					
SPD I/O Bus	0	0-4	0-4	0	4
I/O Card Slots—SPD	0	0	6	13	58
I/O Card Slots—PCI	8	14	0	0	22
Workstation Attachment					
Controllers Min/Max	0-5	0-9	0-18	0-39	0-60
Twinax Devices	188	360	720	1560	2388
ASCII Devices	0	0	108	234	1044
Local Talk Devices	0	0	0	0	0

Communications Lines [7]	1-9	0-18	0-36	0-78	96
Fax Adapters	0	0	0-6	0-13	32
Cryptographic Processor	0	0	0-1	0-1	1
LAN Ports	0-3	0-5	0-12	0-16	16
ATM Ports	0-1	0-3	0-5	0-5	16
Integrated PC Server (SPD) [8]	0	0	0-3[21]	0-6[22]	16
Integrated PC Server (PCI) [8]	0-1	0-1	0	0	2
PCI LAN/ATM Adapters	0-3	0-5	0	0	8
Optical Libraries	0-1	0-2	0-12	0-14	14

9406 Model 640

Processor Features	#2237	#2238	#2239
Relative System Performance (CPW) [1]	319.0	583.3	998.6
Number of Processors	1	2	4
Main Storage (MB) Min/Max			
V4R1/V4R2	512-12288	512-12288	512-12288
V4R3	512-12288	512-16384	512-16384
Processor Group	P40	P40	P40
Disk Unit Capacity (GB)			
Base	4.19	4.19	4.19
Maximum Internal			
V4R1	927.7	927.7	927.7
V4R2/V4R3	1340.0	1340.0	1340.0
Maximum External			
V4R1	893.3	893.3	893.3
V4R2/V4R3	1305.6	1305.6	1305.6
Total Maximum			
V4R1	927.7	927.7	927.7
V4R2/V4R3	1340.0	1340.0	1340.0
Disk Controllers	1-37	1-37	1-37
Diskette (8 or 5 ¼ inch)	0-2	0-2	0-2
CD-ROM	1-18	1-18	1-18
Tape Attachment [6]			
¼-inch and/or 8mm Cartridge	0-17	0-17	0-17
(Internal)	0-4	0-4	0-4
8mm Cartridge (External)	0-4	0-4	0-4
½-inch Reel 9348, 2440	0-2	0-2	0-2
½-inch Reel 9347	0-8	0-8	0-8
½-inch Cartridge 34XX, 35XX			
Physical Packaging			
SPD I/O Bus	1-19	1-19	1-19
I/O Card Slots—SPD	3-235	3-235	3-235
I/O Card Slots—PCI	0	0	0
System Expansion			
(#5072/#5073/#5082/#5083)	0-18	0-18	0-18
Bus Expansion (#5044)	0-9	0-9	0-9
Storage Expansion (#5055)	0-1	0-1	0-1
Storage Expansion (#5052/#5058)	0-18	0-18	0-18
Workstation Attachment			
Controllers Min/Max	1-175	1-175	1-175
Twinax Devices	7000	7000	7000
ASCII Devices	3150	3150	3150
Local Talk Devices	0	0	0

Communications Lines	1-200	1-200	1-200
Fax Adapters	0-32	0-32	0-32
Cryptographic Processor	0-1	0-1	0-1
LAN/ATM Ports	0-32	0-32	0-32
Integrated PC Servers [8]	0-16	0-16	0-16
Optical Libraries	0-22	0-22	0-22

9406 Model 650

Processor Features	#2240	#2243	#2188	#2189
Relative System Performance (CPW) [1]	1794.0	2340.0	3660.0	4550-0
Number of Processors	8	12	8	12
Main Storage (MB) Min/Max				
V4R1/V4R2	1024-20480	1024-20480	--	--
V4R3	1024-32768	1024-32768	1024-40960	1024-40960
Processor Group	P40	P40	P50	P50
Disk Unit Capacity (GB)				
Base	4.19	4.19	4.19	4.19
Maximum Internal				
V4R1	996.4	996.4	--	--
V4R2	1546.1	1546.1	--	--
V4R3	2095.9	2095.9	2095.9	2095.9
Maximum External				
V4R1	962.0	962.0	--	--
V4R2	1511.8	1511.8	--	--
V4R3	2061.3	2061.3	2061.3	2061.3
Total Maximum				
V4R1	996.4	996.4	--	--
V4R2	1546.1	1546.1	--	--
V4R3	2095.9	2095.9	2095.9	2095.9
Disk Controllers	1-37	1-37	1-37	1-37
Diskette (8 or 5 ¼ inch)	0-2	0-2	0-2	0-2
CD-ROM	1-18	1-18	1-18	1-18
Tape Attachment [6]				
¼-inch and/or 8mm Cartridge (Internal)	0-17	0-17	0-17	0-17
8mm Cartridge (External)	0-4	0-4	0-4	0-4
½-inch Reel 9348, 2440	0-4	0-4	0-4	0-4
½-inch Reel 9347	0-2	0-2	0-2	0-2
½-inch Cartridge 34XX, 35XX	0-8	0-8	0-8	0-8
Physical Packaging				
SPD I/O Bus	1-19	1-19	1-19	1-19
I/O Card Slots—SPD	3-237	3-237	3-237	3-237
I/O Card Slots—PCI	0	0	0	0
System Expansion (#5072/#5073/#5082/#5083)	0-18	0-18	0-18	0-18
Bus Expansion (#5044)	0-9	0-9	0-9	0-9
Storage Expansion (#5055)	0-1	0-1	0-1	0-1
Storage Expansion (#5052/#5058)	0-18	0-18	0-18	0-18

Workstation Attachment				
Controllers Min/Max	1-175	1-175	1-175	1-175
Twinax Devices	7000	7000	7000	7000
ASCII Devices	3150	3150	3150	3150
Local Talk Devices	0	0	0	0
Communications Lines				
V4R1/V4R2	1-250	1-250	-	-
V4R3	1-300	1-300	1-300	1-300
Fax Adapters	0-32	0-32	0-32	0-32
Cryptographic Processor	0-1	0-1	0-1	0-1
LAN/ATM Ports				
V4R1/V4R2	0-48	0-48	--	--
V4R3	0-72	0-72	0-72	0-72
Wireless LANs	0-3	0-3	0-3	0-3
Integrated PC Servers [8]	0-16	0-16	0-16	0-16
Optical Libraries	0-22	0-22	0-22	0-22

Servers

9402 Server Model 100 and 9404 Server Models 135 and 140

9402/4 Model	100	135	140
Relative System Perf (CPW) Interactive [1]	5.5	9.6	11.6
Relative System Perf (CPW Value) Client/Server [1]	17.1	32.3	65.6
Relative System Perf (RAMP-C) Interactive [2]	1.9	3.3	4.0
Relative System Perf (RAMP-C) Client/Server [2]	5.9	10.9	22.5
Main Storage (MB)	16-56	32-384	64-512
Disk Storage (GB) (Maximum)	8.2	27.5	86.5
Max. Number Workstations			
Twinax	7	7	7
ASCII	6	6	6
LocalTalk	31	62	62
Communication Lines (Maximum)	8	14	20
LAN Adapters (Maximum)	2	4	6
Available Card Slots (for I/O Adapters)	6	6	21
Number of System I/O Buses	1-2	1-2	1-5
Version 3 Processor Group	P10	P20	P20

9402 Server Model 20S and 9406 Server Model 30S

9402/6 Model 20S, 30S Processor	20S #2010	30S #2411	30S #2412
Relative System Perf (CPW Value) Interactive [1] Relative System Per (CPW Value) Client/Server [1]	5.5 17.1	9.6 32.3	11.6 68.5
Relative System Perf (RAMP-C) Interactive [2] Relative System Perf (RAMP-C) Client/Server [2]	1.9 5.9	3.3 10.9	4.0 23.5
N-Way Multiprocessors	1	1	2
Main Storage (MB)	16-128	32-384	64-832
Disk Storage (GB) Max V3R1 Max V3R2	 23.6 50.3	 86.5 86.5	 86.5 86.5
Maximum Number of Workstations Twinax ASCII LocalTalk	 7 6 31	 7 6 62	 7 6 62
Maximum Communication Lines	20	33	33
Maximum LAN Adapters	2	8	8
Available Card Slots (for I/O Adapters)	5	64	114
Number of System I/O Buses	1	1-3	1-5
Processor Group	P05	P10	P10

9402 Model 40S

9402 Model 40S Processor	#2109	#2110	#2111	#2112
Relative System Perf (CPW) [1] V3R6				
Client/Server Environment	24.5	30.6	52.9	77.3
Interactive Environment	8.4	12.3	18.3	26.9
Relative System Perf (CPW) [1] V3R7				
Client/Server Environment	27.0	33.3	59.8	87.3
Interactive Environment	9.4	13.8	20.6	30.7
Relative System Perf (CPW) [1] V4				
Client/Server Environment	27.0	35.0	63.0	91.0
Interactive Environment	9.4	14.5	21.6	32.2
Relative System Perf (RAMP-C) [2]				
Client/Server Environment	8.3	10.6	†	†
Interactive Environment	2.6	3.8		
Main Storage (MB)	32-224	32-224	64-512	64-512
Disk Storage (GB)				
(Maximum) V3R6	23.6	23.6	23.6	23.6
(Maximum) V3R7 and later	50.3	50.3	50.3	50.3
Maximum Number of Workstations				
Twinax	7	7	7	7
ASCII	6	6	6	6
Local Talk	31	31	31	31
Maximum Communication Lines	20	20	20	20
Maximum LAN Adapters	2^5	2^5	2^5	2^5
Maximum ATM Adapters	1	1	1	1
Available Card Slots (for I/O Adapters)	5	5	5	5
Number of System I/O Buses	1	1	1	1
Processor Group	P05	P05	P05	P10

9406 Models 50S and 53S

Processor Features	50S #2120	50S #2121	50S #2122	53S #2154	53S #2155	53S #2156	53S #2157
Relative System Perf (CPW) [1] V3R6							
Client/Server Environment	66.7	85.0	106.8	132.5	198.7	299.0	349.8
Interactive Environment	18.7	26.9	26.9	26.9	26.9	26.9	26.9
Relative System Perf (CPW) [1] V3R7							
Client/Server Environment	77.7	104.2	130.7	162.7	278.8	459.3	509.9
Interactive Environment	21.4	30.7	30.7	30.7	30.7	30.7	30.7
Relative System Perf (CPW) [1] V4							
Client/Server Environment	81.6	111.5	138.0	188.2	319.0	598.0	650.0
Interactive Environment	22.5	32.8	32.8	32.8	32.8	32.8	32.8
Relative System Perf (RAMP-C) [2]							
Client/Server Environment	19.7	26.6	†	43.4	66.6	101.4	†
Interactive Environment	5.7	8.3		8.3	8.3	8.3	
N-Way Multiprocessors	1	1	1	1	2	4	4
Main Storage (MB)	64-1024	64-1024	64-1024	256-4096	256-4096	256-4096	512-4096
Disk Storage (GB)							
V3R6/V3R7 (Maximum)	318.7	318.7	318.7	520.0	520.0-	520.0	520.0
V4 (Maximum)	652.8	652.8	652.8	996.4	996.4	996.4	996.4
Maximum Communication Lines	96	96	96	200	200	200	200
Maximum LAN Ports	16	16	16	16	32	32	32
Maximum ATM Ports	8	8	8	16	16	16	16
Available Card Slots (for I/O Adapters)	5-82	5-82	5-82	4-237	4-237	4-237	4-237
Number of System I/O Buses	1-7	1-7	1-7	1-19	1-19	1-19	1-19
Processor Group	P10	P10	P10	P20	P20	P20	P20

9406 Model 170

Processor Features	#2159	#2160	#2164	#2176	#2183
Relative System Performance (CPW) [1]					
Constrained					
Client/Server Environment	73.0	114.0	125.0	125.0	125.0
Interactive Environment	16.0	23.0	29.0	40.0	67.0
Unconstrained					
Client/Server Environment	73.0	114.0	210.0	319.0	319.0
Interactive Environment	16.0	23.0	29.00	40.0	67.0
Number of Processors	1	1	1	1	1
Main Storage (MB)	64-832	64-832	256-1024	256-1024	256-1024
Disk Storage (GB)					
V4R2 (Maximum)	85.8	85.8	85.8	85.8	85.8-
V4R3 (Maximum)	175.4	175.4	175.4	175.4	175.4
Maximum Communication Lines	12	12	12	12	12
Maximum LAN Ports	6	6	6	6	6
Maximum ATM Ports	3	3	3	3	3
Available Card Slots (for I/O Adapters)	6-15	6-15	6-15	6-15	6-15
Number of System I/O Buses	1	1	1	1	1
Processor Group	P05	P05	P10	P10	P20

9406 Model 170

Model	170 (September 1998 / February 1999)						
Processor Feature	**#2289**	**#2290**	**#2291**	**#2292**	**#2385**	**#2386**	**#2388**
Relative System Performance [1, 2]							
Processor CPW	50	73	115	220	460	460	1090
Interactive CPW	15	20	25	30	50	70	70
Number of Processors	1	1	1	1	1	1	2
Main Storage (MB)	64-832	64-832	64-832	256-1024	256-3584	256-3584	256-3584
Processor Group	P05	P05	P05	P10	P10	P20	P20

Model	Dedicated Server for Domino (August 1999)		
Processor Feature	**#2407**	**#2408**	**#2409**
Relative System Performance CPW - See Note			
Client/Server Environment	30	60	120
Interactive Environment	10	15	20
Simple Mail Users	1300	2300	4300
Number of N-Way Multiprocessors	1	1	2
Main Storage (MB)	256-1024	512-4096	512-4096
Processor Group	P05	P05	P10

	Base System for All Processors (see Note 5)	**System Unit Expansion #7102 (see Note 5)**	**Total Maximum (see Note 5)**
Disk Storage (GB)			
Minimum Internal	4.19	4.19	4.19
Maximum Internal (V4R2)	34.32	51.48	85.80
Maximum Internal (V4R3 and later)	70.16	105.24	175.40
System I/O Card Slots (PCI)			
Low Speed PCI	2	4	6
Low Speed Integrated Server PCI	2	2	4
High Speed DASD IOA PCI	1	0	1
High Speed Tape IOA PCI	0	1	1
High Speed Ethernet or ATM (See Note 3)	1	2	3
Maximum Communication Lines (see Note 4)	1-12	0-18	30
ATM adapters (see note 6)	0-1	0-2	0-3
Maximum LAN Adapters (see note 6)	3	4	7
Non-Integrated Server LAN Low Speed	1	4	5
Non-Integrated Server LAN 100/10 Ethernet	1	2	3
Integrated Server LAN Low-Speed	2	2	4
Integrated Server LAN 100/10 Ethernet	1	1	2
Maximum Workstation Controllers			
Twinaxial	3	5	6

	Base System for All Processors (see Note 5)	System Unit Expansion #7102 (see Note 5)	Total Maximum (see Note 5)
ASCII	0	0	0
Maximum Workstations			
Twinaxial	108	200	228
¼-inch Cartridge Tape (Internal)	0-1	0	1
½-inch Tape			
Reel 9348	0	0-2	2
Reel 2440, 9347	0	0	0
Cartridge 34xx, 35xx	0	0-2	2
8mm Cartridge (External)	0	0-2	2
Optical Libraries	0	0-2	2
Diskettes (5 ½-inch or 8-inch)	0	0	0
Fax Adapters	0	0	0
Cryptographic Processor	0	2	2

Note 1:	CPW is the Commercial Processing Workload that is now being used to measure the performance of all iSeries and AS/400e processors. The CPW value is measured on all maximum configurations. The type and number of disk devices, the number of workstation controllers, the amount of memory, the system model, other factors, and the application being run determine the performance that is achievable. With the introduction of the Dedicated Servers for Domino, Simple Mail Users has been added as a performance measurement.
Note 2:	Processor performance represents the relative performance (maximum capacity) of a processor feature running CPW in a client/server environment. Processor capacity is achievable when the commercial workload is not constrained by main storage and DASD. Interactive Performance represents the relative performance available to perform host-centric workloads. The amount of interactive capacity consumed will reduce the available processor capacity by the same amount.
Note 3:	The Integrated Netfinity Server is mutually exclusive with the high speed slot for LAN and ATM in the Base System Unit.
Note 4:	One line is used by the Operations Console or Client Access Console if selected. The total is reduced by one if a Twinaxial Console is selected. To reach the maximum of 30 communication lines using the #2745/#9745 in slot C03, the base LAN adapter needs to be removed.
Note 5:	Base System is the maximum total for #2289 processor. The #2289 processor does not support the attachment of the #7101 System Unit Expansion.
Note 6:	The Integrated Server is mutually exclusive with the high speed slot for LAN and ATM.

9406 Model S10

Processor Features	#2118	#2119
Relative System Performance Metric (CPW) [1]		
Client/Server Environment	45.4	73.1
Interactive Environment	16.2	24.4
Number of Processors	1	1
Main Storage (MB) Minimum/Maximum	64-384	128-512
Processor Group	P05	P05
Disk Unit Capacity (GB)		
Base	4.19	4.19
Maximum Internal		
V4R1	85.8	85.8
V4R2/V4R3	175.4	175.4
Maximum External	--	--
Total Maximum		
V4R1	85.8	85.8
V4R2/V4R3	175.4	175.4
Disk Controllers	1	1
Diskette (8 or 5 ¼ inch)	0	0
Tape Attachment [6]		
¼-inch and/or 8mm Cartridge (Internal)	0-1	0-1
8mm Cartridge (External)	0-1	0-1
½-inch Reel 9348	0-1	0-1
½-inch Cartridge 34XX, 35XX	0-1	0-1
Physical Packaging		
SPD I/O Bus	0	0
I/O Card Slots—SPD	0	0
I/O Card Slots—PCI	8	8
Workstation Attachment		
Controllers Minimum/Maximum [17]	0-1	0-1
Twinax Devices		
V4R1	7	7
V4R2/V4R3	28	28
ASCII Devices	0	0
LocalTalk Devices	0	0

Communications Lines [18]	1-10	1-10
Fax Adapters	0	0
Cryptographic Processor	0	0
LAN Ports	1-3	1-3
ATM Ports	0-1	0-1
Integrated PC Servers [8]	0-1	0-1
PCI LAN/ATM Adapters	1-3	1-3
Optical Libraries [9]	0-1	0-1

9406 Model S20

Processor Features	#2161	#2163	#2165	#2166
Relative System Performance (CPW) [1]				
Client/Server Environment	113.8	210.0	464.3	759.0
Interactive Environment	31.0	35.8	49.7	56.9
Number of Processors	1	1	2	4
Main Storage (MB) Min/Max	256-2048	256-2048	256-4096	256-4096
Processor Group	P05	P10	P10	P20

Summary for All Processors	Base System	#5604 with #9329 (PCI Card Expansion) [10]	#5064 with #9331 (SPD Card Expansion) [10]	#507x, #508x (External Tower)	System Maximum
Disk Unit Capacity (GB)					
Base	4.19	--	--	--	4.19
Internal					
V4R1	85.8/128.8[12]	128.8	128.8	274.8	704.3
V4R2/V4R3	175.4/263.2[1] [2]	263.2	263.2	561.5	944.8
Maximum External					
V4R1		--	([12])	([12])	652.8
V4R2/V4R3	--	--	([12])	([12])	893.3
Total Maximum	--				
V4R1					704.3
V4R2/V4R3					944.8
Disk Controllers	1	1	([13])	([13])	20
Diskette (8 or 5 ¼ inch)	0	0	0-2	0-2	2
CD-ROM	1	0-1	0	0-1	5
Tape Attachment [4]					
¼ inch and/or 8mm Cartridge (Internal)	0-1	0-2	0-4	0-4	17
8mm Cartridge (External)	0-1	0-3	0-3	0-4	4
½-inch Reel 9348	0-1	0-2	0-4	0-4	4
½-inch Reel 2440	0	0	0-4	0-4	4
½-inch Reel 9347	0	0	0-4	0-4	4
½-inch Cartridge 34xx, 35xx	0-1	0-2	0-4	0-4	4
Physical Packaging					
SPD I/O Bus	0	0-4	0-4	0	4
I/O Card Slots—SPD	0	0	6	13	58
I/O Card Slots—PCI	8	14	0	0	22

Workstation Attachment					
Controllers Min/Max[17]	0-1	0-1	0-1	0-1	1
Twinax Devices					
V4R1	7	0	7	7	7
V4R2/V4R3	28	0	28	28	28
ASCII Devices					
V4R1	0	0	6	6	6
V4R2/V4R3	0	0	28	28	28
LocalTalk Devices	0	0	0	0	0
Communications Lines	1-10[18]	0-18	0-36	0-78	96
Fax Adapters	0	0	0-6	0-13	32
Cryptographic Processor	0	0	0-1	0-1	1
LAN Ports	1-3	0-5	0-6	0-13	16
ATM Ports	0-1	0-3	0-6	0-13	16
Integrated PC Server (SPD) [8]	0-1	0	0-3	0-6	16
Integrated PC Server (PCI) [8]	1-3	0-1	0	0	2
PCI LAN/ATM Adapters	0-1	0-5	0	0	8
Optical Libraries [9]	0-1	0-1	0-12	0-14	14

9406 Model S30

Processor Features	#2257	#2258	#2259	#2260
Relative System Performance (CPW) [1]				
Client/Server Environment	319.0	583.3	998.6	1794.0
Interactive Environment	51.5	64.0	64.0	64.0
Number of Processors	1	2	4	8
Main Storage (MB) Min/Max				
V4R1/V4R2	512-12288	512-12288	512-12288	1024-12288
V4R3	512-16384	512-16384	512-16384	512-24GB
Processor Group	P20	P20	P20	P30
Disk Unit Capacity (GB)				
Base	4.19	4.19	4.19	4.19
Maximum Internal				
V4R1	927.7	927.7	927.7	927.7
V4R2/V4R3	1340.0	1340.0	1340.0	1340.0
Maximum External				
V4R1	893.3	893.3	893.3	893.3
V4R2/V4R3	1305.6	1305.6	1305.6	1305.6
Total Maximum				
V4R1	927.7	927.7	927.7	927.7
V4R2/V4R3	1340.0	1340.0	1340.0	1340.0
Disk Controllers	1-37	1-37	1-37	1-37
Diskette (8 or 5 ¼ inch)	0-2	0-2	0-2	0-2
CD-ROM	1-18	1-18	1-18	1-18
Tape Attachment [6]				
¼-inch and/or 8mm Cartridge (Internal)	0-17	0-17	0-17	0-17
8mm Cartridge (External)	0-4	0-4	0-4	0-4
½-inch Reel 9348, 2440	0-4	0-4	0-4	0-4
½-inch Cartridge 34xx, 35xx	0-8	0-8	0-8	0-8
Physical Packaging				
SPD I/O Bus	1-19	1-19	1-19	1-19
I/O Card Slots—SPD	3-325	3-325	3-325	3-325
I/O Card Slots—PCI	0	0	0	0
System Expansion (#5072/#5073/#5082/#5083)	0-18	0-18	0-18	0-18
Storage Expansion (#5055/#5057)	0-1	0-1	0-1	0-1
Storage Expansion (#5052/#5058)	0-18	0-18	0-18	0-18

Workstation Attachment				
Controllers Minimum/Maximum [14]	3	3	3	3
Twinax Devices [15]				
V4R1	7	7	7	7
V4R2/V4R3	28	28	28	28
ASCII Devices [15]				
V4R1	6	6	6	6
V4R2/V4R3	28	28	28	28
LocalTalk Devices	0	0	0	0
Communications Lines	1-200	1-200	1-200	1-200
Fax Adapters	0-32	0-32	0-32	0-32
Cryptographic Processor	0-1	0-1	0-1	0-1
LAN/ATM Ports	1-32	1-32	1-32	1-32
Integrated PC Servers [8]	0-16	0-16	0-16	0-16
Optical Libraries	0-22	0-22	0-22	0-22

9406 Model S40

Processor Features	#2256	#2261	#2207	#2208
Relative System Performance (CPW) [1]				
Client/Server Environment	1794.0	2340.0	3660.0	4550.0
Interactive Environment	64.0	64.0	120.0	120.0
Number of Processors	8	12	8	12
Main Storage (MB) Minimum/Maximum				
V4R1/V4R2	1024-20480	1024-20480	--	--
V4R3	1024-32768	1024-32768	1024-40960	1024-40960
Processor Group	P30	P40	P40	P40
Disk Unit Capacity (GB)				
Base	4.19	4.19	4.19	4.19
Maximum Internal				
V4R1	--	996.4	--	--
V4R2	1546.1	1546.1	--	--
V4R3	2095.9	2095.9	2095.9	2095.9
Maximum External				
V4R1	--	962.0	--	--
V4R2	1511.8	1511.8	--	--
V4R3	2061.3	2061.3	2061.3	2061.3
Total Maximum				
V4R1	--	996.4	--	--
V4R2	1546.1	1546.1	--	--
V4R3	2095.9	2095.9	2095.9	2095.9
Disk Controllers	1-37	1-37	1-37	1-37
Diskette (8 or 5 ¼ inch)	0-2	0-2	0-2	0-2
CD-ROM	1-18	1-18	1-18	1-18
Tape Attachment [6]				
¼ inch and/or 8mm Cartridge (Internal)	0-17	0-17	0-17	0-17
8mm Cartridge (External)	0-4	0-4	0-4	0-4
½ inch Reel 9348, 2440	0-4	0-4	0-4	0-4
½ inch Cartridge 34xx, 35xx	0-8	0-8	0-8	0-8
Physical Packaging				
SPD I/O Bus	1-19	1-19	1-19	1-19
I/O Card Slots—SPD	3-327	3-327	3-327	3-327
I/O Card Slots—PCI	0	0	0	0
System Expansion (#5072/#5073/#5082/#5083)	0-18	0-18	0-18	0-18
Storage Expansion (#5055/#5057)	0-1	0-1	0-1	0-1
Storage Expansion (#5052/#5058)	0-18	0-18	0-18	0-18

Workstation Attachment				
Controllers Minimum/Maximum [14]	3	3	3	
Twinax Devices [15]				
V4R1	--	7	--	
V4R2/V4R3	28	28	28	28
ASCII Devices [15]				
V4R1	--	6	--	
V4R2/V4R3	28	28	28	28
LocalTalk Devices	0	0	0	0
Communications Lines				
V4R1/V4R2	1-250	1-250	1-250	1-250
V4R33	1-300	1-300	1-300	1-300
Fax Adapters	0-32	0-32	0-32	0-32
Cryptographic Processor	0-1	0-1	0-1	0-1
LAN/ATM Ports				
V4R1/V4R2	1-48	1-48	1-48	1-48
V4R3	1-72	1-72	1-72	1-72
Integrated PC Servers [8]	0-16	0-16	0-16	0-16
Optical Libraries	0-22	0-22	0-22	0-22

9406 Model 720

Model	720			
Processor Feature	**#2061**	**#2062**	**#2063**	**#2064**
Relative System Performance (Note 1) Version 4 Release 3 and later				
Processor CPW	240	420	810	1600
Interactive CPW/System Feature Code				
#1500 (Base)	35 / 206A	35 / 206D	35 / 207B	35 / 207F
#1501	70 / 206B	70 / 206E	-	-
#1502	120 / 206C	120 / 206F	120 / 207C	120 / 208A
#1503	-	240 / 207A	240 / 207D	240 / 208B
#1504	-	-	560 / 207E	560 / 208C
#1505	-	-	-	1050 / 208D
Number of Processors	1	1	2	4
Main Storage (MB)	256-2048	256-4096	256-8192	256-8192
Processor Group (Note 7)	P10-P20	P10-P20	P20-P30	P20-P30

Numbers are for All Processor Features	Base System	SUE #9364 PCI (#9329) PCI (#9330)	SUE #9364 SPD (#9331)	#5065 Stg/PCI Exp Tower	Expansion Tower	System Maximum
		(Note 4)	(Note 4)			
Disk Storage Base (G)						
Maximum Internal (G)	4.194	263.2	263.2	386.5	561.5	1625.9
Maximum External (G)	263.2		(Note 2)		(Note 2)	1595.3
Total Maximum (G)	(Note 5)					1625.9
External SPD Bus		4	4		0	4
Maximum Card Slots-SPD	0	0	6	0	13	58
Maximum Card Slots-PCI	8	14	0	12	0	70
Communication Lines (Note 3)	18	0-40	0-36	0-42	0-78	128
LAN/ATM Adapters	1-3	0-6	0-6	0-6	0-13	24
Maximum Workstation Controllers						
Twinaxial (Note 6)	5	11	18	12	39	66
ASCII (Note 6)	0	0	6	0	13	58
Maximum workstations						
Twinaxial	188	440	720	480	1560	2628
ASCII	0	0	108	0	234	1044
¼-inch/8mm Cartridge Tape	1	3	3	3	4	17
CD-ROM	1	0-1	0	0-1	0-1	6
½-inch Tape	1	2	8	3	8	8
Reel 9348	1	2	4	3	4	4
Reel 2440	0	0	4	0	4	4
Reel 9347	0	0	2	0	2	2
Cartridge 34xx, 35xx	1	2	8	3	8	8
Tape Libraries Maximum						
½-inch Cartridge	1	2	8	3	8	8
8mm	1	2	4	3	4	4
8mm Cartridge (External)	1	2	4	3	4	4
Optical Libraries	1	2	13	3	14	14
Diskettes (5 ¼-inch or 8-inch)	0	0	2	0	2	2
LAN Ports Maximum	3	6	12	6	24	24
Wireless IOP Maximum	0	0	3	0	3	3
FSIOP Maximum	0	0	3	0	6	16
FSIOA (IPCS) Maximum	1	1	0	0	0	2
PCI LAN Maximum	3	6	0	6	0	9
Cryptographic Processors	1	3	1	3	1	6
Fax Adapters	0	0	6	0	13	32

Note 1:	CPW is the Commercial Processing Workload that is now being used to measure the performance of all iSeries and AS/400e processors. The CPW value is measured on maximum configurations. The type and number of disk devices, the number of workstation controllers, the amount of memory, the system model, other factors, and the application being run determine the performance that is achievable. All iSeries and AS/400e processors announced from September 1996 onward have only CPW performance measurements.
Note 2:	External DASD can be attached using a SPD card in the Expansion Unit.

Note 3:	One line is used for Client Access Console or Operations Console if selected. The maximum is nine if Twinaxial Console is selected.
Note 4:	The #9364 must be configured with #9329 /#9330 (PCI) or #9331 (SPD). Therefore, these columns are mutually exclusive.
Note 5:	Maximum is 175.4 GB on #2061 Processor.
Note 6:	Any combination of Twinax or ASCII workstation controllers up to either maximum shown is allowed, maximums are not additive.
Note 7:	Processor Group is determined by a combination of the Processor and Interactive Feature. The following table provides a cross reference.

Processor	Interactive Feature	System Feature Code	Processor Group
#2061	#1500	206A	P10
	#1501	206B	P20
	#1502	206C	P20
#2062	#1500	206D	P10
	#1501	206E	P20
	#1502	206F	P20
	#1503	207A	P20
#2063	#1500	207B	P20
	#1502	207C	P30
	#1503	207D	P30
	#1504	207E	P30
#2064	#1500	207F	P20
	#1502	208A	P30
	#1503	208B	P30
	#1504	208C	P30
	#1505	208D	P30

Note 8:	The total number of internal tapes and CD-ROM per tower cannot exceed the maximum quantity shown for internal tapes. The system maximum for internal tapes and CD-ROMs is 18.

9406 Model 730

Model	730			
Processor Feature	**#2065**	**#2066**	**#2067**	**#2068**
Relative System Perf. (Note 1) Version 4 Release 3 and later				
Processor CPW	560	1050	2000	2890
Interactive CPW/System Feature Code				
#1506 (Base)	70 / 2A6A	70 / 2A6E	70 / 2B6D	70 / 2C6C
#1507	120 / 2A6B	120 / 2A6F	-	-
#1508	240 / 2A6C	240 / 2B6A	240 / 2B6E	240 / 2C6D
#1509	560 / 2A6D	560 / 2B6B	560 / 2B6F	560 / 2C6E
#1510	-	1050 / 2B6C	1050 / 2C6A	1050 / 2C6F
#1511	-	-	2000 / 2C6B	2000 / 2D6A
Number of Processors	1	2	4	8
Main Storage (MB)	512-24576	512-24576	512-24576	1024-24576
Processor Group (Note 4)	P20-P30	P20-P30	P30-P40	P30-P40

Numbers Are for All Processor Features	System Maximum
Disk Storage	
Base (GB)	4.19
Maximum Internal (GB)	1683.6 / 2499.6 (V4R3 / V4R4)
Maximum External (GB)	1649.2 / 2473.9 (V4R3 / V4R4)
Total Maximum (GB)	1683.6 / 2499.6 (V4R3 / V4R4)
Disk unit IOPs (Note2)	1-37
Communication Lines	1-250
Maximum Workstation Controllers	1-175
Maximum workstations	
Twinaxial	7000
ASCII	3150
¼-inch/8mm Cartridge Tape (Internal) (Note 5)	0-18
CD-ROM (Internal) (Note 5)	1-18
½-inch Tape (Note 3)	
Reel 9348	4
Reel 2440	4
Reel 9347	2
Cartridge 34XX, 35XX	8
Tape Libraries Maximum	10
½-inch Cartridge	4
8mm	4
8mm Cartridge (External)	4
Optical Libraries	14
Diskettes (5 ¼-inch or 8-inch)	2
LAN/ATM Ports Maximum	1-48
Wireless IOP Maximum	3
IPCS Maximum	16
Cryptographic Processors	6
Fax IOPs (2 lines/IOP)	32

Note 1: CPW is the Commercial Processing Workload that is now being used to measure the performance of all iSeries and AS/400e processors. The CPW value is measured on maximum configurations. The type and number of disk devices, the number of workstation controllers, the amount of memory, the system model, other factors, and the application being run determine the performance that is achievable. All iSeries and AS/400e processors announced from September 1996 onward have only CPW performance measurements.

Note 2: This total includes the MFIOP. The combination of internal and external IOPs cannot exceed this number.

Note 3: The maximum combination of 2440, 7208 or 9348 and Tape Libraries may not exceed four.

Note 4: The Processor Group is determined by a combination of Processor and Interactive Feature. The following table provides a cross reference.

Processor	Interactive Feature	System Feature Code	Processor Group
#2065	#1506	2A6A	P20
	#1507	2A6B	P30
	#1508	2A6C	P30
	#1509	2A6D	P30
#2066	#1506	2A6E	P20
	#1507	2A6F	P30
	#1508	2B6A	P30
	#1509	2B6B	P30
	#1510	2B6C	P30
#2067	#1506	2B6D	P30
	#1508	2B6E	P40
	#1509	2B6F	P40
	#1510	2C6A	P40
	#1511	2C6B	P40
#2068	#1506	2C6C	P30
	#1508	2C6D	P40
	#1509	2C6E	P40
	#1510	2C6F	P40
	#1511	2D6A	P40

Note 5: The system maximum for internal tapes and CD-ROMs is 18.

9406 Model 740

Model	740	
Processor Feature	**#2069**	**#2070**
Relative System Perf (Note 1 and 2) Version 4 Release 3 and later		
Processor CPW	3660	4550
Interactive CPW/System Feature Code		
#1514 (Base)	120 / 2D6B	120 / 2E6A
#1510	1050 / 2D6C	1050 / 2E6B
#1511	2000 / 2D6D	2000 / 2E6C
#1512	3660 / 2D6E	3660 / 2E6D
#1513	-	4550 / 2E6E
Number of Processors	8	12
Main Storage (MB)	1024-40960	1020-40960
Processor Group (Note 4)	P40-P50	P40-P50

Numbers Are for All Processor Features	System Maximum
Disk Storage	
Base (GB)	4.19
Maximum Internal (GB)	2095.9 / 4294.9 (V4R3 / V4R4)
Maximum External (GB)	2061.3 / 4260.6 (V4R3 / V4R4)
Total Maximum (GB)	2095.9 / 4294.9 (V4R3 / V4R4)
Disk unit IOPs (Note2)	1-37
SPD I/O Bus	1-19
I/O card slots	3-237
Communication Lines	1-300
Maximum Workstation Controllers	1-175
Maximum workstations	
Twinaxial	7000
ASCII	3150
¼-inch/8mm Cartridge Tape (Internal) (Note 5)	0-18
CD-ROM (Internal) (Note 5)	1-18
½-inch Tape (Note 3)	
Reel 9348	4
Reel 2440	4
Reel 9347	2
Cartridge 34XX, 35XX	8
Tape Libraries Maximum	14
½-inch Cartridge	4
8mm	4
8mm Cartridge (External)	4
Optical Libraries	22
Diskettes (5 ¼-inch or 8-inch)	2
LAN/ATM Ports Maximum	1-72
Wireless IOP Maximum	3
IPCS Maximum	16
Cryptographic Processors	6
Fax IOPs (2 lines/IOP)	32

<table>
<tr><td>Note 1:</td><td colspan="4">CPW is the Commercial Processing Workload that is now being used to measure the performance of all iSeries and AS/400e processors. The CPW value is measured on maximum configurations. The type and number of disk devices, the number of workstation controllers, the amount of memory, the system model, other factors, and the application being run determine the performance that is achievable. All iSeries and AS/400e processors announced from September 1996 onward have only CPW performance measurements.</td></tr>
<tr><td>Note 2:</td><td colspan="4">This total includes the MFIOP. The combination of internal and external IOPs cannot exceed this number.</td></tr>
<tr><td>Note 3:</td><td colspan="4">The maximum combination of 2440, 7208 or 9348 and Tape Libraries may not exceed four.</td></tr>
<tr><td>Note 4:</td><td colspan="4">Processor Group is determined by a combination of the Processor and Interactive Feature. The following table provides a cross reference.
<table>
<tr><th>Processor</th><th>Interactive Feature</th><th>System Feature Code</th><th>Processor Group</th></tr>
<tr><td rowspan="4">#2069</td><td>#1514</td><td>2D6B</td><td>P40</td></tr>
<tr><td>#1510</td><td>2D6C</td><td>P50</td></tr>
<tr><td>#1511</td><td>2D6D</td><td>P50</td></tr>
<tr><td>#1512</td><td>2D6E</td><td>P50</td></tr>
<tr><td rowspan="5">#2070</td><td>#1514</td><td>2E6A</td><td>P40</td></tr>
<tr><td>#1510</td><td>2E6B</td><td>P50</td></tr>
<tr><td>#1511</td><td>2E6C</td><td>P50</td></tr>
<tr><td>#1512</td><td>2E6D</td><td>P50</td></tr>
<tr><td>#1513</td><td>2E6E</td><td>P50</td></tr>
</table></td></tr>
<tr><td>Note 5:</td><td colspan="4">The system maximum for internal tapes and CD-ROMs is 18.</td></tr>
</table>

Custom Mixed-Mode Servers

9406 Model S20 Custom Mixed-Mode Server

Model	S20		
Processor Feature	#2170 [23]	#2177	#2178
Relative System Performance (CPW) [1] Client/Server Environment Interactive Environment	 464.3 49.7	 759.0 110.7	 759.0 221.4
Number of Processors	2	4	4
Main Storage (MB) Minimum/Maximum	256-4096	256-4096	256-4096
Processor Group	P20	P20	P20

Summary for All Processors	Base System	#5064 with #9329 (PCI Card Expansion)	#5064 with #9311 (SPD Card Expansion)	#5073, #5083 (External Tower)	System Maximum
Disk Unit Capacity (GB)					
Base	4.19	--	--	--	4.19
Maximum Internal					
V4R1	85.8/128.8 [12]	128.8	128.8	274.8	704.3
V4R2	175.4/263.2 [12]	263.2	263.2	561.5	944.8
Maximum External					
V4R1	--	--	([12])	([12])	652.8
V4R2	--	--	([12])	([12])	893.3
Total Maximum					
V4R1					704.3
V4R2					944.8
Disk Controllers	1	1	([13])	([13])	20
Diskette (8 or 5 ¼ inch)	0	0	2	2	2
CD-ROM	1	0-1	0	0-1	5
Tape Attachment [6]					
¼-inch and/or 8mm Cartridge (Internal)	0-1	0-3	0-3	0-4	17
8mm Cartridge (External)	0-1	0-2	0-4	0-4	4
½-inch Reel 9348	0-1	0-2	0-4	0-4	4
½-inch Reel 2440	0	0	0-4	0-4	4
½-inch Reel 9347	0	0	0	0	0
½-inch Cartridge 34xx, 35xx	0-1	0-2	0-4	0-4	4
Physical Packaging					
SPD I/O Bus	0	0-4	0-4	0	4
I/O Card Slots—SPD	0	0	6	13	58
I/O Card Slots—PCI	8	14	0	0	22
Workstation Attachment					
Controllers Min/Max	1-5	0-9	0-18	0-39	60
Twinax Devices	188	360	720	1560	2392
ASCII Devices	0	0	108	234	1044
LocalTalk Devices	0	0	0	0	0
Communications Lines	1-10[18]	0-18	0-36	0-78	96
Fax Adapters	0	0	0-6	0-13	32
Cryptographic Processor	0	0	0-1	0-1	1
LAN Ports	1-3	0-5	0-12	0-16	16
ATM Ports	0-1	0-3	0-5	0-5	16
Integrated PC Server (SPD) [8]	0	0	0-3[22]	0-6[23]	16
Integrated PC Server (PCI) [8]	1-3	0-1	0	0	2
PCI LAN/ATM Adapters	0-1	0-5	0	0	8
Optical Libraries [9]	0-1	0-2	0-12	0-14	14

9406 Model S30 and S40 Custom Mixed-Mode eServers

Processor Model	S30			S40	
Feature	**#2320**	**#2321**	**#2322**	**#2340**	**#2341**
Relative System Performance (CPW) [1]					
Client/Server Environment	998.6	1794.0	1794.0	3660.0	4550.0
Interactive Environment	215.1	386.4	579.6	1050.0	2050.0
Number of Processors	4	8	8	8	12
Main Storage (MB) Minimum/Maximum	512-16384	1024-24GB	1024-24GB	1024-40GB	1024-40GB
Processor Group	P20	P30	P30	P40	P40
Disk Unit Capacity (GB)					
Base	4.19	4.19	4.19	4.19	4.19
Maximum Internal					
V4R1	927.7	927.7	927.7	--	--
V4R2	1340.0	1340.0	1340.0	--	--
V4R3	1340.0	1340.0	1340.0	2095.9	2095.9
Maximum External					
V4R1	893.3	893.3	893.3	--	--
V4R2	1305.6	1305.6	1305.6	--	--
V4R3	1305.6	1305.6	1305.6	2061.3	2061.3
Total Maximum					
V4R1	927.7	927.7	927.7	--	--
V4R2	1340.0	1340.0	1340.0	--	--
V4R3	1340.0	1340.0	1340.0	2095.9	2095.9
Disk Controllers	1-37	1-37	1-37	1-37	1-37
Diskette (8 or 5 ¼ inch)	0-2	0-2	0-2	0-2	0-2
CD-ROM	1-18	1-18	1-18	1-18	1-18
Tape Attachment [6]					
¼-inch and/or 8mm Cartridge (Internal)	0-17	0-17	0-17	0-17	0-17
8mm Cartridge (External)	0-4	0-4	0-4	0-4	0-4
½-inch Reel 9348, 2440	0-4	0-4	0-4	0-4	0-4
½-inch Cartridge 34xx, 35xx	0-8	0-8	0-8	0-8	0-8
Physical Packaging					
SPD I/O Bus	1-19	1-19	1-19	1-19	1-19
I/O Card Slots—SPD	3-235	3-235	3-235	3-235	3-235
I/O Card Slots—PCI	0	0	0	0	0
System Expansion (#5072/#5073/#5082/#5083)	0-18	0-18	0-18	0-18	0-18
Storage Expansion (#5055/#5057)	0-1	0-1	0-1	0-1	0-1
Storage Expansion (#5052/#5058)	0-18	0-18	0-18	0-18	0-18

Workstation Attachment					
Controllers Minimum/Maximum	1-175	1-175	1-175	1-175	1-175
Twinax Devices	7000	7000	7000	7000	7000
ASCII Devices	3150	3150	3150	3150	3150
LocalTalk Devices	0	0	0	0	0
Communications Lines					
V4R1/V4R2	1-200	1-200	1-200	--	--
V4R3	1-300	1-300	1-300	1-300	1-300
Fax Adapters	0-32	0-32	0-32	0-32	0-32
Cryptographic Processor	0-1	0-1	0-1	0-1	0-1
LAN/ATM Ports					
V4R1/V4R2	1-32	1-32	1-32	--	--
V4R3	1-72	1-72	1-72	1-72	1-72
Integrated PC Servers	0-16	0-16	0-16	0-16	0-16
Optical Libraries	0-22	0-22	0-22	0-22	0-22

9406 Model SB1

Model	SB1			
Feature	**#2310**	**#2311**	**#2312**	**#2313**
Relative System Performance	†	†	†	†
Number of Processors	8	12	8	12
Main Storage (M) Minimum/Maximum	4096	4096	8192	8192
Software Charge Group	P30	P40	P40	P40
Disk Unit Capacity (G)				
Base	16.77	16.77	16.77	16.77
Maximum Internal	34.35	34.35	34.35	34.35
Maximum External	--	--	--	--
Total Maximum	34.35[1]	34.35[1]	34.35[1]	34.35[1]
Disk Controllers	1	1	1	1
Diskette (8 or 5 ¼ inch)	0-2	0-2	0-2	0-2
CD-ROM	1	1	1	1
Tape Attachment [2]				
¼-inch and/or 8mm Cartridge (Internal)	0-3	0-3	0-3	0-3
8mm Cartridge (External)	0-4	0-4	0-4	0-4
½-inch Reel 9348, 2440	0-4	0-4	0-4	0-4
½-inch Cartridge 34xx, 35xx	0-4	0-4	0-4	0-4
Physical Packaging				
SPD I/O Bus	1-5	1-5	1-5	1-5
I/O Card Slots—SPD	3-29[3]	3-29[3]	3-29[3]	3-29[3]
I/O Card Slots—PCI	0	0	0	0
System Expansion (#5072/#5073/#5082/#5083)	0-2(#5073)	0-2(#5073)	0-2(#5073)	0-2(#5073)
Storage Expansion (#5055/#5057)	0	0	0	0
Storage Expansion (#5052/#5058)	0	0	0	0
Workstation Attachment				
Controllers Minimum/Maximum	1-3[4]	1-3[4]	1-3[4]	1-3[4]
Twinax Devices				
V4R1	7	7	7	7
V4R2/V4R3	28	28	28	28
ASCII Devices				
V4R1	6	6	6	6
V4R2/V4R3	28	28	28	28
LocalTalk Devices	0	0	0	0
Communications Lines	1-16	1-16	1-16	1-16
Fax Adapters	0-2	0-2	0-2	0-2
Cryptographic Processor	0-1	0-1	0-1	0-1
LAN/ATM Ports	1-5	1-5	1-5	1-5
Wireless LANs	0-2	0-2	0-2	0-2
Integrated PC Servers	0-2	0-2	0-2	0-2
Optical Libraries	0-2	0-2	0-2	0-2

Note 1:	There is a logical limit of 17.16 GB if mirrored or 25.76 GB if RAID is used for performance measurements.
Note 2:	It is required to have one tape.
Note 3:	Two logical features are supported on the base system.
Note 4:	With V4R1, a maximum of two workstation controllers is supported.
†	AS/400e server SB1 performance data is based on standard benchmarks. Specific performance data may be found at the following vendor Web sites: **BAAN** — `http://www.baan.com` **SAP** — `http://www.sap.com`

Packages

9401 Model 150

Package	Twinax Entry	Twinax Growth	Server Entry	Server Growth
Package ID	**#0591**	**#0592**	**#0593**	**#0594**
Relative System Performance (CPW)				
Client/Server Environment [24,25]	20.2	20.2	20.2	20.2
Interactive Environment [24,25]	13.8	20.2	13.8	20.2
Number of Processors	1	1	1	1
Main Storage (M) Minimum/Maximum	64-192	128-192	64-192	128-192
Software Charge Group [26]	P05	P05	P05	P05
Disk Unit Capacity (GB)				
Base	4.19	4.19	4.19	4.19
Total Disk	29.9	29.9	29.9	29.9
Disk Controllers	0	0	0	0
Diskette	0	0	0	0
Tape Attachment				
¼" Internal [27]	1	1	1	1
External and Tape Libraries	0	0	0	0
System I/O Card Slots (PCI)				
PCI I/O Card Slots [28]	5	5	5	5
Int Netfinity Server & Bridge Card Slots	2	2	2	2

Package	Twinax Entry	Twinax Growth	Server Entry	Server Growth
Package ID	**#0591**	**#0592**	**#0593**	**#0594**
Workstation Attachment				
Controllers Minimum/Maximum	1	1	0-1	0-1
Twinax Devices	1-7	1-28	0-7	0-28
ASCII Devices	0	0	0	0
Local Talk Devices	0	0	0	0
Communications Lines	1-5	1-5	1-6[29]	1-6[29]
Cryptographic Processors	0	0	0	0
Fax Adapters	0	0	0	0
LAN Ports [30]	0-2	0-2	1-2	1-2
Wireless Adapters	0	0	0	0
Integrated Netfinity Servers	0-1	0-1	0-1	1
100/10 Mbps Ethernet Adapters	0-1	0-1	0-1	0-1
ATM Adapters	0	0	0	0

9402 2xx

Models 2FS, 2SS, 2SG	Twinax Server 2FS	LAN Server 2FS	Starter Server 2SS	Growth Server 2SG
Relative System Performance (CPW) [1]				
Client/Server Environment	17.1	17.1	17.1	17.1
Interactive Environment	5.5	5.5	5.5	5.5
Relative System Performance (RAMP-C) [2]				
Client/Server Environment	5.9	5.9	5.9	5.9
Interactive Environment	1.9	1.9	1.9	1.9
Main Storage (MB)	16-128	16-128	16-128	32-128
Maximum Disk Storage (GB)	7.86	7.86	7.86	7.86
Maximum Number of Workstations				
Twinax	7	0	0	0
ASCII	0	0	0	0
Local Talk	0	0	0	0
Maximum Communication Lines	3	2	2	2
Maximum LAN Adapters	2	2	1	1
Available Card Slots (for I/O Adapters)	0	0	0	0
Number of System I/O Buses	1	1	1	1
Processor Group	P05	P05	P05	P05

Software	O/S 400 Query for AS/400 Client Access for O/S 400 Novell NetWare Support LAN Server for AS/400 (Includes 10 LAN Requesters)	O/S400 Query for AS/400 Client Access for A/S 400 DB2 for OS/400 Query Manager and SQL Novell NetWare Support ADSM for AS/400 (10 Clients with 25G Maximum) LAN Server for AS/400 (Includes One LAN Requester)

9402 Model 400

Model 400 Package	Entry 40E	Entry 41E	Growth 40G	Growth 41G	Large 40L	Large 41L	Entry 42E	Growth 42G	Large 42L
Relative System Perf (CPW) [1] V3R6	12.3	18.3-30.6	12.3	18.3-30.6	12.3	18.3-30.6	12.3-30.6	12.3-30.6	12.3-30.6
Relative System Perf (CPW) [1] V3R7	13.8	20.6-33.3	13.8	20.6-33.3	13.8	20.6-33.3	13.8-35.0	13.8-33.3	13.8-33.3
Relative System Perf (CPW) [1] V4	13.8	20.6-35.0	13.8	20.6-35.0	13.8	20.6-35.0	13.8-35.0	13.8-35.0	13.8-35.0
Main Storage (MB)	64-180	64-224	96-160	96-224	160	160-224	64-224	96-224	160-224
Disk Storage (GB) (Maximum) V3R6 (Maximum) V3R7	 23.6 50.3	 23.6 50.3	 23.6 50.3	 23.6 50.3	 23.6 50.3	 23.6 50.3	 23.6 50.3	 23.6 50.3	 23.6 50.3
Maximum Number of Workstations Twinax ASCII LocalTalk	 280 108 186	 280 108 186	 280 108 186	 280 108 186	 280 108 186	 280 90 155	 280 108 186	 280 108 186	 280 90 155
Maximum Communication Lines	20	20	20	20	20	20	20	20	20
Maximum Line Adapters	2^5	2^5	2^5	2^5	2^5	2^5	2^5	2^5	2^5
Maximum ATM Ports	1	1	1	1	1	1	1	1	1
Available Card Slots	6	6	6	6	6	6	6	6	6
System I/O Buses	1	1	1	1	1	1	1	1	1
Processor Group	P05	P10	P05	P10	P05	P10	Processor #2130 (P05) Processor #2131/#2132 #2133 (P10)		
Software Included	O/S 400 Client Access for AS/400 Query for AS/400 DB2 Query Manager and SQL Development Kit for AS/400						Hardware Only		

9402 Model 436

Model 436 Package	Entry #0114	Growth #0115	Large #0116
Relative System Performance (CPW) [1] V3R6	14.4-24.5	14.4-24.5	14.4-24.5
Relative System Performance (CPW) [1] V3R7/V4	16.3-27.4	16.3-27.4	16.3-27.4
Relative System Performance (RAMP-C) [2] O/S 400	4.8-8.7	4.8-8.7	4.8-8.7
Relative System Performance (RAMP-C) [2] SSP	1.0-2.4	1.0-2.4	1.0-2.4
Main Storage (MB) [3]	32-256	32-256	32-256
Disk Storage (GB) [3] (Maximum) V3R6 (Maximum) V3R7 and later	 23.6 50.3	 23.6 50.3	 23.6 50.3
Maximum Number Workstations [3] Twinax Devices ASCII LocalTalk Devices	 280 108 0	 280 108 0	 280 108 0
Maximum Communication Lines [3]	20	20	20
Maximum LAN Adapters [3]	2^5	2^5	2^5
Maximum ATM Adapters [3]	1	1	1
Available Card Slots (for I/O Adapters)	6	6	6
System I/O Buses	1	1	1
Processor Group	Processor #2102 (P05) Processor #2104/#2106 (P10)		

9402 Model 40S

Model 40S Hardware/Software Packages	Small Server 4SS	Entry Server 4SE	Growth Server 4SG	Growth Server 4TG	Large Server 4SL	Large Server 4TL
Relative System Perf (CPW) [1] V3R6						
Client/Server Environment	24.5-52.9	24.5-52.9	24.5-52.9	77.3	24.5-52.9	77.3
Interactive Environment	8.4-18.3	8.4-18.3	8.4-18.3	26.9	8.4-18.3	26.9
Relative System Perf (CPW) [1] V3R7						
Client/Server Environment	27.0-59.8	27.0-59.8	27.0-59.8	87.3	27.0-59.8	87.3
Interactive Environment	9.4-20.6	9.4-20.6	9.4-20.6	30.7	9.4-20.6	30.7
Relative System Perf (CPW) [1] V4						
Client/Server Environment	27.0-63.0	27.0-63.0	27.0-63.0	91.0	27.0-63.0	91.0
Interactive Environment	9.4-21.6	9.4-21.6	9.4-21.6	32.2	9.4-21.6	32.2
Main Storage (MB)	32-224/ 64-512	32-224/ 64-512	64-224/ 64-512	128-512	96-224/1 28-512	128-512
Disk Storage (GB)						
(Maximum) V3R6	23.6	23.6	23.6	23.6	23.6	23.6
(Maximum) V3R7	50.3	50.3	50.3	50.3	50.3	50.3
Maximum Number of Workstations						
Twinax Devices	7	7	7	7	7	7
ASCII	6	6	6	6	6	6
LocalTalk Devices	31	31	31	31	31	31
Maximum Communication Lines	23	20	20	20	20	20
Maximum LAN Adapters	2^5	2^5	2^5	2^5	2^5	2^5
Maximum ATM Adapters	1	1	1	1	1	1
Available Card Slots (for I/O Adapters)	6	6	6	6	6	6
System I/O Buses	1	1	1	1	1	1
Processor Charge Group	P05	P05	P05	P10	P05	P10
Software	OS/400 Client Access for AS/400 Query for AS/400 DB2 Query and SQL Development Kit for AS/400					

9402 Model 40S

Model 40S Hardware Packages	Small Server 4HS	Entry Server 4HE	Growth Server 4HG	Large Server 4HL
Relative System Performance (CPW) [1] V3R6 Client/Server Environment Interactive Environment	 24.5-77.3 8.4-26.9	 24.5-77.3 8.4-26.9	 24.5-77.3 8.4-26.9	 24.5-77.3 8.4-26.9
Relative System Performance (CPW) [1] V3R7 Client/Server Environment Interactive Environment	 27.0-87.3 9.4-30.7	 27.0-87.3 9.4-30.7	 27.0-87.3 9.4-30.7	 27.0-87.3 9.4-30.7
Relative System Performance (CPW) [1] V4 Client/Server Environment Interactive Environment	 27.0-91.0 9.4-32.2	 27.0-91.0 9.4-32.2	 27.0-91.0 9.4-32.2	 27.0-91.0 9.4-32.2
Main Storage (MB)	32-224/ 64-512	32-224/ 64-512	64-224/ 128-512	96-224/ 128-512
Disk Storage (GB) Maximum V3R6 Maximum V3R7	 23.6 50.3	 23.6 50.3	 23.6 50.3	 23.6 50.3
Maximum Number of Workstations Twinax Devices ASCII LocalTalk Devices	 7 6 31	 7 6 31	 7 6 31	 7 6 31
Maximum Communication Lines	20	20	20	20
Maximum LAN Adapters	2^5	2^5	2^5	2^5
Maximum ATM Adapters	1	1	1	1
Available Card Slots (for I/O Adapters)	6	6	6	6
System I/O Buses	1	1	1	1
Processor Group	Processor #2109/#2110/#2111 (P05) Processor #2112 (P10)			

Table Notes for All Summary Tables

1. CPW is the Commercial Processing Workload that is used to measure the performance of all iSeries and AS/400e processors. The CPW value is measured on maximum configurations. The type and number of disk devices, the number of workstation controllers, the amount of memory, the system model, other factors, and the application being run determine what performance is achievable. With the introduction of Dedicated Servers for Domino, Simple Mail Users has been added as a performance measurement. For more details, see “Commercial Processing Workload” on page 41.

2. 9404 Model B10 with 16M Main Storage and 945M of Disk assigned value of 1.0. All data for 70% system utilization and maximum configurations. IBM RAMP-C workload. Customer results may vary.
3. There are particular limitations within SSP which means that quoted minimums and maximums are often with OS/400 installed.
4. RSP CPW 5.5/17.1 refers to interactive and client/server environments respectively on the 9401 Server 10S. RSP RAMP-C of 1.9/5.9 also refers to these two environments in the same order.
5. Three LANs are allowed when running IBM Firewall for AS/400 (5769-FW1).
6. One tape is required.
7. Does not include Operations Console.
8. These cards may have one or two LAN ports. The #6617 SPD Integrated PC Server can have up to three ports.
9. V4R2 or later is a prerequisite for Optical Library support.
10. Either #9329 (PCI cards) or #9331 (SPD cards) must be chosen on a #5064/#9364. Therefore, columns two and three below this point are mutually exclusive.
11. The lower figure is for #2175, #2179, and #2180 processors. The higher number is for the #2181 and #2182 processors.
12. External DASD can be attached through an SPD disk controller in this unit.
13. Maximums are:

    12 of #6500
    20 of #6501
     9 of #6502, #6512, #6530, #6532, #6533

    These maximums may be limited when used in combination with other disk controllers.
14. With V4R1, a maximum of two workstation controllers is supported.
15. The combined maximum of local and remote displays attached to ASCII and Twinax is seven with V4R1 and 28 with V4R2 and V4R3.
16. The lower number is for the #2161 processor. The higher number is for #2163, #2165, and #2166 processors.
17. If there is no workstation controller specified, the console must be specified by #9721.
18. One line is used for Operations Console. The maximum is nine if there is a Twinaxial System Console.
19. For systems shipped between October 1997 and February 1998, maximum storage is 2048M.

21. The maximum reflects the usage of two slot wide IPCS. If using a three slot wide IPCS, Integrated Netfinity Server, or Integrated xSeries Server, the maximum is two.
22. The maximum reflects the usage of two slot wide IPCS. If using a three slot wide IPCS, Integrated Netfinity Server, or Integrated xSeries Server, the maximum is four.
23. Requires V4R2 or later.
24. On the 9401 Model 150, the processor is the same on both the Twinaxial and Server Models, therefore, the performance figures are the same.
25. The performance figures shown are for a “constrained” workload due to memory and disk limitations on the 9401 Model 150. If these limitations are lifted, the “unconstrained” CPW measurements in the following table apply.

Processor	Interactive	Client/Server
#0591 and #0593	13.8	27.0
#0592 and #0592	20.6	35.0

26. The system also includes CD-ROM for IBM software.
27. The 9401 Model 150 includes BasePak software in the hardware cost. This includes OS/400, Client Access Family for Windows, Query, SQL, Facsimile Support, and PSF/400. Additional programs have to be purchased.
28. Two of these PCI I/O card slots are reserved for the Integrated Netfinity Server. Three are driven by the Multi-Function I/O Processor.
29. Six lines in total, but one is reserved for Operations Console.
30. A maximum of one LAN can be driven off the Multi-Function I/O Processor. If Integrated Netfinity Server is installed, no LANs are supported on the MFIOP.

† This processor was announced in September 1996 when IBM introduced CPW as the new method of measuring the performance of AS/400e processors. For this and future processor announcements, CPW values only will be quoted.

General note: Capacities shown may require prerequisites. Some combinations of features may not be valid.

Referenced Lists

Referenced Lists

Referenced Lists

This appendix accomodates lists and details considered pertinent to you, as referred to within the context of this publication. The details are presented in this appendix to improve the readability of the base information.

Communication References

These networks, communication facilities, and protocols are supported on the iSeries.

Supported Communication Networks

Network types supported on the iSeries are:

- 1 Gigabit/second Ethernet
- 100/10 Mbps Fast Ethernet
- IBM Token Ring 100/16/4 Mbps Network
- ATM 155 Mbps LAN
- X.21
- X.25
- ISDN Data Link Control (IDLC)
- T1/E1/J1 and Fractional T1 Networks (high bandwidth)
- Asynchronous
- Binary Synchronous
- Synchronous Data Link Control (SDLC)
- Ethernet Version 2 or IEEE 802.3
- IBM Token-Ring 16 Mbps Network (IEEE 802.5 and 802.2)
- FDDI/SDDI LANs (100 Mbps medium)

Supported Communication Facilities

OS/400 offers the following facilities

- Simple Network Management Protocol (SNMP) in TCP/IP Networks
- Alerts support to NetView, iSeries, System/36, and System/38
- IBM Token-Ring Network Management Support
- Distributed Host Command Facility (DHCF)
- Link Problem Determination Aid (LPDA)
- Distributed System Node Executive (DSNX)

Supported Communication Protocols

Protocols supported by the iSeries are:

- TCP/IP Support
- X.21 Short Hold Mode (SHM) and Multiple Port Sharing (MPS)
- Remote Workstation Support
- 3x74 Remote Attach
- 5x94 Remote Attach
- Intersystem Communications Function
- Advanced Peer-to-Peer Networking (APPN)
- Dependent Logical Unit Requester (DLUR)
- Advanced Program-to-Program Communication (APPC)
- SNA Upline Facility to System/370 IMS and CICS Hosts
- Binary Synchronous Communications Equivalence Link (BSCEL)
- ICF Retail Communications Support
- ICF Finance Communications Support
- Non-ICF Finance Communications Support
- SNA Distribution Services (SNADS)
- SNA Primary Logical Unit 2 Support
- SNA/Management Services Transport
- Distributed Relational Database Support
- Object Distribution Facility (ODF)
- Display Station Pass-through
- Distributed Data Management (DDM)
- SNA Pass-through
- IBM Network Routing Facility (NRF) Support/400
- Autodial Support
- 3270 Device Emulation
- 3270 SNA API Support for IBM 3278 Model 3, 4, and 5
- ISDN Support
- 5394/5494 SNA Backbone Support
- File Transfer Support
- Interactive Terminal Facility (ITF)
- SAA Common Programming Interface for Communications (CPI-C)
- IPX/SPX Communications
- ATM LAN Emulation

NetVista Features and Requirements

NetVista N2200 Features and Requirements

These components are required to use NetVista N2200:

- OS/400 (V4R2, V4R3, or V4R4), Windows NT 4.0 TSE, or AIX (4.3 or 4.2.1) boot server
- Network Station Manager V2R1

NetVista N2200 is a low priced, full-featured thin client that provides:

- 233 MHz National Geode Enhanced Processor
- Keyboard and mouse
- Complete package when combined with Network Station Manager for V2R1 software
  - Management tools
  - Terminal emulators
  - Browser
  - Java Virtual Machine

The required features include:

- 16-bit audio and jacks for headphones or speakers and microphone
- 10/100 Mbps Ethernet or 4/16 Mbps token-ring network attachment
- Memory expansion up to 288 MB
- Two Universal Serial Bus (USB) ports
  - One dedicated to a keyboard and mouse combination
  - One available to support a standard parallel or serial device with a third-party cable converter
- Optional Compact Flash memory (24 MB up to 64 MB)
- VGA, SVGA, and XGA video support at up to 1024 x 768 with 16-bit color
- Low power usage
- Three-year warranty

NetVista N2800 Features and Requirements

These components are required to use NetVista N2800:

- OS/400 (V4R2, V4R3, or V4R4), Windows NT 4.0 TSE, or AIX (4.3 or 4.2.1) boot server
- Network Station Manager V2R1

The NetVista N2800 Thin Client comes with system unit, keyboard, mouse, and installation publications. The unit and peripherals are stealth black. You can order either a 4 MB/16 MB Token-Ring model or a 10/100 Ethernet model. The system integrates:

- 266 MHz Intel Pentium MMX Processor
- 512 KB Integrated Cache

- System support for up to 256 MB memory
- Advanced video graphics
  - Accelerated drawing support
  - 4 MB of video memory for high resolution and greater than 256 colors
  - Video resolution up to 1600 x 1200 at 85 Hz refresh rate are supported. Applications that require high resolution should be verified with your IBM or Business Partner technical marketing representative.
- 16-bit business-level audio
  - Built-in speaker with good quality monophonic audio
  - Stereo headphone or speaker connect
  - Mono microphone connector
- Other Standard System I/O
  - One parallel port
  - Two serial ports
- System functional expansion (located inside the system)
  - Two slots for additional Half-High PCI Adapters
  - One slot with a connector supporting an optional removable Compact Flash card (operates like an Advanced Technology Attach (ATA) hard file)
- Three-year warranty
- Software
  - Navigator 4.5 with:
    - Two-way e-mail
    - News Reader
    - .AU and .WAV audio
    - Live Connect
  - PDF viewer and Real Audio/Video
  - Enhanced ICA support
  - Boot from flash, remote flash boot storage management
- Enhanced GUI desktop

Removable Media Devices

The following table compares tape subsystems that can attach to the iSeries or AS/400e server. It indicates whether the attachment IOP supports Hardware Data Compression (HDC) and whether the tape subsystem controller supports a compaction algorithm, either Improved Data Recording Capability (IDRC) or Lempel Ziv 1 (LZ1). These algorithms enable more data to be written to tape up to the maximum shown.

Storage Subsystem	IOP	OS/400 Version (min)	HDC	IDRC	LZ1	Max. Capacity (Compressed)	Data Transfer Rate (Native)
¼-inch Cartridge Tape							
*2.5 GB	#2726/#2740/#2741/#9728 MFIOP/#2624/#6513	3.0.5	x		x	4.5 GB	300 KB/Sec
*4 GB	MFIOP/#2726/ #2740/#2741/#9728	4.1			x	8 GB	380 KB/Sec
*4 GB external	#2718/#2768	4.2			x	8 GB	320 KB/Sec
*13 GB	#2726/#2740/#2741/#9728 MFIOP/#6513	3.7			x	32 GB	1.5 MB/Sec
*16 GB	#2726/#2740/#2741/#9728 MFIOP/#6513	4.1			x	32 GB	1.5 MB/Sec
*25 GB	#2726/#2740/#2741/#9728 MFIOP/#6513	4.1			x	50 GB	2.0 MB/Sec
CD-ROM							
#6325 / #6425	MFIOP/#2624	4.4				650 MB	-
7210-020	#2718/#2768	4.5					
½-inch Reel							
9348*	#6534/#2729/#2749	1.2	x			200 MB	781 KB/Sec
8mm Cartridge							
7208-012	#6534/#2729/#2749	2.2	x	x		10 GB	500 KB/Sec
7208-222	#6534/#2729/#2749	3.1	x	x		14 GB	500 KB/Sec
7208-232	#6534/#2729/#2749	2.2	x	x		20 GB	500 KB/Sec
7208-234	#6534/#2729/#2749	2.2	x	x		28 GB	500 KB/Sec
*7208-342	#6534/##2729/#2749	4.1		x		40 GB	3 MB/Sec
#6390/#1261	MFIOP/#2624/#6513	3.0.5	x	x		14 GB	500 KB/Sec
#6490	#2726/#2740/#2741/ #9728/#6513	4.1		x		14 GB	500 KB/Sec
½-inch Cartridge							
*3490E-C11	#6501/#6534	2.1.1	x	x		14.4 GB	3 MB/Sec
	#2729/#2749		x	x			
*3490E-C22	#6501/#6534	2.1.1	x	x		28.8 GB	3 MB/Sec
	#2729/#2749		x	x			
3490E-E01/E11	#6501/#6534/#2729/#2749	2.3	x			16.8 GB	3 MB/Sec
*3490E-F00	#6501/#6534/#2729/#2749	3.1	x	x		2.4 GB	3 MB/Sec
*3490E-F01/F11	#6501/#6534/#2729/#2749	3.1				24 GB	3 MB/Sec
*3590-B11[1]	#6501/#6534/#2729/#2749	3.1	x	x	x	300 GB	9 MB/Sec
*3590-B11[2]	#6501/#6534/#2729#2749	3.2		x	x	300 GB	9 MB/Sec
*3590-E11	#6501/#6534/#2729/#2749	4.1		x	x	600 GB	14 MB/Sec
MagstarMP Cassette							
*3570-B00/C00	#6501/#6534/#2729#2749	3.1			x	15 GB	2.2 MB/Sec 7 MB/Sec

Storage Subsystem	IOP	OS/400 Version (min)	HDC	IDRC	LZ1	Max. Capacity (Compressed)	Data Transfer Rate (Native)
Libraries							
*9427	#6534/#2729/#2749	3.1	x	x		280 GB	500 KB/Sec
*3494	#6534/#2729/#2749	2.3		x	x	374 TB[3]	14 MB/Sec
*3570-Bxx	#6534/#2729/#2749	3.1			x	300 GB[3]	2.2 MB/Sec
*3570-Cxx	#6534/#2729/#2749	3.1			x	300 GB[3]	7 MB/Sec
*3575	#6534/#2729/#2749	3.1			x	4.8 TB[3]	2.2 MB/Sec
*3584	#2749	4.5				496.2 TB[3]	15 MB/Sec

Notes:
***** Tape models available. The others have been withdrawn from Marketing.

1. Models shipped prior to 29 January 1999 and without feature #5790.
2. Models shipped after 29 January 1999 or with feature #5790.
3. Capacity and transfer rates vary depending on the tape drives used.
4. Capacity and transfer rates vary depending on the tape drives used.
5. Features #2729 and #6534 require OS/400 V4R1 or later. Feature #2749 requires OS/400 V4R5 or later.

Common Magnetic Media Controllers

The iSeries and AS/400e servers have common magnetic media controllers for disk, tape units, optical libraries, and diskettes. This table indicates what can be attached to each model.

Feature Function	270	820[1]	830[1]	840[1]	SB2[1] SB3[1]	Migration Towers
#2624 Storage Device Controller SPD[2]		x	x	x	x	x
#6501 Tape/Disk Device Control SPD	x	x	x	x	x	x
#6513 Internal Tape Device Control SPD		x	x	x		x
#6533 RAID Disk Unit Control Ultra (4M) Compression SPD		x	x	x		x
#6534 Magnetic Media Control SPD	x	x	x	x	x	x
#2718 PCI Magnetic Media Controller		x	x	x		x
#2726 RAID Disk Unit Control Ultra (4M) PCI[3]		x	x			x
#2729 Magnetic Media Control PCI		x	x	x		x
#2740 RAID Disk Unit Control Ultra (4M) PCI		x	x			x
#2741 RAID Disk Unit Control Ultra (4M) Compression PCI[3]		x	x			x
#2748 PCI RAID Disk Unit Controller		x	x	x		x
#2749 PCI Ultra Magnetic Media Controller	x	x	x	x	x	
#2763 PCI RAID Disk Unit (10M) Controller	x	x	x	x	x	
#2768 PCI Magnetic Media Controller	x	x	x	x	x	
#4748 PCI RAID Disk Unit (26M) Controller	x	x	x	x	x	
#9728 Base Disk Unit Control Ultra PCI[3]		x	x			x
#9748 Base PCI Disk Unit (26M) Controller			x	x	x	
#9767 Base PCI Disk Unit Controller	x	x				
#6146 (on #2624) 9331-01X Diskette Controller SPD[3]		x	x	x		x

Notes:

1. SPD cards in 8xx and SBx models are only supported in migration towers and towers attached to these migration towers via the SPD Bus.
2. #2624 can support internal tape and diskette devices only.
3. No longer available, but is supported during migrations to these systems.
4. Supported in the #5065 Storage/PCI Expansion Tower only.

None of the above magnetic media controllers are supported on the 9401 models.

IOP workload and bus data traffic may need to be considered for tape, DASD, and LAN subsystems.

Database References

Among the many database standard functions that are supported, these features are included:

- National Language Capability
- Structured Query Language (SQL) standards conformance
- IBM SQL Version 1
- ANSI X3.135.1992
- ISO 9075-1992
- FIPS 127-2 standards
- Embedded static, dynamic, and extended dynamic SQL
- ANSI and ISO-defined SQL procedures
- Large object support up to 15 MB of data
- DATALINK data type
- User-defined types
- User-defined functions
- Declarative referential integrity
- User-accessible logs
- Column-level security
- Data striping across disks
- Stored procedures
- Triggers
- Outer Join
- Alter Table function
- X/Open Call Level Interface to SQL

  The X/Open standard CLI is supported on several other database platforms, which makes SQL application portability to and from the DB2 UDB for iSeries platform even easier.

- SQL Repeatable Read
- Access to data areas and data queues
- Two-phase commit transaction management
- Data replication
- System-wide database catalog
- Multiple-level concurrency control
- National Language Support (NLS)
- High Performance Database Server (Centralized and Distributed Server)

DB2 UDB for iSeries Functions

These DB2 UDB for iSeries functions are available to enhance application performance:

- Advanced SQL optimizer
- SQL Encoded Vector Indexes (EVIs)
- Explain function

- Block INSERT and FETCH
- Automatic record blocking
- Parallel data access
- Query Governor
- Ease of Use and Management
- Online backup and restore
- Object level recovery
- Roll forward and backward recovery
- Audit trail
- Performance tuning and trace

WebSphere Commerce Suite Pro Edition for AS/400 Prerequisites

The prerequisites for select WebSphere and related products are:

- OS/400, V4R5 or V4R4 5769-SS1

  If the system's primary language is not Category 1, apply these PTFs:

  – SF64213 for OS/400 V4R5
  – SF64212 for OS/400 V4R4
  – SF64266 to 5798-WC4

- DB2 UDB for iSeries, Version 4.4
- HTTP Server for AS/400, V4R4 5769-DG1
- Crypto Access Provider for AS/400, V4R4 5769-AC2 (56-bit) or 5769-AC3 (128-bit)
- Crypto Service Provider for AS/400 (56 bit or 128 bit)

The HTTP server includes:

- Net.Data for AS/400, V4R4
- Digital Certificate Manager
- Qshell Interpreter
- MQSeries for AS/400
- AS/400 Development Kit for Java, V4R4 (5769-JV1) including Java Developer Kit 1.1.7
- AS/400 Toolbox for Java (5769-JC1)
- TCP/IP Connectivity Utilities for AS/400 (5769-TC1)
- Lotus Domino for iSeries (5769-LNT)
- V4.6.2 to use Domino e-mail and discussion database from WebSphere Commerce Suite

WebSphere Commerce Suite Administrator requires the use of a standard Internet browser, such as Netscape Communicator V4.7, that supports Java, JavaScript, cookies, and frames.

Other recommendations include:

- AS/400 Client Access Family (5769-XW1 and 5769-XD1)
- Payment Manager for AS/400 (5733-PY2) V2.1 (included)
- WebSphere Application Server, 56-bit (5733-WA2), or 128-bit (5733-WA3), V3.0.2 (included)
- WebSphere Commerce Studio requires Microsoft Windows NT Server, Version 4.0 or Windows 2000 Server, with Service Pack 4 and Netscape Communicator 4.61
- WebSphere Catalog Architect requires Microsoft Windows NT Server with Service Pack 5 or Windows 2000 Server
- Programming skills are necessary for customizing work.

WebSphere Payment Manager V2.1

The prerequisites for select WebSphere and related products are identified here.

WebSphere Payment Manager V2.1 requires these software components on the iSeries server:

- OS/400 V4R5 for iSeries (V4R5 5769-SS1) including:
  - Option 30, Qshell Interpreter
  - Option 34, Digital Certificate Manager
- WebSphere Application Server for AS/400 Version 3.0.2 (for V2.1 of 5733-PY2)
  - Standard Edition (5733-AS2 for 56-bit encryption, 5733-AS3 for 128-bit encryption)
  - Advanced Edition (5733-WA2 for 56-bit encryption, 5733-WA3 for 128-bit encryption)
- IBM Cryptographic Access Provider
  - IBM Cryptographic Access Provider 40-bit for AS/400, V4R4 (5769-AC1) *
  - IBM Cryptographic Access Provider 56-bit for AS/400, V4R4 (5769-AC2)
  - IBM Cryptographic Access Provider 128-bit for AS/400, V4R4 (5769-AC3)

  * 5722-AC1 is supported with OS/400 V4R5. 5722-AC3 provides equivalent function at OS/400 V5R1 and V4R5
- AS/400 Application Developer Kit for Java, V4R4 (5769-JV1)
- IBM HTTP Server for AS/400, V4R4 (5769-DG1)

WebSphere Payment Manager V2.2

The prerequisites for select WebSphere and related products are identified here.

WebSphere Payment Manager V2.2 requires these software components on the iSeries server:

- OS/400 V4R5 (5769-SS1) including:
  - Option 30, Qshell Interpreter
  - Option 34, Digital Certificate Manager
- WebSphere Application Server for AS/400, Version 3.5
  - Standard Edition (5733-AS2 for 56-bit encryption, 5733-AS3 for 128-bit encryption)
  - Advanced Edition (5733-WA2 for 56-bit encryption, 5733-WA3 for 128-bit encryption)
- IBM Cryptographic Access Provider
  - IBM Cryptographic Access Provider 40-bit for AS/400, V4R5 (5769-AC1) *
  - IBM Cryptographic Access Provider 56-bit for AS/400, V4R5 (5769-AC2)
  - IBM Cryptographic Access Provider 128-bit for AS/400, V4R5 (5769-AC3)

  * 5722-AC1 is supported with OS/400 V4R5. 5722-AC3 provides equivalent function at OS/400 V5R1 and V4R5
- AS/400 Application Developer Kit for Java, V4R4 (5769-JV1)
- IBM HTTP Server for AS/400, V4R4 (5769-DG1)

IBM Connect for iSeries Prerequisites

The prerequisites for select WebSphere and related products are identified here.

IBM Connect for iSeries requires these software components and configuration on the iSeries server:

- OS/400 V5R1 (5722-SS1)
- Digital Certificate Manager (5722-SS1 Option 34)
- HTTP Server (5722-DG1) or Lotus Domino Server (5769-LNT)
- TCP/IP utilities for iSeries (5722-TC1)
- Developer Kit for Java 1.1.8 and 1.2 (5722-JV1)
- Toolbox for Java (5722-JC1)
- Cryptographic Access Provider for iSeries (5722-AC3)
- Web Application Server
- WebSphere Application Server Standard Edition Version 3.5 (5733-AS3) or WebSphere Application Server Advanced Edition Version 3.5 (5733-WA3)
- Lotus Domino Server (5769-LNT)
- Minimum recommended processor: 9406-270 #2250 or 9406-820 #2395 with 512 MB of memory

IBM WebSphere Personalization for AS/400 Prerequisites

The prerequisites for select WebSphere and related products are identified here.

Recommended minimum processor CPW value of 420. Use the iSeries Workload Estimator for help with sizing all system configurations. The IBM Workload Estimator for iSeries is located on the Web at: http://as400service.ibm.com/servlet/EstimatorServlet

- 1 GB of memory (minimum)
- *BASE (client application development software only) 500 MB during install and 250 MB after installation
- Option 1 (includes *BASE and WebSphere Application Server environment) 600 MB during install and 450 MB after installation
- Communications adapter that supports TCP/IP
- WebSphere Application Server V3.5, Advanced Edition for AS/400
- Latest Database Group PTF
- Java Development Kit 1.2.2 provided via the AS/400 Developer Kit for Java (5769-JV1)
- JOS/400 Host Servers (5769-SS1 Option 12) for remote installation from the CD-ROM of another workstation
- OS/400 Qshell Interpreter (5769-SS1 Option 30) for local installation from the CD-ROM
- AS/400 TCP/IP Connectivity Utilities/400 (5769-TC1) for remote installation from the CD-ROM of another workstation
- DB2 Universal Database (UDB) for AS/400

For WebSphere Personalization V3.5 for AS/400 Recommendation Engine, you need one of these systems:

- A dual Pentium PC running Windows NT Server V4.0 with 1 GB of disk space, 1 GB memory, a CD-ROM drive, and support for a communications adapter.
- A dual Pentium PC running Windows 2000 Advanced Server with 1 GB of disk space, 1 GB memory, a CD-ROM drive, and support for a communications adapter.
- A workstation running Sun Solaris V2.6 or V2.7 at the latest available maintenance level with 1 GB of disk space, 1 GB memory, CD-ROM drive and support for a communications adapter.

For WebSphere Personalization V3.5 for AS/400 Recommendation Engine, you need one of these systems:

- Windows NT or Windows 2000
  - A Relational Database Management System (RDBMS):
  - DB2 V6.1
  - Microsoft SQL Server V7.0

  - Oracle 8 or 8I
  - Any Open Database Connectivity (ODBC)-compliant RDBMS
- Sun Solaris
  - An RDBMS
  - DB2
  - Oracle 8 or 8I
  - Any ODBC-compliant RDBMS
- Any CGI- or JSP-compliant Web server

Secure Sockets Layer Prerequisites

The prerequisites for select WebSphere and related products are:

- AS/400 Developer Kit for Java (5769-JV1), Version 1.2 (Option 3)
- IBM HTTP Server for AS/400
- IBM DB2 Universal Database (UDB) for AS/400
- DB2 Query Manager and SQL Development Kit for AS/400 (5769-ST1) (optional)
- 500 megabytes of disk on the server (250 after installation)
- The recommended minimum Processor CPW value for workloads performing simple Java servlets and JavaServer Pages is 222. The recommended minimum Processor CPW value for WebSphere workloads is approximately 460.
- Communications adapter that supports TCP/IP
- Workstation requirements:
  - Any of these systems:
    - Any Intel-based personal computer capable of running Windows NT V4.0 SP 6A or higher or Windows 2000
    - Any workstation that is capable of running Solaris V7 (at the latest available maintenance level)
    - Any RS/6000 or RS/6000SP that is capable of running AIX V4.3.3 at 4330-02 maintenance level or later
  - Support for a communications adaptor or an appropriate network interface that runs TCP/IP
  - 40 MB of free disk space (minimum)
  - 96 MB of memory (minimum)
  - CD-ROM drive
- AS/400 Developer Kit for Java (5769-JV1), Version 1.2 (Option 3)

Options included in OS/400 V5R1

- Option 1 OS/400 - Extended Base Support
- Option 2 OS/400 - Online Information
- Option 3 OS/400 - Extended Base Directory Support
- Option 4 OS/400 - System/36 and System/38 Migration
- Option 5 OS/400 - System/36 Environment
- Option 6 OS/400 - System/38 Environment
- Option 7 OS/400 - Example Tools Library
- Option 8 OS/400 - AFP Compatibility Fonts
- Option 9 OS/400 - PRV CL Complier Support
- Option 11 OS/400 - System/36 Migration Assistant
- Option 12 OS/400 - Host Servers
- Option 13 OS/400 - System Openness Includes
- Option 14 OS/400 - GDDM
- Option 16 OS/400 - Ultimedia System Facilities
- Option 18 OS/400 - Media and Storage Extensions
- Option 21 OS/400 - Extended NLS Support
- Option 22 OS/400 - ObjectConnect
- Option 23 OS/400 - OptiConnect
- Option 25 OS/400 - NetWare Enhanced Integration
- Option 26 OS/400 - DB2 Symmetric Multiprocessing
- Option 27 OS/400 - DB2 Multisystem
- Option 30 OS/400 - Qshell Interpreter
- Option 31 OS/400 - Domain Name System
- Option 32 OS/400 - Directory Services
- Option 33 OS/400 - Portable Application Solutions Environment
- Option 34 OS/400 - Digital Certificate Manager
- Option 35 OS/400 - CCA Crypto Service Provider
- Option 36 OS/400 - PSF/400 1-45 IPM Printer Support
- Option 37 OS/400 - PSF/400 1-100 IPM Printer Support
- Option 38 OS/400 - PSF/400 Any Speed Printer Support
- Option 39 OS/400 - International Components for Unicode
- Option 41 OS/400 - HA Switchable Resources

Keyed Stamp Media Distribution

The products shipped on the Keyed Stamped Media for V5R1 are:

- **5722-SS1** OS/400
  - Option 18 Media and Storage Extensions
  - Option 36 Print Services Facility 1-45 IPM printer support
  - Option 37 Print Services Facility 1-100 IPM printer support

  - Option 38 Print Services Facility any speed printer support
- **5769-AF1** Advanced Function Printing Utilities for iSeries
- **5769-AP1** Advanced DBCS Printer Support
  - Option 1 IPDS Printer Support
- **5722-BR1** Backup and Recovery Media Services (BRMS) for iSeries
  - Option 1 Network
  - Option 2 Advanced
- **5722-WDS** WebSphere Development Toolset
- **5722-CM1** Communications Utilities for iSeries
- **5722-DP3** DB2 Data Propagator for iSeries Version 7.1
- **5722-JS1** Advanced Job Scheduler for iSeries
- **5722-PT1** Performance Tools for iSeries
  - Option 1 Manager
  - Option 2 Agent
- **5722-QU1** Query for iSeries
- **5722-ST1** DB2 Query Manager and SQL Development Kit
- **5722-RD1** Content Manager OnDemand for iSeries
  - Option 1 Spooled File Archive
  - Option 2 Object Archive
  - Option 3 Record Archive
  - Option 4 Anystore
  - Option 9 Content Manager OnDemand/400 Server trial feature
- **5722-XW1** iSeries Client Access Family

Products and Features no Longer Marketed by IBM

The products and features shown in the following table are not represented in this published edition of the Handbook because they *are now withdrawn* from marketing, or will be in the near future. In some cases, the product to replace the given product is listed with the description.

Product or Feature	Description	Withdrawal Date	Recommended Replacement
#0018	2440-xxx Local Source Rack Mount	06/30/2000	
#0046	Opti-Connected system	12/28/2001	
#0059	Transition Data Link	06/30/2000	
#0059	9401 model 150 Transition Data Link	05/31/2000	
#0029	9347-xx Lcl Src Rack Mount	10/31//2000	
#0034	Red Covers	10/31/2000	
#0086	Optimize 3590 Performance	05/31/1999	
#0088	Opti-Connect Cluster Specify	12/28/2001	
#0095	Local Src Tape w/SPD Controller	12/28/2001	
#0096	Local Src Tape w/PCI Controller	12/28/2001	
#0185	Performance Enhancement Model 150	10/31/2000	
#0200	Replacing the Release	05/31/1999	
#0201	Unload/Reload	05/31/1999	
#0202	Staged Upgrade Offering	05/31/1999	
#0204	Staged Side-by-Side Upgrade	05/31/1999	
#0295	Performance Enhancement/28WS	10/31/2000	
#0336	V.36/EIA449 50-ft Cable	06/30/2000	
#0337	V.36/EIA449 150-ft Cable	06/30/2000	
#0340	V.35 80-ft Cable	06/30/2000	
#0355	V.35 80-ft PCI Cable	06/30/2000	
#0358	V.36 150-ft PCI Cable	06/30/2000	
#0362	20 ft Comm Console Cable	01/31/2001	
#0366	Optical Bus Cable 20m	12/28/2001	
#0399	4 Port Twinaxial Expansion	06/30/2000	
#0399	9401 Model 150 4 port Twinaxial Expansion	05/31/2000	
#0422	Preload JDE	01/31/2001	
#0429	Preload Datatex (TIM)	10/23/2000	

Product or Feature	Description	Withdrawal Date	Recommended Replacement
#0430	Preload SSA	10/23/2000	
#0435	Preload Infinium	10/23/2000	
#0439	Preload Lawson	10/23/2000	
#0440	Preload JBA	10/23/2000	
#0445	Preload Acacia	10/23/2000	
#0449	Preload Vormittag	01/31/2001	
#0451	RRR Preload (Test Server)	05/31/1999	
#0460	Preload Intentia	10/23/2000	
#0465	Preload Lilly	10/23/2000	
#0470	Preload IBS	10/23/2000	
#0475	Preload E3	01/31/2001	
#0480	Preload MAPICS	01/31/2001	
#0485	Preload Manhattan Associates	10/23/2000	
#0490	Preload Baan	10/23/2000	
#0591	Entry Twinaxial Package V4R4 (type 9401)	10/31/2000	
#0592	Growth Twinaxial Package V4R4 (type 9401)	10/31/2000	
#0593	Entry Server Package V4R4 (type 9401)	10/31/2000	
#0594	Growth Server Package V4R4 (type 9401)	10/31/2000	
#0605	Linux Direct Attach - 4748	12/28/2001	
#1312	1-Byte 1.03 GB Disk Unit Kit	10/31/2000	
#1313	1-Byte 1.96 GB Disk Unit Kit	10/31/2000	
#1322	2-Byte 1.03 GB Disk Unit Kit	10/31/2000	
#1323	2-Byte 1.96 GB Disk Unit Kit	10/31/2000	
#1325	2-Byte 1.03 GB Disk Unit Kit	10/31/2000	
#1326	2-Byte 1.96 GB Disk Unit Kit	10/31/2000	
#1327	2-Byte 4.19 GB Disk Unit Kit	10/31/2000	
#1333	2-Byte 8.58 GB Disk Unit Kit	10/31/2000	
#1334	2-Byte 17.54 GB Disk Unit Kit	10/31/2000	

Product or Feature	Description	Withdrawal Date	Recommended Replacement
#1336	2-Byte 1.96 GB Disk Unit Kit	10/31/2000	
#1337	2-Byte 4.19 GB Disk Unit Kit	10/31/2000	
#1349	1.2 GB ¼-Inch Tape Kit	10/31/2000	
#1350	2.5 GB ¼-Inch Tape Kit	10/31/2000	
#1355	13.0 GB ¼-Inch Tape Kit	10/31/2000	
#1360	7.0 GB 8mm Cartridge Tape Kit	10/31/2000	
#2061	Model 720 processor	12/28/2001	
#2065	Model 730 processor	12/28/2001	
#2069	Model 740 processor	12/28/2001	
#2159	9406 170 Processor	02/2000	
#2289	9406 170 Processor	05/31/2001	
#2310	Model SB1 8-Way Processor	07/25/2000	
#2311	Model SB1 128-Way Processor	07/25/2000	
#2312	Model SB1 8-Way Processor	07/25/2000	
#2313	Model SB1 12-Way Processor	07/25/2000	
#2407	9406 170 dedicated Domino Processor	05/31/2001	
#2605	ISDN Basic Rate Adapter	12/31/1999	#2751
#2609	EIA 232/V.24 Two-Line Adapter	03/31/1999	#2745
#2610	X.21 Two-Line Adapter	03/31/1999	#2745
#2612	EIA 232/V.24 One-Line Adapter	03/31/1999	#2745
#2613	V.35 One-Line Adapter	03/31/1999	#2745
#2614	X.21 One-Line Adapter	03/31/1999	#2745
#2617	Ethernet/IEEE 802.3 CMSA/CD Adapter	03/31/1999	#2838
#2618	Fiber Distributed Data Adapter		High speed TRN or Ethernet network
#2619	16/4 Mbps Token-Ring Adapter/HP	03/31/1999	#2744
#2620	Cryptographic Processor	12/31/1999	#4801 / #4802
#2621	Removable Media Device Attach	06/30/2000	

Product or Feature	Description	Withdrawal Date	Recommended Replacement
#2623	Six Line Communications Controller	12/31/1999	
#2624	Storage Device Controller	12/28/2001	
#2626	16/4 Mbps Token-Ring Adapter		#2744
#2628	Limited Cryptographic Processor	12/31/1999	
#2629	LAN/WAN/Workstaton IOP	05/31/2001	
#2644	34xx Magnetic Tape Attachment	03/31/1999	
#2654	EIA 232/V.24 20E		#2745
#2655	EIA 232/V.24 20		#2745
#2656	X.21 Two line 20		#2745
#2657	EIA 232/V.24 50E		#2745
#2658	EIA 232/V.24 50		#2745
$2659	X.21 Two line 50		#2745
#2664	Integrated Fax adapter	12/31/1999	#2761
#2665	Copper Distributed Data Interface		High speed Ethernet or Token-Ring network
#2668	Wireless LAN Adapter	08/31/1998	None
#2669	Shared Bus Interface Card	12/28/2001	
#2673	Optical Bus Adapter	06/30/2000	
#2674	Optical Bus Adapter	06/30/2000	
#2680	Optical Bus Receiver - 266 Mbps	12/28/2001	
#2683	266 Mbps OptiConnect Receiver	12/28/2001	
#2685	1063 Mbbs OptiConnect Receiver	12/28/2001	
#2686	Optical Link Processor	12/28/2001	
#2699	Two-Line WAN IOA	12/28/2001	
#2721	PCI Two-Line WAN IOA	10/31/2000	
#2722	PCI Twinaxial Workstation IOA	07/31/2001	
#2723	PCI Ethernet IOA	12/28/2001	

Product or Feature	Description	Withdrawal Date	Recommended Replacement
#2724	PCI 16/4 Mbps Token Ring IOA	07/31/2001	
#2726	PCI RAID Disk Unit Controller	06/30/2000	
#2740	PCI RAID Disk Unit Controller	05/31/2001	
#2741	PCI RAID Disk Unit Controller	05/31/2001	
#2748	PCI RAID Disk Unit Controller	12/28/2001	
#2790	PCI Integrated Netfinity Server	05/31/2001	
#2809	PCI LAN/WAN/Workstaton IOP	05/31/2001	
#2810	LAN/WAN IOP	05/31/2001	
#2811	PCI 25 Mbps UTP ATM IOA	05/31/1999	
#2812	PCI 45 Mbps Coax T3/DS3 ATM IOA	05/31/1999	
#2815	PCI 155 Mbps UTP ATM IOA	05/31/2001	
#2816	PCI 155 Mbps MMF IOA	12/28/2001	
#2818	PCI 155 Mbps SMF ATM IOA	05/31/2001	
#2819	PCI 34 Mbps Coax E3 ATM IOA	05/31/1999	
#2850	Integrated PC Server 32MB	03/31/1999	
#2851	Integrated PC Server	03/31/1999	
#2852	PCI Integrated PC Server	06/30/2000	
#2854	PCI Integrated PC Server	05/31/1999	
#2857	PCI Integrated PC Server (Model 170 only)	05/31/1999	
#2858	FSIOA 128 MB Memory, Keyboard and Mouse	06/30/2000	
#2860	Integrated PC Server Memory	03/31/1999	
#2861	32 MB IOP Memory	12/28/2001	
#2862	128 MB IOP Memory	12/28/2001	
#2868	PCI Integrated Netfinity Server (type 9401)	10/31/2000	
#2890	PCI Integrated Netfinity Server	05/31/2001	
#3001	32 MB Main Storage	05/31/2001	
#3103	32 MB Main Storage	03/31/1999	
#3104	64 MB Main Storage	03/31/1999	

Product or Feature	Description	Withdrawal Date	Recommended Replacement
#3110	64 MB Main Storage	03/30/2001	
#3117	8 MB Main Storage	03/31/1999	
#3118	16 MB Main Storage	03/31/1999	
#3120	8 MB Main Storage	03/31/1999	
#3121	8 MB Main Storage	03/31/1999	
#3122	32 MB Main Storage	03/31/1999	
#3133	64 MB Main Storage	03/31/1999	
#3134	128 MB Main Storage	03/31/1999	
#3135	256 MB Main Storage	03/31/1999	
#3136	256 MB Main Storage	03/31/1999	
#3138	64 MB Main Storage	03/31/1999	
#3144	8 MB Main Storage	03/31/1999	
#3145	16 MB Main Storage	03/31/1999	
#3146	32 MB Main Storage	03/31/1999	
#3147	32 MB Main Storage	03/31/1999	
#3149	128 MB Main Storage	03/31/1999	
#3172	32 MB Main Storage (2 SIMMS)	03/31/1999	
#3182	32 MB Main Storage	05/31/2001	
#3520	OS/400 V3R2 and its associated 5763-xxx programs	02/25/2000	
#4308	4.19 GB Disk Unit	12/29/2000	
#4314	8.58 GB Disk Unit	10/23/2000	
#4324	17.54 GB Disk Unit	10/23/2000	
#4723	PCI 10 Mbps Ethernet IOA	12/28/2001	
#4748	PCI Disk Unit Controller	12/28/2001	
#4800	PCI Crypto Coprocessor	12/29/2000	
#4815	PCI 155 Mbps UTP ATM IOA	12/28/2001	
#4816	PCI 155 Mbps MMF ATM IOA	12/28/2001	
#4818	PCI 155 Mbps SMF ATM IOA	12/28/2001	

Product or Feature	Description	Withdrawal Date	Recommended Replacement
#5006	Backup Tape - Preload software	05/31/2001	
#5023	OS/400 V4R1	05/31/1999	
#5024	OS/400 V4R2 and its associated 5769-xxx programs	02/25/2000	
#5025	OS/400 V4R3 and its associated 5769-xxx programs	12/29/2000	
#5026	OS/400 V4R4 and its associated 5769-xxx programs	05/31/2001	
#5043	Convert Primary Rack to Secondary Rack	03/31/1999	
#5044	System Unit Expansion Rack	03/31/1999	
#5051	Eight Disk Unit Expansion	06/30/2000	
#5052	Storage Expansion Unit	05/31/2001	
#5055	Storage Expansion Unit	05/31/2001	
#5058	Storage Expansion Unit	05/31/2001	
#5064	System Unit Expansion	12/28/2001	
#5070	266 Mbps System Unit Expansion Tower	06/30/2000	
#5073	1063 Mbps System Unit Expansion Tower	12/28/2001	
#5080	266 Mbps System Unit Expansion Tower	06/30/2000	
#5082	1063 Mbps Storage Expansion Tower	06/30/2000	
#5083	1063 Mbps Storage Expansion Tower	12/28/2001	
#5135	Feature Power Supply	06/30/2000	
#5518	Alt IPL Spec 13 GB Tape	10/31/2000	
#5543	Sys Console on Comm	12/29/2000	
#5601	OptiConnect in Rack	12/28/2001	
#5062	OptiConnect in Tower	12/28/2001	
#5063	OptiConnect in System Unit Tower	12/28/2001	
#6050	Twinaxial Workstation IOP	05/31/2001	#2746
#6140	Twinaxial Workstation IOP		#2746
#6141	ASCII Workstation Controller	03/31/1999	
#6142	ASCII 12-Port Workstation Expansion	03/31/1999	
#6148	Eight-Port Twinaxial Expansion	06/30/2000	

Product or Feature	Description	Withdrawal Date	Recommended Replacement
#6149	16/4 Mbps Token Ring IOA	05/31/2001	
#6151	X.21 One-line adapter		#2745
#6152	EIA 232/V.24 adapter		#2745
#6153	V.35 One-line adapter		#2745
#6173	V.35 One-line adapter 50 foot		#2745
#6180	Twinaxial Workstation IOA	07/31/2001	
#6181	Ethernet IOA	07/31/2001	
#6380	2.5 GB ¼-Inch Cartridge Tape	06/30/2000	
#6381	2.5 GB ¼-Inch Cartridge Tape	12/29/2000	
#6385	13 GB ¼-Inch Cartridge Tape	05/31/2000	
#6481	2.5 GB ¼-Inch Cartridge Tape	12/29/2000	
#6485	13 GB ¼-Inch Cartridge Tape	05/31/2000	
#6501	Tape/Disk Device Controller	07/31/2001	
#6513	Internal Tape Controller Device SPD	10/01/1999	
#6512	Disk Unit Controller for RAID	06/30/2000	
#6522	Disk Unit Controller for RAID	06/30/2000	
#6523	Storage Device Controller	06/30/2000	
#6530	DASD Controller	03/31/1999	
#6532	RAID Disk Unit Controller	06/30/2000	
#6533	RAID Disk Unit Controller	05/31/2001	
#6534	Magnetic Media Controller	05/31/2001	
#6607	4.19 GB Disk Unit	12/29/2000	
#6616	Integrated PC Server	03/31/1999	
#6617	Integrated PC Server	05/31/1999	
#6618	Integrated PC Server	12/28/2001	
#6713	8.58 GB Disk Unit: Withdrawn for new orders only; still valid for feature conversions	10/23/2000	
#6714	17.54 GB Disk Unit	10/23/2000	

Product or Feature	Description	Withdrawal Date	Recommended Replacement
#6807	4.19 GB Disk Unit	12/29/2000	
#6813	8.58 GB Disk Unit	10/23/2000	
#6824	17.54 GB Disk Unit	10/23/2000	
#6907	4.19 GB Disk Unit	12/29/2000	
#7000	Panel Keylock	06/30/2000	
#7101	System Unit Expansion	05/31/2001	
#7108	Expansion Gate	06/30/2000	
#7117	Integrated Expansion Unit	06/30/2000	
#7174	Ethernet IEEE 802.3 Adapter		#2838
#7175	16/4 Mbps Token-Ring Adapter		#2744
#7500	Qty 150 of #4314	10/23/2000	
#7503	Qty 150 of #4324	10/23/2000	
#8180	Opt. Base 512 MB Main Storage	12/28/2001	
#8191	Opt. Base 512 MB Main Storage	12/28/2001	
#8192	Opt. Base 1024 MB Main Storage	12/28/2001	
#8193	Opt. Base 2048 MB Main Storage	12/28/2001	
#8809	EIA 232/V.24 Two line adapter		#2745
#8617	Opt. Base 8.58 Gb 10k RPM Disk Unit	12/28/2001	
#8618	Opt. Base 17.54 Gb 10k RPM Disk Unit	12/28/2001	
#8713	Opt Base 8.58 GB Disk Unit: Withdrawn for new orders only; still valid for feature conversions	10/23/2000	
#8714	Opt Base 17.54 GB Disk Unit: Withdrawn for new orders only; still valid for feature conversions	10/23/2000	
#8813	Opt Base 8.58 GB Disk Unit	10/23/2000	
#8817	Opt. Base 8.58 Gb 10k RPM Disk Unit	12/28/2001	
#8818	Opt. Base 17.54 Gb 10k RPM Disk Unit	12/28/2001	
#8824	Opt Base 17.54 GB Disk Unit	10/23/2000	
#8863	EIA 232/V.24 Two line adapter		#2745
#8866	EIA 232/V.24 Two line adapter (50-foot)		#2745

Product or Feature	Description	Withdrawal Date	Recommended Replacement
#8924	Opt Base 17.54 GB Disk Unit	10/23/2000	
#9174	Ethernet/IEEE 802.3 Adapter		#2838
#9175	16/4 Mbps Token-Ring Adapter		#2744
#9190	Base 256 MB Main Storage	05/31/2001	
#9240	Base 400 W Power Supply	06/30/2000	
#9249	Base 16/4 Mbps Token Ring IOA	05/31/2001	
#9243	400 W Power Supply	06/30/2000	
#9244	Expansion Unit 320 W Power Supply	06/30/2000	
#9245	Base Battery Backup	06/30/2000	
#9280	Base Twinaxial Workstation Controller	12/28/2001	
#9313	Base 8.58 Disk Unit	10/23/2000	
#9329	Base PCI Integrated Expansion Unit	05/31/2001	
#9331	Base Expansion Unit for SPD Cards	12/28/2001	
#9364	Base System Unit Expansion	12/28/2001	
#9381	Base Ethernet IOA	12/28/2001	
#9699	Base Two-Line WAN IOA	12/28/2001	
#9707	Base 4.19 GB Disk Unit	12/29/2000	
#9721	Base PCI Two-Line WAN IOA	10/31/2000	
#9748	Base PCI Disk Unit Controller	12/28/2001	
#9751	Base MFIOP with RAID (Models 640, 650, S30, S40, SB1)	05/31/1999	
#9754	Base MFIOP with RAID	12/28/2001	
#9853	20.0 Meter Optical Bus Cbl	10/31/2000	
#9907	Base 4.19 GB Disk Unit	12/29/2000	
5716-SSP	Advanced 36 Release 7.5 programs	04/28/2000	
5769-FW1	5769-FW1 Firewall: All releases	12/29/2000	
5769-XY1	Client Access Family 5769-XY1: All releases	02/25/2000	
9401 Model 150	System and features	10/31/2000	

Product or Feature	Description	Withdrawal Date	Recommended Replacement
9401 Model 150	V4R1 and V4R2 9401-150 packages	12/31/1999	
9402 Model 236	Model upgrades from Model 236 to Model 436	02/25/2000	
9402 Model 436	Processor upgrades within the Model 436	02/25/2000	
9406 Model 170	V4R2 Processor features on new systems: #2160, #2164, #2176, and #2183	02/25/2000	
9406 Model 170	All models - new model sales only	05/31/2001	
9406 Model 170	All Processor upgrades	12/28/2001	
9406 Model 4xx	Model upgrades from 4xx to 7xx	06/30/2000	
9406 Model 5xx	Model upgrades from 5xx to 7xx	06/30/2000	
9406 Model 6xx	9406 600, 620, 640, and 650	05/31/1999	
9406 Model 6xx	Model upgrades from 6xx to 6xx and processor feature conversions within 6xx	05/31/2000	
9406 Model 6xx/Sxx	Model upgrades from 6xx/Sxx to 7xx/8xx	09/28/2001	
9406 Model 7xx	All models - New model sales only(processor upgrades within each model still supported)	12/28/2001	
9406 Model 7xx	7xx model to 7xx model upgrades	12/28/2001	
9406 Model SB1	System: Replacement product is the 9406 SB2 or 9406 SB3	12/29/2000	
9406 Model Sxx	9406 S10, S20, S30, S40	05/31/1999	
9406 Model Sxx	Model upgrades from Sxx to Sxx and processor feature conversions within Sxx	05/31/2000	
9406 Model Sxx	Model upgrades from Sxx to 7xx/8xx	09/28/2001	
2440			
2480	Wireless LAN Access Point (2480-RS0)	01/13/1999	
2480	Wireless LAN Access Point (2480-E00, -EB0, -TR0, -TB0)	05/24/1999	
2482	PTC	05/24/1999	
2483	Integrated Laser PTC	05/24/1999	
2484	Industrial PTC	05/24/1999	
2486	Integrated Laser PTC	05/24/1999	

Product or Feature	Description	Withdrawal Date	Recommended Replacement
2422	1/2" Reel Tape Drive		
3430	1/2" Reel Tape Drive		
3466 #7419	Token Ring Remote Console Support for all models of the 3466 Network Station Manager. Replaced by 3466 Model C00 and then the 3494 feature #5219 and #5226.	03/02/2001	
3466 #7420	Ethernet Remote Console Support for all models of the 3466 Network Station Manager. Replaced by 3466 Model C00 and then the 3494 features #5220 and #5226.	03/02/2001	
3995 Models A43, 043 143, 042, 142	Optical Library		
4330 - 4IZ	Printer: Replacement product is the 4230 - 4I3	10/31/2000	
5308	ASCII to 5250 Connection	12/21/1999	
5494	Remote Control Unit	12/21/1999	
5500	Express IP Control Unit	12/21/1999	
6299	Midrange Hub	09/01/1999	
7133	IBM 7133 SSA Disk Subsystem Model 010	05/05/1997	
7133	IBM 7133 SSA Disk Subsystem Model 020	06/16/1999	
8361 -100	Network Station series 100 Ethernet	10/14/1999	
8361 - 200	Network Station series 100 Token-Ring	10/14/1999	
8361 - 210	Network Station series 300 Token-Ring	12/31/1999	
8361 - 341	Network Station series 300 Twinax	12/31/1999	
9331- 001 and 002	Diskette Drive		
#8713	Opt Base 8.58 GB Disk Unit (7200 RPM): Withdrawn for new orders only; feature conversions to these features remain valid	01/31/2001	
#8714	Opt Base 17.54 GB Disk Unit (7200 RPM): Withdrawn for new orders only; feature conversions to these features remain valid	01/31/2001	
#8813	Opt Base 8.58 GB Disk Unit (7200 RPM)	01/31/2001	
#8824	Opt Base 17.54 GB Disk Unit (7200 RPM)	01/31/2001	
#8924	Opt Base 17.54 GB Disk Unit (7200 RPM)	01/31/2001	

Product or Feature	Description	Withdrawal Date	Recommended Replacement
9309	Rack Enclosure feature #9171 is still available. A 7104 rack may provide an additional option.	02/27/2001	
9347	Tape Drive	10/31/2000	
#9313	Base 8.58 GB Disk Unit (7200 RPM)	01/31/2001	9348
#9347	Local Source Rack Mount	10/31/2000	
9348	Magnetic Tape Unit	02/26/1999	

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Special Notices and Publications

Special Notices

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Operating System/400	OS/2
OS/400	Presentation Manager
Print Services Facility	PROFS
Proprinter	RISC System/6000
RPG/400	RS/6000
S/370	S/390
Seascape	SP
SP2	StorWatch
System/36	System 370
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- *3590 Introduction and Planning Guide*, GA32-0329
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Abbreviations

Abbreviations

List of Abbreviations

Measurements

K	1,024 bytes
M	1,000,000 bytes
M	1,048,576 bytes
G	1,000*M* bytes
T	1,000G bytes

bps	bits per second
Kbps	1,024 bps
Mbps	1,048,576 bps
lpm	lines per minute
lpi	lines per inch
cps	characters per second
cpi	characters per inch
bpi	bits per inch
cpl	characters per line
ips	inches per second
dpi	dots per inch

Keywords

ACD	Automated Call Director
ADCS	Advanced Data Communications for Stores
ADSM	Adstar Distributed Storage Manager
AFP	Advanced Function Printing
APAR	Authorized Program Analysis Report
API	Application Program Interface
APPC	Advanced Program to Program Communication
APPN	Advanced Peer to Peer Network
ARP	Address Resolution Protocol
ASP	Auxiliary storage pool
ASP	Application Solution Provider
ATM	Asynchronous Transfer mode
AWT	Abstract Windowing Toolkit
B2B	Business to business
B2C	Business to consumer
BBU	Battery Backup Unit
BI	Business Intelligence
BIOS	Basic Input Output System
BLOB	Binary Large Object
BRI	Basic Rate Interface
BRMS	Backup and Recovery Media Services
BSC	Bisynchronous
CBX	Computerized
CDMF	Commercial Data Masking Facility
CCIN	Custom Card Identification Number
CCSID	Coded Character Set ID
CCW	Continuous Composite Worm
CEC	Central Electronics Complex
CGI	Common Gateway Interface
CICS	Customer Information Control System
CIF	Customer Install Feature
CISC	Complex Instruction Set Computing
CL	Control Language
CLOB	Character Large Object
CODE	Cooperative Development Environment
COLD	Computer Output to Laser Disk
CORBA	Common Object Request Broker Architecture
CPA	Common Programming APIs
CPM	Continuously Powered Main Storage
CPW	Commercial Processing Workload

CRG Cluster Resource Group

CSA Callpath Services Architecture

CSU Customer Setup

CSV Comma Separated Variable

CUoD Capacity Upgrade on Demand

DASD Direct Access Storage Device

DBCS Double Byte Character Set

DBLOB Double-byte Large object

DCA Document Content Architecture

DCE Distributed Computing Environment

DDE Dynamic Data Exchange

DDL Database Definition Language

DDM Data Directory Manager

DECS Domino Enterprise Connection Services

DES Data Encryption Standard

DFU Data File Utility

DHCF Distributed Host Command Facility

DIMM Dual Inline Memory Module

DLL Dynamic Link Library

DMZ Demilitarized Zone

DOM Document Object Model

DRDA Distributed Relational Database Architecture

DSD Dedicated Server Domino

DSNX Distributed System Node Executive

DSP Digital Signal processing

DST Dedicated Service Tools

DTD Document Type Definition

DUOW Distributed Unit of Work

ECS Electronic Customer Support

EJB Enterprise JavaBeans

ERP Enterprise Resource Planning

ESJ Enterprise Server Java

ESP Extreme Support Through Personalization

ESS Enterprise Storage Server

EVI Encoded Vector Indexes

FCMU File Compose and Merge Utility

FIPS Federal Information Processing Standard

FFDC First failure Data Capture

FFT Final Form Text

FSIOP File Serving Input Output Processor

FTP File Transfer Protocol

FULIC Featured User Licensed Internal Complex

GUI Graphical User Interface

HCP Host Command Processor

HPT Host Print Transform

HSL High Speed Link

HSM Hierarchical Storage Manager

HTML Hypertext Markup Language

HTTP Hypertext Transfer Protocol

HPOFS High Performance Optical File System

HSL High Speed Link

HVD High Voltage Differential

IASP Independent Auxiliary Storage Pool

IBM International Business Machines

ICA Integrated Computing Architecture

ICSS Internet Connection Secure Server

ICMP Internet Control Message Protocol

IDLC ISDN Datalink Control

IDRC Improved data recording capability

IIOP Internet Inter-ORB Protocol

IKE Internet Key Exchange

ILE Integrated Language Environment

IMPI Internal Machine Program Instruction

INS Integrated Netfinity Server

IOA Input Output Adapter

IOP Input Output Processor

IPCS Integrated PC Server

IPDS Intelligent Printer Data Stream

IPL Initial Program Load

IPLA International Program License Agreement

IPM Impressions Per Minute

IPS IP over SNA Snackets

IPSec IP Security Protocol

IPX Internet Packet exchange

ISA Industry Standard Architecture

ISDB Interactive Source Debugger

ISDN Integrated Services Digital Network

ISV Independent Software Vendor

ITF Interactive Terminal Facility

ITU International Telecommunication Union

IXA Integrated xSeries Adapter

IXS Integrated xSeries Server for iSeries

IMPI Internal microprogram instruction

JDBC Java Database Connectivity

JDBC Java Database Connection

JDK Java Developer Kit

JFC Java Foundation Classes

JIT Just in Time (Java compiler)

JSP JavaServer Pages

JVM Java Virtual Machine

L2TP Level 2 Tunneling protocol

LAN Local Area Network

LDAP Lightweight Directory Access Protocol

LEI Lotus Enterprise Integrator

LID License Information Document

LLC Logical Link Control

LOB Large Object

LOB Line of Business

LPAR Logical Partition

LPDA Link Problem Determination Aid

LPD Line Printer Daemon

LPR Line Printer Requester

LVD Low Voltage Differential

LTO Linear Tape Open

LZ1 Lempel Ziv 1

MAC Media Access Control

MBPS Mega Bytes Per Second

MCU Mail and Calendaring Users

MDI Microsoft Data Interchange

MES Miscellaneous Equipment Specification

MFIOP Multi Function Input Output Processor

MIB Management Information Base

MMF Multi Mode Fiber

MO Magneto-Optical

MQI Message Queue Interface

MRI Machine Readable Instruction

MSF Mail Services Framework

MULIC Machine User License Internal Code

MVS Multiple Virtual Storage

NC Network Computer

NLS National Language Support

NNTP Net News Transfer Protocol

NRF Network Routing Facility

NSM Network Station Manager

ODBC Open Database Connectivity

ODF Object Distribution Facility

OLAP Online Asynchronous Processing

OLP Optical link Processor

OLTP Online transaction processing

ORB Object Request Broker

OSF Open Software Foundation

PASE Portable Application Solutions Environment

PBX Private Branch Exchange

PCI Peripheral Component Interconnect

PCL Printer Control Language

PCML Panel Call Markup Language

PDF Portable Document Format

PDM Programming Development Manager

PDML Panel Definition Markup Language

PDPA Physical Device Placement Aid

PICS Platform for Internet Content Selection

PIN Personal Identification Number

PING Packet Internet Groper

POD Processor on Demand

POP Post Office Protocol

PPP Point to Point Protocol

PRPQ Programming Request for Price Quotation

PSF Printing Support Facility

PTF Program Temporary Fix

PVC Private Virtual Circuit

QIC Quarter Inch Cartridge

QMF Query Management Facility

R/DARS Report Data Archive and Retrieval System

RAD Rapid Aplication Development

RAID Redundant Array of Independent Disks

RCD Read Cache Device

RDBMS Relational Database Management System

RF Radio Frequency

RFC Request for Comments

RFT Revisable Form Text

RIP Routing Information Protocol

RISC Reduced Instruction Set Computing

RJE Remote Job Entry

RLU Report Layout Utility

RMI Remote Method Invocation

RPG Report Program Generator

RPQ Request for Price Quotation

RPR Relative Performance Rating

RSP Relative System Performance

SAN Storage Area Network

SCSI Small Computer System Interface

SDA Screen Design Aid

SDF Server Definition File

SDLC Synchronous Datalink Control

SEU System Expansion Unit
Source Entry Utility

SCM Software Confguration Management

SHM Short Hold Mode

SIMM Single On-line Memory Module

SIU Software Inventory Utility

SLIC System Licensed Internal Code

SLIP Serial Line Internet Protocol

SMAPP System Managed Access Path Protection

SMF Single Mode Fiber

SMP Symmetric Multi Processing

SMTP Simple Mail Transfer Protocol

SMU Simple Mail Users

SNA Systems Network Architecture

SNADS SNA Distribution Services

SNMP Simple Network Management Protocol

SOI Silicon-on-Insulator

SPCN System Power Control Network

SPD System Products Division

SQL Structured Query Language

SSL Secure Sockets Layer

SSP System Support Program

SST System Service Tools

SUE System Unit Expansion

SVC Switched Virtual Circuit

TCP/IP Transmission Control Protocol/Internet Protocol

TIMI Technology Independent Machine Interface

TMA Tivoli Management Agent

UDB Universal Database

UDF User Defined Functions

UDP User Datagram Protocol

UDT User Defined Types

UOW Unit of Work

UPS Uninterruptible Power Supply

URL Universal Resource Locator

URL Uniform Resource Locator

UTP Unshielded Twisted Pair

VM Virtual Machine

VPN Virtual private network

VRU Voice Response Unit

VSE Virtual Storage Extended

WAF Workfolder Application Facility

WAN Wide Area Network

WML Wireless Markup Language

WORM Write-Once-Read-Many

WWW World Wide Web

W3 World Wide Web

XSL Extensible Stylesheet Language

XML Extensible Markup Language

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