IBM

IBM @server iSeries System Handbook

Version 5 Release 2

- The authoritative source for iSeries POWER4, IStar, SStar, and Pulsar Processors
- Facts, rules for iSeries features, including HSL and Model 890
- Includes OS/400 V5R2 enhancements

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IBM @server iSeries System Handbook: Version 5 Release 2

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Twenty-third edition (September 2002)

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Preface

This Twenty-third edition of the *IBM @server iSeries System Handbook*, distributed worldwide, offers you a comprehensive guide to the iSeries processor hardware, related hardware, and OS/400-related software currently marketed by IBM representatives. This edition provides a product and feature overview of the new hardware and software announced in April of 2002, including the iSeries Model 890. It also describe the iSeries 840, 830, and 820 servers; Models 250, 270, SB2, and SB3; and the new release of OS/400 software Version 5 Release 2.

Note: This edition includes iSeries announcements made in July and October 2002.

This IBM Redbook is one of three books produced by IBM to highlight the iSeries product line. Use this Handbook as a reference for the options that are available. Then, refer to the companion manual, *IBM @server iSeries and AS/400e System Builder*, SG24-2155, for more detailed information and configuration rules. You may also refer to *AS/400e to IBM @server iSeries Migration*, SG24-6055, for details on upgrading to the iSeries 820, 830, 840, and 890 servers. And you can consult the *IBM @server iSeries Pocket Handbook*, SG24-9406, as a quick reference to product and feature numbers.

This Handbook is written for use by IBM System Specialists, Marketing Representatives, Business Partners, and IBM customers to answer first-level questions. It serves as a reference for the options available with the iSeries server. It is designed for *guidance* only.

This IBM Redbook reflects the introduction of the IBM @server iSeries Model 890 server (supported by OS/400 V5R2), which is the latest addition to the iSeries server product line. The iSeries product line includes Models 270, 820, 830, 840, SB2, and SB3 announced in May 2000 (supported by OS/400 V4R5), and the Model 250 packages announced in February 2002. 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, and the 250 models prior to February 2002.

Integrated xSeries Server for iSeries: Throughout this book, you can find many references to the 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 is, the name Integrated xSeries Server is used to indicate the Integrated Netfinity Server (INS), Integrated PC Server (IPCS), and Integrated File Server IOP (FSIOP).

This Handbook provides much of the technical hardware and software information available from an HTML format document. You can access this information from the iSeries home page at:

`http://www.ibm.com/eserver/iseries`

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.

To order a copy or copies of this handbook, see “Related publications” on page 929.

The team that wrote this redbook

This redbook was produced by a team of specialists from around the world working at the International Technical Support Organization, Rochester Center.

Susan Powers is a Senior I/T Specialist at the International Technical Support Organization, Rochester Center. Prior to joining the ITSO in 1997, she was an AS/400 Technical Advocate in the IBM Support Center with a variety of communications, performance, and work management assignments. Her IBM career began as a Program Support Representative and Systems Engineer in Des Moines, Iowa. She holds a degree in mathematics, with an emphasis in education, from St. Mary’s College of Notre Dame. She is the project leader for the iSeries Handbook, System Builder, and Pocket Book suite of IBM Redbooks.

Louis Cuypers, iSeries 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 System/32, System/34, System/36, System/38, and AS/400 system. He has participated in several residencies in the ITSO since the release of OS/400 V4R1.

Miroslav Iwachow is an AS/400 TeCenter support specialist for Avnet in Germany, a distributor of IBM. Miroslav previously worked for six years for IBM in the Czech Republic as the AS/400e product manager and team leader. Presently he specializes in supporting IBM Business Partners, including a joint partnership between Avnet and Vision Solutions for high availability solutions. He holds several IBM certifications and teaches courses that prepare IBM Business Partners for IBM certifications.

Dale Barrick is a Senior IT Specialist and has 25 years with IBM. He has been with Americas Techline for the past 10 years and has participated in two other ITSO residencies. He is the national team lead for Techline's LPAR Solution Initiative and has helped to rewrite two different LPAR classes and was directly involved with the development of the LPAR Validation Tool. He is responsible for monitoring the Rochester ITC LPAR validation queue and is currently participating in the creation of the LPAR certification examination.

Celia Burke is an I/T Specialist with IBM in Sydney, Australia. Celia has 17 years experience in IBM midrange servers, including System/36, System/38, AS/400, and iSeries. Her experience includes System Administration roles with IBM Customers, problem determination and software support with the IBM Support Centre in Australia, and a pre-sales support role with an IBM Business Partner. Her current role involves pre-sales support in the IBM Australian Techline group.

Barbara Bungate is an I/T Specialist with IBM in Sydney, Australia. Barbara has 20 years experience in IBM midrange servers, including System/34, System/36, AS/400, and iSeries. Her experience includes system administration, delivering education, application development, testing of software, problem determination, and software support with the IBM Support Centre in Sydney.

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.

Jerry Watson has been with IBM UK for 18 years. After ten years as an AS/400 Systems Engineer working with customers in the London area he moved to iSeries Techline and is now based in Leeds. He previously participated in the V4R1 and V4R2 Handbook and System Builder residencies.

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- For input on iSeries processors and features:
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iSeries Domino Development

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Introduction

Introduction

1

Introduction

The IBM @server iSeries demonstrates a unique design that delivers the benefits of today's innovative technology without complexity. With OS/400 V5R2, this design has been extended to take advantage of the latest industry-leading technology and new OS/400 capabilities.

In the year 2000, the iSeries Models 270, 820, 830, and 840 were introduced to significantly accent the evolution of the IBM @server family. In 2001, SStar processors refreshed the iSeries product line to run faster than the IStar processors. In 2002, two Model 250 packages were introduced to refresh a low-cost entry solution to the IBM @server iSeries product line.

With V5R2, there are new, more powerful processor features based on IBM's industry leading Copper and Silicon on Insulator (SOI) technology. Increased disk and memory capacities provide the flexibility for even more scalability and performance improvements. New Processor on Demand (PoD) features on the Models 830, 840, and 890 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 V5R2 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 V5R2 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 32 partitions on a single iSeries server and dynamic resource allocation permit different applications to run efficiently and safely, 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 32 direct attach external n-way IBM @server xSeries servers, and up to 32 internal Integrated xSeries Servers. iSeries hardware and software provide SAN functions for these directly attached Windows 2000 servers.

OS/400 V5R2 includes a broad range of enhancements for e-business and application enablement, OS/400 PASE (Portable Application Solutions Environment), eXtensible Markup Language (XML), iSeries Access, directory services, IBM HTTP Server (powered by Apache), database, Java, Internet printing, and Technical Support Advantage enhancements. These enrichments include:

- New 32-way Model 890 with POWER4 processors (base and PoD) to boost top performance by 1.85 times over the largest Model 840.
- New base processor features on Models 830 and 840 designed for compute-intensive workloads and a new standard processor features with Capacity Upgrade on Demand (CUoD) for the 830 model.
- Model 890 memory and disk features double the Model 840 capacity.
- 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 (IASPs), provide high availability and redundant data options for integrated file system applications, such as Lotus Domino and Web serving. V5R2 allows switchable towers for OS/400 objects as well.
- 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).

- Linux on iSeries brings iSeries integration, scalability, and robust availability to Linux customers. A new generation of Web-based applications is enabled with resource sharing and management via logical partitions.
- As of V5R1, logical partitioning (LPAR) is available on select uni-iSeries processors, including SStar Model 270s. LPAR supports dynamic resource movement, resource sharing and Virtual LAN. V5R2 extends this dynamic resource movement by allowing dynamic processor movement for Linux partitions.
- Windows Server Integration is enhanced to allow the connection of external 4-way xSeries servers with an Integrated xSeries Adapter via HSL. It also offers the ability to run up to 32 Integrated xSeries Servers inside a single iSeries server.
- The 1 GHz Integrated xSeries Server increases the capabilities of an iSeries solution to consolidate Windows server workloads.
- Lotus Domino Server for iSeries now supports iNotes access for Microsoft Outlook clients. This allows 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 capabilities, EZ-Setup wizard for Domino, TCP/IP Autostart, and an incremental installer.
- The WebSphere Platform provides a complete infrastructure for dynamic e-business, including integrated tools to build, deploy, and grow e-business solutions.
- WebSphere is critical for iSeries e-business success today and in the future. WebSphere Application Server is IBM's strategic Web application server for the IBM @server family, including the iSeries product line. WebSphere provides the e-business infrastructure required to support transactional Web-based applications.

  A WebSphere implementation allows iSeries customers to:

  - Extend RPG/5250 and other existing applications to the Web leveraging WebSphere and using WebFacing (a component of WebSphere Development Studio for iSeries), iSeries Access for the Web, Host Publisher, and Connect for iSeries.
  - Build new, modern Web-based applications using IBM tools such as the Java and Web tooling included in WebSphere Development Studio for iSeries.
  - Buy IBM and ISV applications based on WebSphere such as WebSphere Commerce Suite and WebSphere Portal Server.

  - Consolidate Windows NT-based, Linux, WebSphere, and OS/400 workloads via iSeries, logical partitioning, and Integrated xSeries Server and Integrated xSeries Adapter.

- 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 can 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.
- IBM WebSphere Commerce Suite for iSeries means confident e-commerce. Open, industry-accepted standards make it easy to increase customer value globally. It facilitates collaboration with customers, suppliers and partners. This solution helps you quickly create and efficiently maintain a high-volume, interactive site that attracts consumers and keep them coming back, facilitating a fast return on your investment.
- iSeries Access now allows access to the iSeries with a Web browser and enables 5250 applications for the Web. iSeries Access for Web and WebSphere Host Publisher provide a complete Web-to-host integration solution.
- Print support with 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.
- Technical Support Advantage provides high-speed connectivity and VPN support via the Internet.

The new technologies offered with the iSeries Model 890 announced with V5R2 enlarge the range for processor power, main storage, and DASD storage far beyond the previous scalability – to extreme scalability. With this extended 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 server.

This Handbook provides an overview of both hardware and software for the newly refreshed iSeries servers. Included are the new Model 890 supported by V5R2, and Models 250, 270, 820, 830, 840, SB2, and SB3 supported with both OS/400 V5R2 and V5R1.

iSeries technology in stride

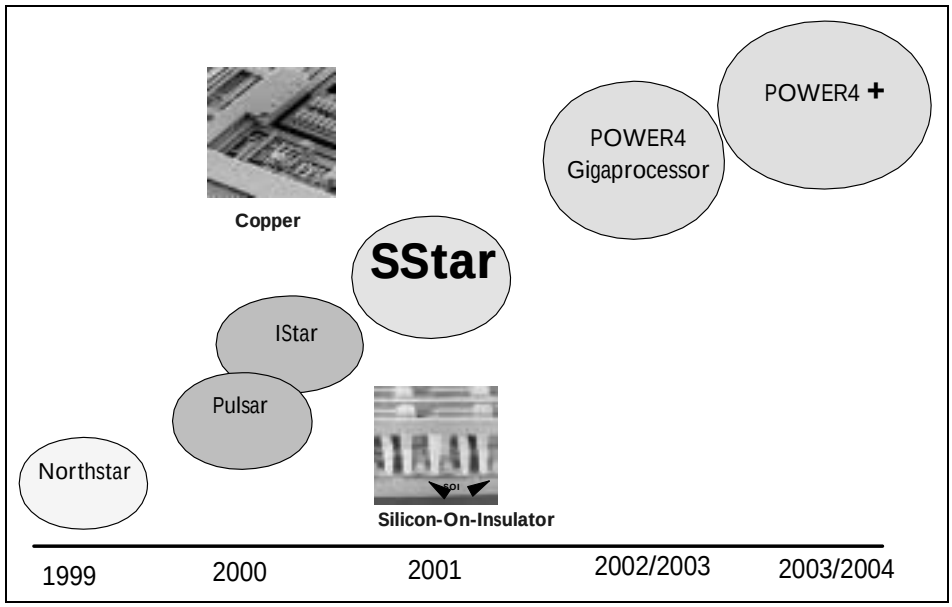
The iSeries server delivers tremendous capacity growth in its product line. The iSeries Layer (also known as Technology Independent Machine Interface (TIMI)) has made it possible to completely change the underlying hardware with minimum, if any, impact to iSeries applications. TIMI helps condition the 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 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, SStar and POWER4 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.

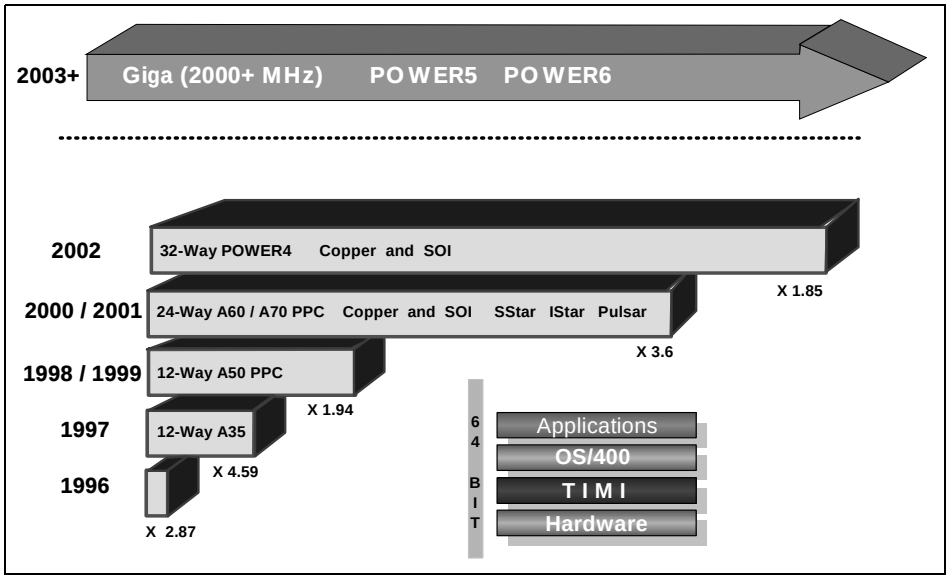
Pulsar, IStar, SStar, and POWER4 processors use on-chip copper-wiring technology as opposed to the aluminum used by the Northstar processor. Copper’s better conductivity permits thinner wires to be used, which enables the transistors to be packed closer together. The Pulsar processors integrate IBM CMOS7S technology. IStar and SStar processors integrate CMOS8S technology. The POWER4 processors integrate CMOS 8S3 technology. The denser new technology permits additional micro-architecture methods to improve performance.

Pulsar, IStar, and SStar technologies are implemented in the iSeries Models 270, 820, 830, 840, SB2, and SB3, with POWER4 in the 890. The iSeries Model 250 packages implement the Northstar processor technology.

Keeping multiple levels of high-speed cache is still necessary to keep the processors busy. Denser processor technology permits more on-chip cache. On-chip cache technology is implemented on the new Pulsar-, IStar-, SStar-, and POWER4-based 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 the change of hardware processor technology and previews what is planned in future generations.



Advanced Technology

Advanced Technology

2

iSeries architecture: Fundamental strength of the iSeries

iSeries servers and the supporting software offer important advanced capabilities in key areas such 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 well over 650,000 systems shipped worldwide, iSeries servers have the highest customer satisfaction index in the industry, as measured by IBM internal studies. Ten major factors contributing to this are that the iSeries:

- Offers state-of-the-art 64-bit relational database processing.
- Leads the industry in delivering the first server with Silicon on Insulator (SOI) technology. The new POWER4 processor is an extension of that technology at the .18 micron level.
- 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 (NSF), ASCII files, and EBCDIC files.
- Can ship with over 650 processor chips under the covers of a “single” large system.
- Can have up to 64 Windows NT servers in a single system while sharing host systems disk storage, tape, and CD-ROM resources.
- Object-based design makes it highly virus resistant.
- Has proven it can deliver over 99.9% availability.
- In hundreds of customer shops, OS/400 has operated for more than one year without ever requiring a re-IPL.
- 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. iSeries customers worldwide have tens of thousands of proven business applications. 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 relatively minimum 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?”

Based on these criteria and the iSeries proven track-record, we believe the iSeries server will be your number one choice.

System concepts

iSeries 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. It enables 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 15.
- 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. The iSeries allows you to rapidly deploy advanced business applications and facilitates business growth.
- Customers typically decide on the required application software first and then select an environment in which to run it. iSeries models have thousands of client/server applications written by IBM Business Partners across the globe. In addition, the iSeries server provides excellent platforms for Windows NT, Lotus Domino and Linux applications. iSeries 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 iSeries server architecture is contained in the renowned book *Inside the AS/400 and Fortress Rochester: The Inside Story of the IBM iSeries* written by the AS/400 system's Chief Architect, Dr. Frank G. Soltis.

iSeries architecture

This section describes aspects of the iSeries server architecture that contribute most to the server’s success as the “server of choice”.

Single-level storage

Application programs on an iSeries server are unaware of the underlying hardware characteristics, because of the iSeries Layer (or TIMI). 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. Objects are accessed by name, not by address.

The iSeries server address size is vast. iSeries 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 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 customers 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.

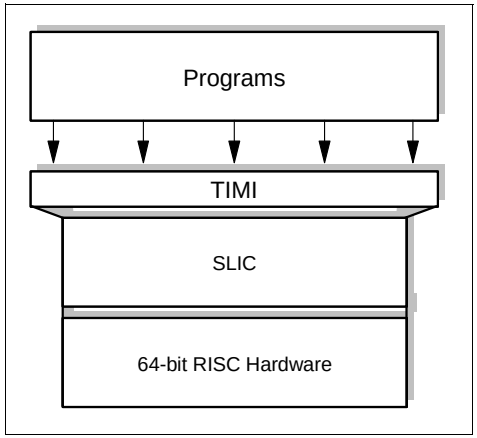
Persistence of objects is extremely important for future support of object-oriented databases for data accessibility and recovery. Objects continue to exist even after their creator goes away. iSeries models are uniquely positioned to exploit this characteristic of object persistence. Customary systems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

Technology Independent Machine Interface (TIMI)

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 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) programs. Even then, the programs would run in 32-bit mode on the newer 64-bit hardware.

This is not so with the iSeries 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*.

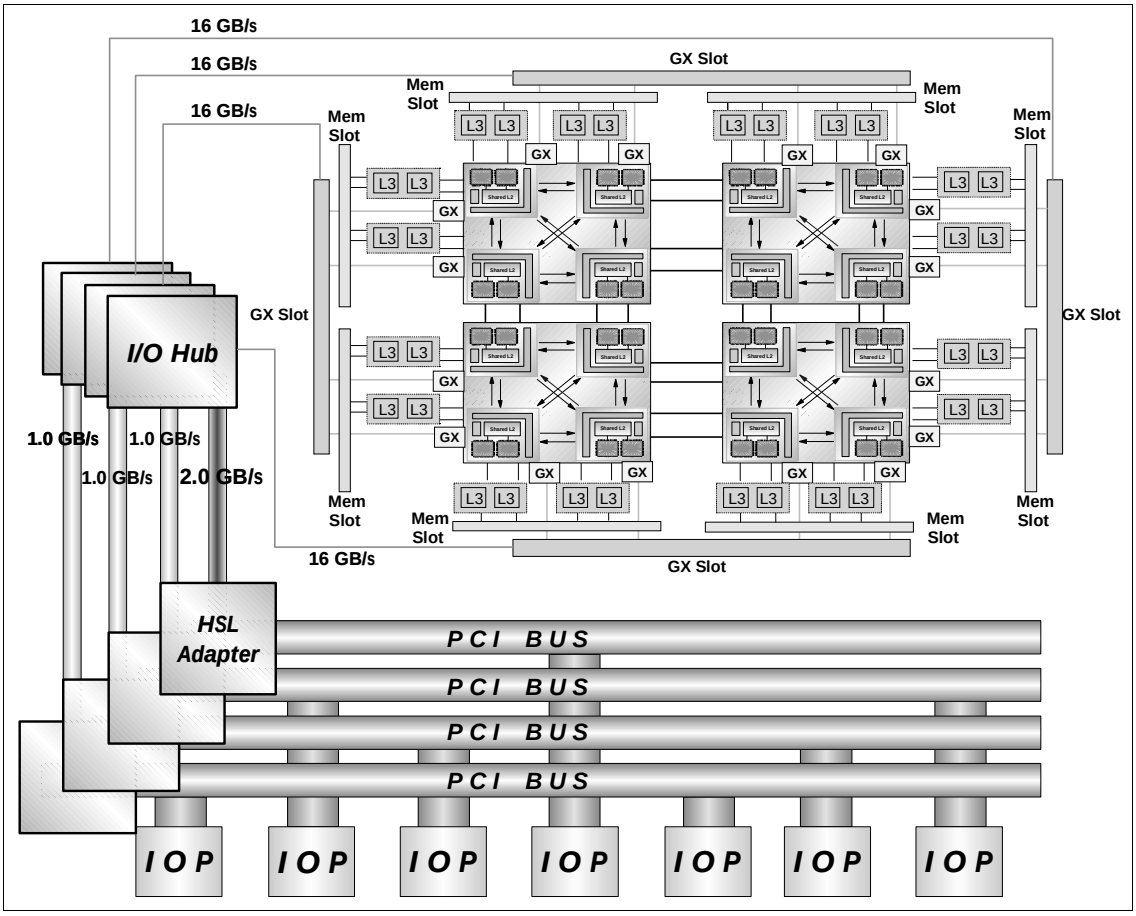
TIMI and SLIC take 64-bit RISC processor technology in stride. These same architectural features will be exploited to fully accommodate post-RISC technologies, which may incorporate 96-bit or 128-bit processors.

Hierarchy of microprocessors

iSeries 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 design hierarchy gives the iSeries server an elegant method of integrating diverse environments into a single, harmonious customer solution.

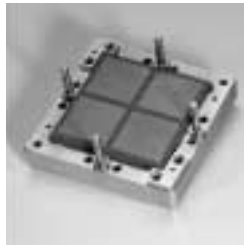
The microprocessors that look after a particular I/O device are accommodated on I/O cards that fit into slots on the system buses. One of these cards may be the Integrated xSeries Server. This is a PC on a card, which enables the iSeries to run a Windows NT server, for example.

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



This figure shows a high-level overview of the structure of the iSeries 890 model. In the upper right-hand corner of this figure, you see a presentation of the physical layout of the Model 890 32-way processing complex. In this processing complex, you can find four distinct units called Multi Chip Modules (MCM). These MCMs contain eight processors each. In such a MCM, there are four copper Silicon on Insulator chips. Each chip contains 174 million transistors forming two processors and 1.5 MB L2 cache running at a speed of 1.3 GHz. The 8-way MCM is the building block for the system. It is only available with four chips, each with its attached L3 cache. A single processor on a chip has all of the L3 cache (128 MB per MCM) resources attached to the module and the full L2 onboard the chip (1.5 MB per chip). Four such modules can be interconnected to form a 32-way symmetric multiprocessor (SMP).

A single large iSeries configuration can have well over 650 processors. The main system processor complex (can be comprised of 32 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).



POWER4 is the new chip technology used in the Model 890. POWER4 cannot be considered only a chip, but rather an architecture of how a set of chips is designed together to realize a system. As such, POWER4 can be considered a technology in its own right. In that light, systems are built by interconnecting POWER4 chips to form up to 32-way symmetric multiprocessors. The interconnect topology, referred to as a *Distributed Switch*, is new to the industry. The reliability, availability, and serviceability (RAS) design incorporated into POWER4 is pervasive throughout the 890 system and is as much a part of the design.

The POWER4 design can handle a varied and robust set of workloads. This is especially important as the e-business world evolves and data intensive demands on systems merge with commercial requirements. The need to satisfy high performance computing requirements with its historical high bandwidth demands and commercial requirements, along with data sharing and SMP scaling requirements dictate a single design to address both environments.

Silicon on Insulator

The Silicon on Insulator technology was applied for the first time in the computing industry with the iSeries server and OS/400 V4R5. SOI is used by the IStar, SStar, and POWER4 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, SStar and POWER4 processors use on-chip copper-wiring technology. Pulsar processors integrate IBM CMOS 7S technology. IStar and SStar processors integrate IBM CMOS 8S technology. POWER4 processors integrate CMOS 8S3 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 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 enables efficient utilization of the processors.

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.

The original systems used so called SPD (book) cards to add I/O to the servers. Today the entire range of iSeries models uses the more flexible, cheaper, and higher performing industry standard, PCI. The SPD cards integrated the IOP (processor) and a IOA (adapter) function on a single card. The PCI architecture separates these functions so that you can add one IOP and several different IOA controlled by this one IOP. This is a much more flexible approach.

The PCI I/O structure enables customer setup of select iSeries server models. On certain models of the 270, 820, 830, 840, and 890, adding or removing PCI cards can be performed without taking the server down. This allows you to power down a PCI slot and remove the PCI card from the system without powering down the system. This improves availability of the system and allows you to perform upgrades, maintenance or repair without impacting the users of the system.

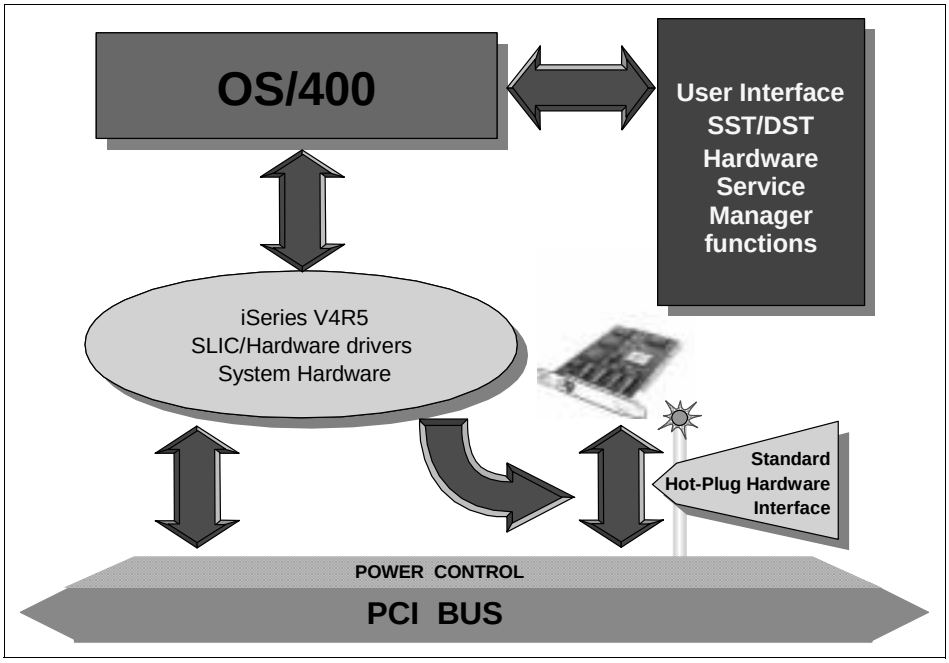
Refer to the individual PCI card feature descriptions and description of the server model to determine if *hot swapping* of a specific PCI card is supported.

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 270 models.

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 following figure.



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 a limited paging environment, Dedicated Service Tools communicates directly with System Licensed Internal Code.

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.

Operating System/400 (OS/400)

One of the single, most dramatic points about the iSeries 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 server, you do not have to continue shopping for system software components before the server is ready to run your business. All of the software factors for a relational database, comprehensive security, communications with a broad range of diverse systems, including Internet capabilities, and many more components are already in the operating system. Each is 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. An ordinary operating system needs a range of software products added before the environment is ready to support modern business applications. Add-on components can include 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.

Many of these software modules are provided by third parties. A customer has to assure that all these modules get integrated and perform 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 (at a compatible release level) along with any other software modules on which it depends. 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 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 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-iSeries systems without an object-based approach. The iSeries remains virus-free with features such as this.

Java

Java is a key application development environment for the iSeries server. IBM Developer Kit for Java supports Sun's Java 2. The Java virtual machine (JVM), which resides below the iSeries Layer, enables fast interpretation and execution of Java code on the iSeries 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 IBM 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. Server programs with graphical interfaces for configuration or tuning run on the system without modification.

Java objects on the iSeries servers can be full-fledged system objects that allow them to be persistent, shared, secure, backed up, and restored. iSeries server 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 server. This is the common method used to package and install applications on other platforms, such as Windows NT. InstallShield on the iSeries server 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 zipping or unzipping of Java packages. To aid in performance analysis and tuning of Java applications on iSeries, 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 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 applications and data using low-level APIs. The AS/400 Toolbox for Java can be used on a client to access iSeries servers running OS/400 V3R2, V3R7, or V4R1 and later.

The ability to run Java applications require OS/400 V4R5 on the iSeries and OS/400 V4R2 or later on the AS/400e. The Toolbox requires Java virtual machine 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 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 server 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 656 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 servers, network computing is supported with HTTP Server for iSeries and HTTP Server for iSeries (powered by Apache).

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 complete 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 536 and “HTTP Server for iSeries (5722-DG1)” on page 536.

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 server allows you to build a complete e-business Web site that is secure, easy to develop and maintain, and scale based on your needs.

See Chapter 28, “WebSphere and e-business” on page 619, and “WebSphere Development Studio for iSeries (5722-WDS)” on page 669 for more information.

Lotus Domino

Lotus 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. Lotus 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 Lotus Domino for iSeries delivers. Lotus Domino for iSeries is offered with familiar iSeries and AS/400e terms and conditions for purchase, services, and support.

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 Chapter 8, “iSeries Dedicated Server for Domino” on page 149, and “AS/400e Dedicated Server for Domino positioning” on page 52 for more information on the Domino servers, and Chapter 30, “IBM licensed programs: Lotus products” on page 697, for associated software.

iSeries integration with the Windows NT Server

Benefits of Windows Server consolidation on iSeries

Windows Server consolidation on the iSeries server 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.

OS/400 Server Consolidation is provided by using logical partitioning (LPAR).

Consolidating Windows Servers inside an iSeries server

Many 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 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.

The iSeries is enhanced with additional Windows server integration facilities. These enhancements enable the 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 external n-way xSeries servers via the high-speed link. With the 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 and a new Integrated xSeries Server with a 1 GHz processor. See “iSeries Integration with Windows Server (Base 5722-SS1 as 5722-WSV)” on page 532 and “#2799/#2899 PCI Integrated xSeries Server” on page 315.

Logical partitioning

Logical partitioning enhances 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 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 iSeries 270 and 8xx models. LPAR design addresses 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 server. Logical partitions allow the interactive performance of an iSeries to be flexibly allocated between partitions.

LPAR allows dynamic movement of processor, memory, and interactive performance between partitions with OS/400 V5R1. Up to four OS/400 V5R1 partitions per processor with a maximum of 32 partitions are supported. Virtual LAN support establishes multiple high-speed TCP/IP communication connections between partitions.

Linux is supported in secondary logical partitions as of V5R1. V5R2 enhancements allow dynamic processor movements for Linux partitions.

You can find more details on LPAR in “Logical partitions (LPAR)” on page 499.

Virtual LAN

Virtual LAN provides the ability to provide multiple communication paths between applications that are executed in each logical partition. Up to 16 independent high-speed internal bus-to-bus communication paths are supported between

logical partitions. More importantly, Virtual LAN allows high-speed bus-to bus communication between *selective* OS/400 partitions and Linux partitions. It is possible to tie in each of the multiple communication paths between partitions to a specific application. V5R2 adds the capability to connect Integrated xSeries Servers and Integrated xSeries Adapter via Virtual LAN.

The enablement and setup 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.

Additional communications software or hardware is not required.

Linux for iSeries

IBM supports your choice of platform and operating systems. This commitment is 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 when the primary partition runs OS/400 V5R1 or V5R2. Up to 31 Linux partitions are supported depending on the iSeries model. See “Linux for iSeries” on page 503 for more details.

OS/400 Portable Application Solutions Environment

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

The broad base of iSeries server applications is continually enhanced by new applications coming to the platform from a variety of sources. Until recently, the iSeries server’s 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 server.

Refer to “OS/400 PASE (Portable Application Solutions Environment) (5722-SS1 Option 33)” on page 524. 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, thousands 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. From its inception, the iSeries architecture inherits a design where reliability and availability are equivalent to features like processor speed, memory capability, and number of disk arms when planning for reliability.

  The iSeries design and development resources that enable high levels of availability in a single system environment are useful for prevention of unplanned outages. 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 not only fast and automated, but are easy to use. Planned and unplanned outages are reduced with high availability facilities which include:
  - Automated journal management
  - Access path protection
  - Batch journal caching
  - Save-while-active
  - Parallel save and restore
  - Backup Recovery and Media Services (BRMS) for iSeries RAID-5 disk parity protection
  - Disk mirroring protection
- **Clusters:** Cluster technology is implemented to reduce downtime caused by planned outages and site disasters. The system availability during planned outages contributes to an increase coverage of unplanned outage.

  Cluster Resource Services (APIs) were introduced with OS/400 V4R4. OS/400 handles the complexity of managing systems in a cluster and keeps track of data and applications. Simple cluster management at V5R1 is provided with the Simple Cluster Management GUI (part of V5R1 Operations

Navigator). Advanced cluster management and enhanced data resilience applications are available from cluster middleware providers to complete the total high availability solution.

Significant capabilities include independent auxiliary storage pools (IASPs), which at V5R1 allow access to integrated file system data that is independent of the System ASP and other User ASPs. IASPs under V5R2 also support library based (OS/400) objects and Microsoft Clustering as well. Refer to "iSeries clustering" on page 506.

- **Applications - ClusterProven:** A high availability solution for the iSeries server involves an active participation of cluster middleware providers. IBM business partners provide advanced cluster management and data resiliency tools. Solution developers design applications to maintain the state of an application across an outage.
- **Availability services and support:** As a world leading enterprise computing vendor, IBM has a collection of products and services to assist the customer to develop and maintain a high availability environment.

High-speed links (HSL)

Introduced with V5R1, a new bus structure using high-speed links provides a faster data transportation mechanism for the iSeries product line. iSeries Models 270, 820, 830, 840, and 890 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.

The new HSL bus structure 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) for 820, 830, and 840 models
- A homogeneous HSL network with HSL adapters
  - Switchable HSL connected tower with IASP
  - xSeries for iSeries HSL connectivity
  - V5R2 Complex HSL Clusters (three iSeries and no towers)
  - V5R1 Simple HSL Clusters (two iSeries and up to four towers)

For further details, see the product sections within this Handbook or *AS/400e to IBM @server iSeries Migration: A Guide to System Upgrades at V4R5 and V5R1*, SG24-6055.

Clustering with switchable DASD and IASP

OS/400 V5R2 and V5R1 with HSL OptiConnect provide switchable disk capability between two servers. V5R2 allows three systems on an HSL loop. Independent auxiliary storage pools 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 switchable disk experiences an outage. Operations are continued on a system even when an isolated controller or disk unit fails.

Data availability is improved with IASPs or switched disk clustering. Upon an outage within a cluster, users can be switched to an alternate node in the cluster (another iSeries server). Integrated file system data and OS library objects residing in an IASP can be switched to another iSeries server without an IPL. This enables one iSeries to take over data and an I/O controller in a disk tower from another iSeries.

The primary function in the early stages of clustering is to offer coverage for planned upgrades and maintenance on the production system without affecting users accessing data from the switched disk towers, for the User Defined File System only. Cluster management middleware software, shipped as part of OS/400 option 41 (HA Switachable Resources), manages the switchover. For high availability purposes, it ensures that no two systems access the disks (data) at the same time.

A properly designed switched disk cluster can offer advantages over a data replication cluster. Because a switched disk cluster does not use data replication, there is less overhead on the systems and, therefore, more resource available to process transactions. A switched disk cluster can be simpler to operate. The application is critical to the design of a true continuously available environment.

V5R1 Independent ASPs support only IFS files. This enables IFS applications, such as Lotus Domino, or many Web-serving applications to use the advantages offered with IASPs. This is useful in situations where workstations or communication lines are associated with the IFS data and the associated application is being switched. V5R2 adds support for operating system library objects and provides for Microsoft Clustering as well. Planning and setup work are required to make sure the resources being switched are named identically on both servers.

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.

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

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

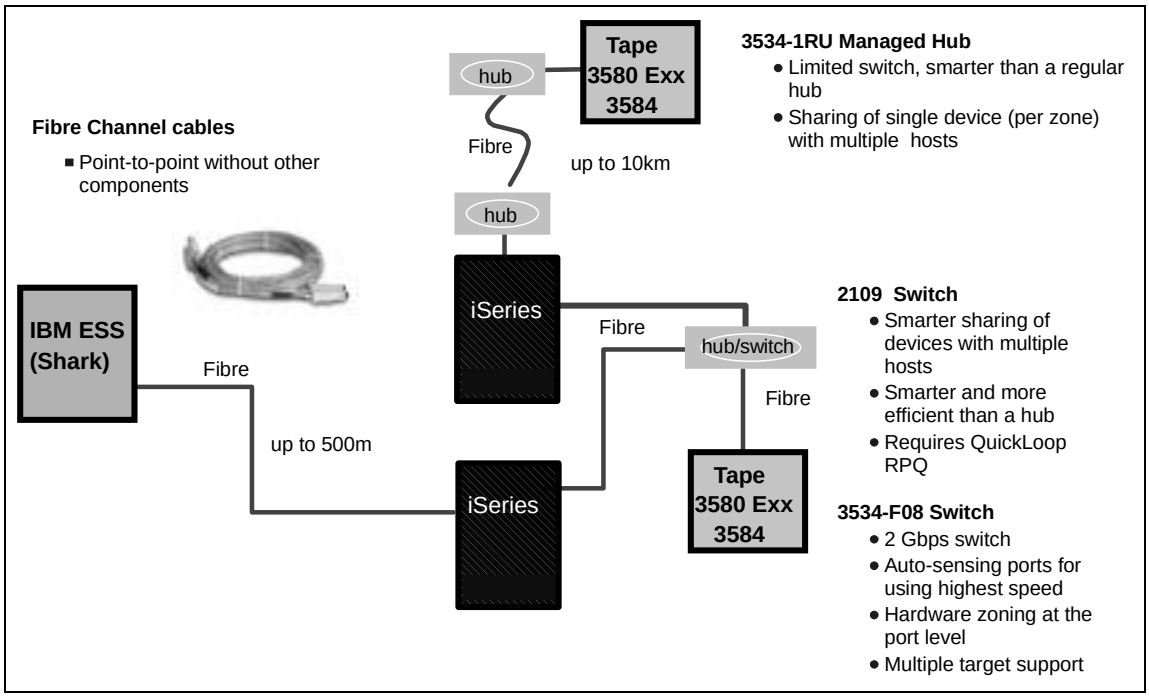
Fibre Channel Adapters

Starting with V5R1, the iSeries can attach external disk and tape subsystems via high-speed Fibre Channel disk and tape adapters. This enhances the iSeries server's ability to participate in Storage Area Networks (SAN). SANs may be defined as a combination of technologies (including hardware, software, and networking components) that provide 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.

As shown in the following figure, 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 Enterprise Storage Server (ESS) (commonly referred to as 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, limited switch, but smarter than a plain, regular hub. The iSeries also supports a regular switch in QuickLoop mode, and as of V5R2, it supports a 2 Gbps high-speed switch (the 3534-F08).

These components are illustrated in the following figure.



Refer to “System unit hardware (PCI)” on page 329 for information on Fibre Channel Adapters. See Chapter 21, “Peripherals” on page 419, for information on hubs and switches. You can refer to Chapter 20, “External tape, optical, and disk storage” on page 377, for tape drive information.

Database

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

DB2 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 database is integrated allows the operating system to control some of its management functions and makes it easier to maintain than competitive database 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 databases where additional tools may need to be purchased to provide these functions.

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. The SQL Client Integration API allows providers of gateways and client/server solutions to integrate their products with DB2 UDB for iSeries.

See “DB2 Universal Database for iSeries” on page 481 for further information on OS/400 DB2, and Chapter 26, “IBM licensed programs: Database accessories” on page 561, for associated database products.

iSeries Business Intelligence solutions

What is Business Intelligence?

Business Intelligence (BI) turns corporate data into meaningful business information. BI provides a means for you to become familiar with who your customers are. 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, to analyze daily sales information and make snap decisions that can significantly impact your company's performance.

Business Intelligence turns corporate data into decision support information. BI solutions are now much more affordable due to new innovations in software and hardware. One of these key technologies is data warehousing, which provides the structure for Business Intelligence applications. The advent of data warehouse technology and industry specific Business Intelligence applications have made implementations meaningful and cost effective.

iSeries enabling technology

The iSeries servers offer state-of-the-art 64-bit relational database processing. The system is optimized for a Business Intelligence environment with customized hardware (iSeries servers) and optimized software (DB2 UDB for iSeries, DB2 Symmetric Processing, 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 server open interfaces, hundreds of tools can be used to provide BI solutions accessing DB2 UDB for iSeries 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.

DB2 Symmetric provides parallel query processing. This allows multiple processors in a single server to collectively work on a single query, which can improve query performance by as much as 400%. DB2 multisystem support provides clustering for the iSeries and allows up to 32 servers to be “clustered” together into a single system. This 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 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 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 BI 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 BI tool is supported on the iSeries servers. That includes tools for moving and cleansing data and tools for organizing data into a multi-dimensional and relational format such 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 BI applications. They also allow applications to use OS/400 and non-OS/400 data.

There are many technical advantages of using the iSeries server for your Business Intelligence server. The main reason why customers choose the iSeries 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 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 *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 you need a server that is flexible, versatile, and can deliver customized solutions, all in a cost effective manner.

The iSeries server has always been designed for business. By tightly integrating hardware, software, middleware, and the operating system. The iSeries 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.

OS/400 is engineered to provide the performance and tools needed to help to obtain a quicker return on a business investments in the critical areas of e-business and in enterprise resource planning, BI, 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 iSeries 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 outstanding performance of iSeries as a Domino server in an independent NotesBench audit (10,400 concurrent light mail users on a single iSeries server) demonstrates that the iSeries 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 *defining actions* of tomorrow's successful e-business include:

- 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 Chapter 28, "WebSphere and e-business" on page 619, and Chapter 30, "IBM licensed programs: Lotus products" on page 697.

Advanced user interface

The iSeries serves the small business customer with minimal skill or resource to manage complex environments. OS/400 delivers advanced GUI functions to iSeries customers. Operations Navigator is enriched with industry-leading integrated systems management via easy-to-use graphical interface.

iSeries Navigator

The systems management function is delivered via the easy-to-use iSeries Navigator GUI. iSeries Navigator includes:

- Work management (Active jobs, subsystems, job queues, memory pools)
- Backup and Recovery (BRMS GUI plug-in)
- LPAR
- System values, including a 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 events over 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 and complex three-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 V5R2 include the addition of numerous GUI extensions to existing iSeries Navigator functions, for 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 plug-in for performance management. Extensive automation for workload management with new file and business-to-business (B2B) transaction monitors, systems and storage management, backup and media policies, and network management including support for IPv6. Also supported is IBM DB2 UDB transaction management, switched disk cluster management, Linux dynamic partition management, and enterprise identity mapping security.

Management Central-Pervasive

Management Central-Pervasive (MC-Pervasive) allows iSeries network administrators to keep an eye on their iSeries 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 server status and performance metrics on the iSeries servers.

As of V5R1, functions for Management Central-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 functions are available via an English-only PTF. Refer to the iSeries Navigator for Wireless Web site to find the PTF numbers to load the code for Management Central-Pervasive:

`http://www-1.ibm.com/servers/eserver/iseries/navigator/pervasive.html`

EZ-Setup

EZ-Setup includes:

- Installing and configuring Lotus 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 part of iSeries Client Access Express and is on the *Setup and Operations* CD-ROM (shipped with all orders).

iSeries Information Center

The iSeries Information Center 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`

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. 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. These solutions range from B2B solutions that link together trading partners to pervasive computing applications, which connect mobile devices such as cell phones to core business solutions.

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

The XML application enablers provided in OS/400 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 foundation offered with OS/400 includes system integrity with digital signature and object signing, a Digital Certificate Manager, and password protection

V5R2 enhancements include:

- Enterprise Identity Mapping
- Web Caching Accelerator
- Secure Sockets Accelerator
- IPv6 with self configuring wizards
- Firewall-friendly VPN with UDP encapsulation

See “Security” on page 478.

Summary

iSeries 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 servers have enabled their customers to:

- Provide Internet access to existing iSeries applications. Through a product known as HTML Gateway (which resides within OS/400), Internet users can access and run iSeries applications.
- Integrate diverse environments (such as Microsoft Windows NT and Lotus Notes/Domino) onto the iSeries server. All customer solutions require a range of hardware and software products from a variety of vendors. When these mixed environments are integrated, the iSeries server simplifies the task of managing them.
- Change to the on-chip copper-wiring processor technology with 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

3

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. You can find detailed performance information in *iSeries Performance Capabilities Reference*, SC41-0607, which is located on the Web at:

`http://www.iseries.ibm.com/developer/performance/index.html`

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

A new tool offered with V5R2 is PATROL for iSeries - Predict (5620-FIF). Refer to “PATROL for iSeries - Predict (5620-FIF)” on page 790.

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 iSeries 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 the commercial processing workload on the iSeries server. 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 Chapter 35, "Summary of earlier AS/400, AS/400e, and iSeries models" on page 829, 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 that users see with their iSeries server 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, and the application being run.

You can find more detailed performance information in the *iSeries Performance Capabilities Reference*, SC41-0607.

IBM Workload Estimator for iSeries

The IBM Workload Estimator for iSeries 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.

You can find more information on IBM Workload Estimator for iSeries at:

`http://www-912.ibm.com/servlet/EstimatorServlet`

Disk arm requirements

The configuration of disk units influences the overall performance of the system. To provide for the best obtainable disk subsystem performance, and, therefore, to enable the best possible overall system performance, it is important to size an iSeries server with an appropriate number of disk arms.

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 iSeries processor, refer to the “AS/400 Disk Arm Requirements Based on 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 as it relates to their solution.

iSeries Model 270, 820, 830, 840, and 890 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, 840, and 890 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.

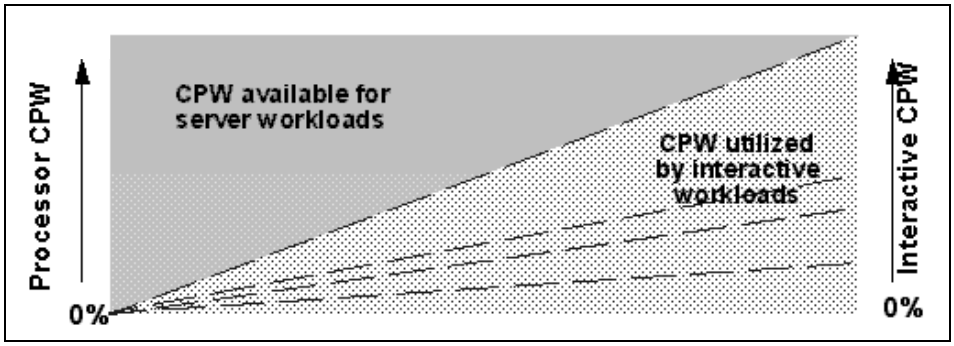
Note the following terms:

- **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, 840, and 890 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, 820, 830, 840, and 890 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 server 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, 840, and 890. CUoD adds capacity in increments of one processor, up to the maximum number of On Demand processors built into the server. CUoD has significant value for installations for customers who want to upgrade without disruption.

There are two Capacity Upgrade on Demand processor feature options for the Model 890 (#2487 and #2488), six CUoD options for the Model 840 (#2416, #2417, #2419, #2352, #2353, and #2354), and one CUoD option for the Model 830 (#2351). Each CUoD 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 #1610 for the Model 890, #1604 for Models 840 or #1605 for the Model 830 as a Miscellaneous Equipment Specification (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.
- Stand-alone 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 that reflects 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.

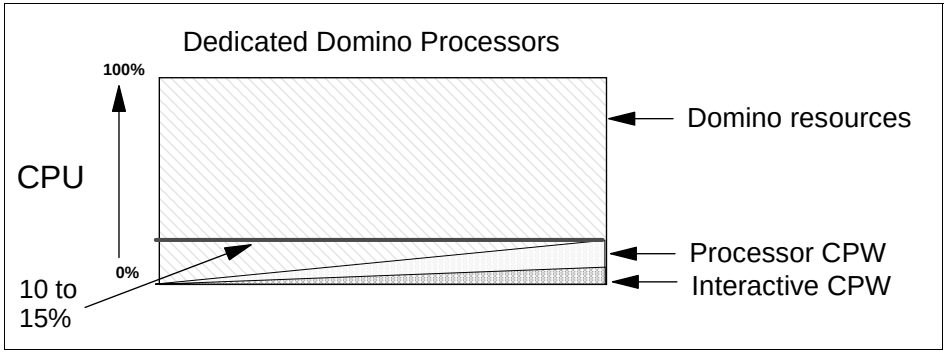
- Application processing that uses 5250 interfaces is not supported on the iSeries Dedicated Server for Domino.
- 5250 print is not supported on the iSeries Dedicated Server for Domino.

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.

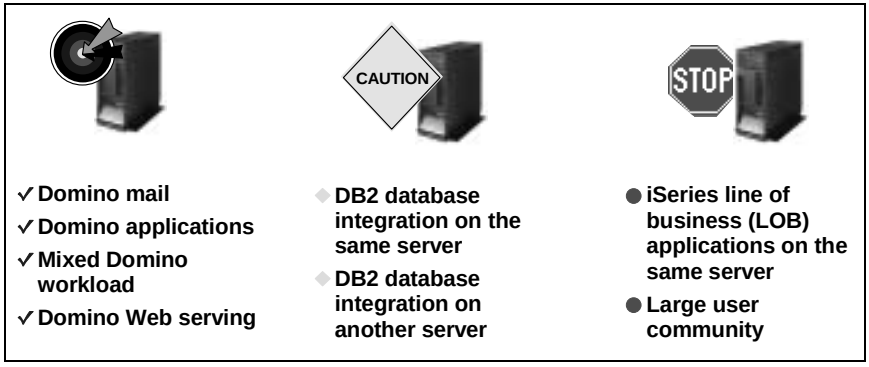
The following figure shows the relationships of the various workloads on the Dedicated Domino Processors. Domino can take any available CPU capacity (even below the line). The CPW workload can never rise above the line, and excessive attempts to use CPW resources do not significantly affect Domino performance. 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 iSeries 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 UDB for iSeries 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**: 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

4

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. They represent goals and objectives only. All statements regarding IBM's plans, directions, and intent are subject to change or withdrawal without notice.

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 each incremental announcement (23 April 2001, 28 August 2001, 12 February 2002, 29 April 2002, and 29 June 2002).

Product Previews: Open

These product previews are open at the time of the V5R2 announcements made on 04 June 2002:

- **Microsoft Windows .NET:** IBM plans to support Windows .NET Standard and Enterprise servers on the Integrated xSeries Server and the xSeries servers attached to iSeries with the Integrated xSeries Adapter.
- **Growth options for Model 270 customers:** Product offerings for small and medium enterprise customers are important to iSeries success and are part of our strategic and tactical plans. IBM intends to provide technology upgrade options for the Model 270 customer in the second half of 2002. This capability will support our customer's e-business and workload consolidation plans.
- **Lotus Product Ordering**: To provide you with a single, consistent way to obtain Lotus software, IBM plans to offer the fulfillment of Lotus products available on iSeries through a single channel – Passport Advantage.

  Currently, two Lotus products, Lotus Domino for iSeries (5769-LNT) and Lotus Enterprise Integrator (5769-LNP), are available through Passport Advantage and as OS/400 licensed programs via AAS. Other Lotus software, including Sametime, QuickPlace, and Domino.doc, are available only through Passport Advantage.

  When Lotus Domino 6 and related products are announced, the products will be available for the iSeries platform only through Passport Advantage. We do not plan to provide a separate licensed program version of these products. This does not affect your ability to obtain Domino 6 and related products, if you have Software Subscription for iSeries or Passport Advantage, regardless of how you acquired your software.

You may continue to acquire Release 5 of Lotus Domino for iSeries and Lotus Enterprise Integrator as licensed programs through 31 December 2002. However, we encourage you to make the switch to Passport Advantage as you make new software acquisitions. A transition program is planned to give you the option to move current licenses to Passport Advantage.

- **Connect for iSeries**: IBM plans to provide a Connect for iSeries program for OS/400 V5R2. It will replace the current V5R1 supported version of 5733-B2B and will provide the same functions and features. The new version is planned to be available in 2002.

  Connect for iSeries V1.1 continues to be available if you are using OS/400 V5R1.

This product preview remains open at the time of the 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 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.

  You can find more information about Connect for iSeries on the Web at:

  `http://www.ibm.com/servers/eserver/iseries/btob/connect`

Product Previews: Closed

These products previews were closed at the time of the 04 June 2002 announcements:

- **Support for WebSphere Application Server 4.0:** IBM intends to support iSeries Access for Web and WebSphere Host Publisher when used with WebSphere Application Server 4.0 Advanced Edition for iSeries. This support will be available in the next release.

- **POWER4 microprocessor technology for iSeries:** IBM plans to bring the POWER4 microprocessor technology to the iSeries in the second half of 2002. In addition, the iSeries plans to continue to strengthen its position as a leading e-business server with enhancements that further extend the integration of Domino, Linux, and WebSphere technologies.
- **SPD I/O not supported on POWER4 iSeries:** IBM does not intend for the planned POWER4 iSeries servers to support non-PCI (SPD-based) I/O controllers and adapters.

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.

Statement of Direction: Open

As part of the iSeries announcements made in June 2002, IBM announced a commitment to the following direction:

- **Support for AIX on iSeries**: IBM plans to further extend its IBM autonomic computing initiative's (formerly known as Project eLiza) self-managing systems initiative with self-optimizing and configuring capabilities that include native support for AIX in logical partitions alongside OS/400 partitions on iSeries servers. This would allow customers to leverage a broader range of application environments including OS/400, Windows, Linux, and now AIX on iSeries servers. With this capability, a common set of resources can be managed and shared across a total customer solution, made up of applications targeted to different operating environments. This would extend the eLiza self-optimization capabilities of iSeries to meet the needs of customers in a simple, low-cost, and efficient manner.
- **DB2 and WebSphere Application Server for Linux on iSeries**: IBM plans to make DB2 Universal Database and WebSphere Application Server available for Linux on iSeries.
- **WebSphere Portal for Multiplatforms**: It is currently the intention of IBM to support delivery of WebSphere Portal for Multiplatforms for IBM eServer iSeries, IBM eServer zSeries, and z/OS1 starting in the second half of 2002.

Statement of Direction: Closed

As part of the iSeries announcements made in June 2002, IBM fulfilled the 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. It would extend the list of possible switched objects beyond integrated file system (IFS) files. Additions would include objects associated with DB2 Universal Database for iSeries and other OS/400 library-based objects.

Planning information

As 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.

- **OS/400 support of selected AS/400 Models**: IBM plans for OS/400 V5R2 to be the final release supported on AS/400e Models 150, 600, 620, 640, 650, S10, S20, S30, S40, and SB1.
- **iSeries Access**: IBM plans to remove the support of the Windows 98 and Windows Me operating systems from the iSeries Access for Windows client. iSeries Access for Windows on Windows 98 and Me will continue to be supported in V5R2. In subsequent releases, iSeries Access for Windows will not install on Windows 95, 98, or Me operating systems.

  The removal of Windows 98 and Windows Me applies to all of the functions shipped with iSeries Access for Windows, including EZ-Setup, iSeries Navigator, Management Central, and Operations Console. iSeries Access for Windows will continue to be supported on the Windows NT 4.0, Windows 2000, and Windows XP operating systems. In addition, the following function in iSeries Access for Windows will continue to be supported in V5R2 but will be removed in subsequent releases:

  – Migration from Client Access for Windows 95/NT and Client Access Enhanced for Windows 3.1 to iSeries Access for Windows.
- **iSeries Support for Windows Network Neighborhood (iSeries NetServer)**: IBM plans to remove the support of the Windows 98 and Windows Me operating systems from iSeries NetServer. Windows 98 and Me continue to be supported in V5R2, but not in subsequent releases. iSeries NetServer will continue to support the Windows NT 4.0, Windows 2000, Windows XP, and Linux (running Samba) operating systems.

- **Integrated xSeries Server**: IBM plans for V5R2 to be the final release to support the Windows NT 4.0 operating system on the Integrated xSeries Server.
- **IBM HTTP Server**: IBM HTTP Server for iSeries includes the generally available version of the Apache Software Foundation's Apache 2.0 Web server released 5 April 2002. IBM HTTP Server (powered by Apache) is the recommended solution for your Web serving needs. IBM plans for the HTTP Server (original) to be removed from IBM HTTP Server for iSeries in a future release. For more information, including migrating HTTP Server (original) configurations to HTTP Server (powered by Apache), visit: `http://www.ibm.com/eserver/iseries/software/http`
- **XML Parsers**: IBM plans for V5R2 to be the final release to ship the XML for C++ and procedural parsers as part of OS/400. These parsers are service programs QXML4C310 and QXML4PR310 in library QSYS. Comparable XML for C++ and procedural parsers are now available via LPO 5733-XT1 (XML Toolkit for iSeries).

  Suggested Replacements: Replace with LPO 5733-XT1, XML Toolkit for iSeries, which delivers the latest in XML parser technology
- **S/36 and S/38 Migration**: IBM plans for V5R2 to be the final release to support:
  - OS/400 Option 4 -- S/36 and S/38 Migration
  - OS/400 Option 11 -- S/36 Migration Assistant
  - RSTS36FLR command within OS/400 used to restore S/36 folders.
- **Asynchronous Transfer Mode**: IBM plans for V5R2 to be the final release to support the Asynchronous Transfer Mode (ATM) networking technology and ATM adapters:
  - #2811 PCI 25 Mbps UTP ATM
  - #2812 PCI 45 Mbps Coax T3/DS3 ATM
  - #2815 PCI 155 Mbps UTP OC3 ATM
  - #2816 PCI 155 Mbps MMF ATM
  - #2817 PCI 155 Mbps MMF ATM
  - #2818 PCI 155 Mbps SMF OC3 ATM
  - #2819 PCI 34 Mbps Coax E3 ATM
  - #4815 PCI 155 Mbps UTP OC3 ATM
  - #4816 PCI 155 Mbps MMF ATM
  - #4818 PCI 155 Mbps SMF OC3 ATM

  Suggested replacements: Gigabit Ethernet (#2743 and #2760) or 10/100 Fast Ethernet (#2838 or #2849) are recommended replacements, with required infrastructure changes (switches, routers etc.) to the network as applicable. Gigabit Ethernet supports TCP/IP only and so SNA Traffic would require using ANYNET as SNA over TCP/IP. 10/100 Fast Ethernet supports both

SNA and TCP/IP. Although the Fast Ethernet adapter is limited to UTP cable, an external transceiver may be used to convert to multimode fiber (compatible with ATM fiber).

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Server Mode	ATM with SNA	ATM with TCP/IP
6xx, Sxx, 7xx, 250	2838	2838
270, 8xx	2849	2743, 2760

- **PCI Integrated Analog Modem**: IBM plans for V5R2 to be the final release to support the #2761 and #4761 PCI Integrated Analog Modem adapters for fax functions. IBM previously announced that V5R1 was the final OS/400 release to support the use of the #2761 and #4761 PCI Integrated Analog Modem adapters for non-fax functions.

  Suggested replacements: Replace with #2805 or #2806 (Australia / New Zealand) PCI Quad Modem IOA.

- **Application Development Manager and Application Dictionary Services**: There are two priced features in WebSphere Development Studio for iSeries: Application Development Manager (ADM) and Application Dictionary Services (ADS). IBM is planning to discontinue marketing these products in the release after V5R2.

  IBM intends to discontinue marketing ADM and ADS. This should not be construed as a lack of interest in source and library control, and impact analysis. The importance of source-control management and impact analysis has increased greatly in the last several years since the introduction of the Integrated Language Environment to promote modular programming and to encourage code reuse. In recent years, the introduction of Web and Java development and the IBM WebFacing Tool have also dramatically increased the number of Java components that have to be managed.

  The IBM decision to discontinue marketing ADM and ADS is based on the following reasons:

  – ADM and ADS do not support C++ and Java.
  – ADM and ADS support the native file system only. All Java and most C++ program source is stored on theIntegrated File System (IFS).
  – There are strong non-IBM competitive Source/Library Control and Impact Analysis products that provideJava, C++ and IFS support in the iSeries marketplace.
  – IBM would have to make substantial investments in ADM and ADS to make these products functionallycomparable/competitive to the vendor products. Just making ADM and ADS competitive with the dominant vendor products would not substantially increase the value of ADM and ADS in the iSeries market.

IBM is currently working with the key iSeries partners to provide competitive non-IBM products to replace ADM and ADS. The vendors have agreed to:

- Integrate their tools to the WebSphere Studio Workbench
- Support Java and C++ and IFS
- Provide a migration plan for ADM and ADS customers to migrate to their solutions

For more information, see the white paper "A Case for Source Control Management"at:

`http://www.ibm.com/servers/enable/tools/pdf/scmpaper.pdf`

Open Class Library: IBM intends that V5R2 will be the final release to ship the Open Class Library, part of WebSphere Development Studio for iSeries and OS/400. Documentation to assist in migrating from IBM Open Class to the C++ Standard Library can be found at:

`http://www.ibm.com/servers/eserver/iseries/support/planning/nav.html`

Suggested Replacements:

All applications that use the 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.

To assist migration from IBM Open Class to the C++ Standard Library, refer to:

`http://www.ibm.com/servers/eserver/iseries/support/planning/pdf/iocmigrwp.pdf`

- **Distributed Computing Environment (DCE)**: IBM plans for V5R2 to be the final release to support Distributed Computing Environment Base Services for AS/400 (5769-DC1) and Distributed Computing Environment Data Encryption Standard Library Routines for AS/400 (5769-DC3).

  Suggested Replacements:

  IBM recommends that customers build their distributed applications using the functions provided by MQ Series, IBM Toolbox for Java, WebSphere Application Server, or Lotus Domino technologies for iSeries.

- **Ultimedia System Facility (USF)**: IBM plans for V5R2 to be the final release for the Ultimedia System Facility (USF) APIs to be shipped or supported with iSeries Access for Windows.

  Suggested Replacements:

Customers have chosen to develop multimedia applications using more standard means such as DB2 UDB for iSeries Binary Large Object (BLOB) support or the Integrated File System.

- **Access Class Libraries**: IBM plans for V5R2 to be the final release to support the Access Class Libraries in OS/400. The Access Class Libraries are C++ classes that provide access to OS/400 resources, including DB2 UDB for iSeries.

  Suggested Replacements:

  IBM suggests the current users of the Access Class Libraries use appropriate 'C' language APIs to access OS/400 resources. Current users should also consider using Java and the corresponding IBM Toolbox for Java interfaces to access OS/400 resources.

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 this Handbook. You can find information on all iSeries and AS/400e products and features by referencing IBM online systems. This may include searching for a legacy edition of the *AS/400e System Handbook*, which is available from the following Web site, or at the iSeries home site:

`http://publib.boulder.ibm.com/pubs/html/as400/online/chgfrm.htm`

Refer to “Products and features no longer marketed by IBM” on page 899 for a listing of many withdrawn features and products.

Features and devices not supported with V5R2

These systems are not supported with V5R2:

- AS/400 Models 4xx and 5xx

These features are not supported with V5R2:

- #4800 Cyptographic CoProcessor
- #2750 / #4750 ISDN adapters
- #2751 / #4751 ISDN adapters
- #6385 / #6485 QIC-5010 13GB 1/4-inch Cartridge Tape

The IPX protocol is not supported with V5R2.

These devices are not supported with V5R2:

- NetVista Thin Clients

Features and devices not supported with 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 16 MS FSIOP Memory
- #6516 16MB One-Port FSIOP
- #6517/#9517 32MB One-Port FSIOP
- #6518 48 MB One-Port FSIOP
- #6519 64 MB One-Port FSIOP
- #6520 Upgrade 1 to 2 Port FSIOP
- #6526 16 MB Two-Port FSIOP
- #6527 32 MB Two-Port FSIOP
- #6528 48 MB Two-Port FSIOP
- #6529 64 MB Two-Port FSIOP
- #6616 Integrated PC Server
- #8716 Optional 16 MB One-Port FSIOP
- #8717 Optional 32 MB One-Port FSIOP
- #8718 Optional 48 MB One-Port FSIOP
- #8719 Optional 64 MB One-Port FSIOP
- #8726 Optional 16 MB Two-Port FSIOP
- #8727 Optional 32 MB Two-Port FSIOP
- #8728 Optional 48 MB Two-Port FSIOP
- #8729 Optional 64 MB Two-Port FSIOP

These devices are not supported with OS/400 V5R1:

- 2440
- 3422
- 3430

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

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	2 July 2002	31 July 2002 12 December 2002[1]	N/A
V5R1	25 May 2001		31 May 2003	N/A

[1] Program support for the V4R5 licensed programs listed in the following table is extended to 12 December 2002.

Program name	Program number
AFP Font Collection for AIX, OS/400, and OS/2	5648-B45
Connect for iSeries	5733-B2B
DB2 Forms for AS/400 V2	5697-G14
DB2 Warehouse Manager AS/400 V7.1	5697-G23
QMF for Windows for AS/400	5697-G24

Program name	Program number
IBM InfoPrint Designer	5733-ID1
DB2 Intelligent Miner for Data for AS/400 V6.1	5733-IM3
Cryptographic Access Provider 40-bit for AS/400	5769-AC1
Cryptographic Access Provider 56-bit for AS/400	5769-AC2
Cryptographic Access Provider 128-bit for AS/400	5769-AC3
AFP Utilities for AS/400	5769-AF1
Advanced DBCS Printer Support for AS/400	5769-AP1
Backup Recovery and Media Services for AS/400	5769-BR1
ILE COBOL for AS/400	5769-CB1
AS/400 Client Encryption (40-bit)	5769-CE1
AS/400 Client Encryption (56-bit)	5769-CE2
AS/400 Client Encryption (128-bit)	5769-CE3
VisualAge RPG and CODE/400	5769-CL3
Communications Utilities for AS/400	5769-CM1
Cryptographic Support for AS/400	5769-CR1
ILE C for AS/400	5769-CX2
VisualAge for C++ for AS/400	5769-CX5
System/38 Utilities for AS/400	5769-DB1
DCE Base Services for AS/400	5769-DC1
DCE DES Library Routines for AS/400	5769-DC3
CICS for AS/400	5769-DFH
Dictionary and Linguistic Tools for AS/400	5769-DL1
DB2 DataPropagator for AS/400 V7.1	5769-DP3
Business Graphics Utility for AS/400	5769-DS1
Advanced Function Printing DBCS Fonts for AS/400	5769-FN1
Advanced Function Printing Fonts for AS/400	5769-FNT
Job Scheduler for AS/400	5769-JS1
Lotus Domino Enterprise Server for AS/400	5769-LNT
Managed System Services for AS/400	5769-MG1

Program name	Program number
MQSeries for AS/400	5769-MQ2
Application Program Driver for AS/400	5769-PD1
Performance Tools for AS/400	5769-PT1
Application Development ToolSet for AS/400	5769-PW1
Query for AS/400	5769-QU1
Content Manager OnDemand for AS/400	5769-RD1
ILE RPG for AS/400	5769-RG1
System Manager for AS/400	5769-SM1
Operating System/400	5769-SS1
DB2 Query Manager and SQL Development Kit for AS/400	5769-ST1
VisualAge Generator Server for AS/400	5769-VG1
Content Manager for AS/400	5769-VI1
WebSphere Development Studio	5769-WDS
AS/400 Client Access Family for Windows	5769-XW1
Advanced Function Printing PrintSuite for AS/400	5798-AF3
Facsimile Support AS/400	5798-TBY

Server Summary

Server Summary

5

iSeries and AS/400e servers

The tables in this chapter 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 Model 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/type	1/Northstar	1/Northstar
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 TR/Ethernet	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

	Package configuration (note 4)	Configuration maximum
Main storage (MB) (min/max)	256	1024
Main storage or DIMMs (min/max)	2	8
Disk storage (GB) (note 5)		
Minimum internal	17.54	35.08
Maximum internal	35.08	70.16
System I/O card slots	6	6
Communication lines (note 6)	1	12
ATM adapters	0	0
Maximum LAN/ATM adapters (note 7)	1	2
Non-integrated server LAN low-speed	0	1
Non-integrated server LAN 100/10 Ethernet	1	1
Integrated server LAN low-speed TR/Ethernet	0	2
Integrated server LAN 100/10 Ethernet	0	1
Maximum workstation controllers - Twinaxial	1	2
Maximum workstations - Twinaxial	28	80
Cryptographic processors	0	0
¼-inch cartridge tape (internal) (note 8)	1	1
8mm ½-inch cartridge (external)	0	0
Tape libraries	0	0
CD-ROM	1	1
Optical libraries - Direct attach	0	0

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 250 packages

Model	250	
Processor feature	**#0297 Entry**	**#0298 Growth**
Relative system performance - CPW (notes 1 and 2)		
Processor performance	50	75
Interactive performance	15	20
Number of n-way multiprocessors/type	1/Northstar	1/Northstar
L2 Cache (MB)	0	0
Processor group (note 3)	PPS/P05	PPS/P05

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	Package includes: ► OS/400 Base (5722-SS1) ► iSeries Client Access Family (5722-XW1) ► IBM Query for AS/400 (5722-QU1) ► IBM DB2 Query Manager and SQL Development Kit for AS/400 (5722-ST1) Other licensed programs may be added to the package when ordered.
Note 4	Package configuration reflects system as shipped from IBM. No modification of the hardware configuration is allowed on a new order. Optional features may be added after shipment through IBM Business Partners.
Note 5	Package configuration includes two drives and is shipped with mirroring active. Minimum internal disk storage refers to available disk with mirroring active. Maximum internal disk storage refers to unprotected disk capacity.
Note 6	Package configuration includes #9771 2-Line WAN with Modem to provide for Electronic Customer Support through the integrated modem on port 1. If the use of port 2 is required, the appropriate communications cable must be obtained through an IBM Business Partner.
Note 7	The integrated server is mutually exclusive with the high-speed slot for LAN.
Note 8	Package configuration includes #6382 4 GB ¼-inch Cartridge Tape Unit.

Table 3: 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	P05	P20/P20

Model	270		
Processor feature	**#2431**	**#2432**	**#2434**
Relative system performance (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	210.9	421.9	210.9	843.9	843.9
External maximum (note 7)	808.7	-	808.7	808.7	808.7
Total maximum	843.9	421.9	808.7	843.9	843.9
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
Internal/DVD-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 Ops Console is used on a #9771 WAN adapter. 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 35.16 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

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

Table 4: Summary of the iSeries Model 820

Model	820			
Processor feature	**#2395**	**#2396**	**#2397**	**#2398**
Relative system performance (note 1)	370	950	2000	3200
Processor CPW				
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)	100	200	300
Processor CPW			
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)	600	1100	2350	3700	1100	2350	3700
Processor CPW							
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)	120	240	380
Processor CPW			
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 max (note 6)	LPAR system max
Disk storage minimum (GB)	8.58				8.58	
Maximum internal (GB)	421.9	210.9	1582.4	1625.9	8334.1	
Maximum external (GB) (note 11)	4501.1	4501.1	6751.6	1595.3	8298.9	
Total maximum (GB)	4923.1	4712.1	8298.9	1625.9	8334.1	
DASD arms maximum	140	134	236		237	
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	
Ext 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	8	-	-	-	8	
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 the #5544 System Console on Ops Console is used on a #9771 WAN adapter. 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 a base CD-ROM in the 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

<table>
<tr><td>Note 10 (cont.)</td><td>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>Processor feature</th><th>Processor group</th></tr>
<tr><td rowspan="4">#2395</td><td>#1521</td><td>#23A1</td><td>P10</td></tr>
<tr><td>#1522</td><td>#23A2</td><td>P20</td></tr>
<tr><td>#1523</td><td>#23A3</td><td>P20</td></tr>
<tr><td>#1524</td><td>#23A4</td><td>P20</td></tr>
<tr><td rowspan="5">#2396</td><td>#1521</td><td>#23A9</td><td>P20</td></tr>
<tr><td>#1522</td><td>#23AA</td><td>P30</td></tr>
<tr><td>#1523</td><td>#23AB</td><td>P30</td></tr>
<tr><td>#1524</td><td>#23AC</td><td>P30</td></tr>
<tr><td>#1525</td><td>#23AD</td><td>P30</td></tr>
<tr><td rowspan="6">#2397</td><td>#1521</td><td>#23B1</td><td>P20</td></tr>
<tr><td>#1522</td><td>#23B2</td><td>P30</td></tr>
<tr><td>#1523</td><td>#23B3</td><td>P30</td></tr>
<tr><td>#1524</td><td>#23B4</td><td>P30</td></tr>
<tr><td>#1525</td><td>#23B5</td><td>P30</td></tr>
<tr><td>#1526</td><td>#23B6</td><td>P30</td></tr>
<tr><td rowspan="7">#2398</td><td>#1521</td><td>#23B8</td><td>P30</td></tr>
<tr><td>#1522</td><td>#23B9</td><td>P40</td></tr>
<tr><td>#1523</td><td>#23BA</td><td>P40</td></tr>
<tr><td>#1524</td><td>#23BB</td><td>P40</td></tr>
<tr><td>#1525</td><td>#23BC</td><td>P40</td></tr>
<tr><td>#1526</td><td>#23BD</td><td>P40</td></tr>
<tr><td>#1527</td><td>#23BE</td><td>P40</td></tr>
</table></td></tr>
<tr><td>Note 11</td><td>External DASD maximum assumes 17.54 GB LUNs. External DASD cannot exceed the maximum system capacity or the maximum number of disk arms.</td></tr>
</table>

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

Table 5: Summary of the iSeries Model 830

Model	830		
Processor feature	**#2400**	**#2402**	**#2403**
Relative system performance (note 1)	1850	4200	7350
Processor CPW			
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

Model	830	
Processor feature	**0153**	**2349**
Relative system performance (note 1)	7350	7350
Processor CPW		
Interactive CPW (note 9)	0	
#1531 (Base)		70
#1532		120
#1533		240
#1534		560
#1535		1050
#1536		2000
#1537		4550
Number/type/speed of processors	8/IStar/540 Mhz	4 to 8/IStar/540 Mhz
L2 Cache (MB)	16	16
Main storage (GB min/max)	1-64	1-64
Main storage DIMMs (min/max)	8/64	8/64
Minimum operating system level	V5R1	V5R1
Processor group (note 9)	P30	P30/P40

Numbers are for all processor features	Base System #9074	PCI Exp 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)	1582.4	1582.4	1625.9	4294.9	22153.9	
Maximum external (GB)	5626.4	6751.6	1595.3	4260.9	22118.8	
Total maximum (GB) (note 10)	7208.8	8298.9	1625.9	4294.9	22153.9	
DASD arms maximum (note 10)	205	205		596	630	
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	16	-	-	-	16	
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 the #5544 System Console on Ops Console is used on a #9771 WAN adapter. 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 a base CD-ROM in the migration tower (no feature code).

<table>
<tr><td>Note 9</td><td colspan="4">Processor group is determined by a combination of the processor and interactive feature. The following table provides a cross reference.</td></tr>
<tr><td></td><td>Processor</td><td>Interactive feature</td><td>Processor feature</td><td>Processor group</td></tr>
<tr><td></td><td>#2400</td><td>#1531</td><td>#23C1</td><td>P20</td></tr>
<tr><td></td><td></td><td>#1532</td><td>#23C2</td><td>P30</td></tr>
<tr><td></td><td></td><td>#1533</td><td>#23C3</td><td>P30</td></tr>
<tr><td></td><td></td><td>#1534</td><td>#23C4</td><td>P30</td></tr>
<tr><td></td><td></td><td>#1535</td><td>#23C5</td><td>P30</td></tr>
<tr><td></td><td>#2402</td><td>#1531</td><td>#23D1</td><td>P30</td></tr>
<tr><td></td><td></td><td>#1532</td><td>#23D2</td><td>P40</td></tr>
<tr><td></td><td></td><td>#1533</td><td>#23D3</td><td>P40</td></tr>
<tr><td></td><td></td><td>#1534</td><td>#23D4</td><td>P40</td></tr>
<tr><td></td><td></td><td>#1535</td><td>#23D5</td><td>P40</td></tr>
<tr><td></td><td></td><td>#1536</td><td>#23D6</td><td>P40</td></tr>
<tr><td></td><td>#2403</td><td>#1531</td><td>#23D8</td><td>P40</td></tr>
<tr><td></td><td></td><td>#1532</td><td>#23D9</td><td>P50</td></tr>
<tr><td></td><td></td><td>#1533</td><td>#23DA</td><td>P50</td></tr>
<tr><td></td><td></td><td>#1534</td><td>#23DB</td><td>P50</td></tr>
<tr><td></td><td></td><td>#1535</td><td>#23DC</td><td>P50</td></tr>
<tr><td></td><td></td><td>#1536</td><td>#23DD</td><td>P50</td></tr>
<tr><td></td><td></td><td>#1537</td><td>#23DE</td><td>P50</td></tr>
<tr><td></td><td>#0153</td><td></td><td>#245D</td><td>P30</td></tr>
<tr><td></td><td>#2349</td><td>#1531</td><td>#24D8</td><td>P30</td></tr>
<tr><td></td><td></td><td>#1532</td><td>#24D9</td><td>P40</td></tr>
<tr><td></td><td></td><td>#1533</td><td>#24DA</td><td>P40</td></tr>
<tr><td></td><td></td><td>#1534</td><td>#24DB</td><td>P40</td></tr>
<tr><td></td><td></td><td>#1535</td><td>#24DC</td><td>P40</td></tr>
<tr><td></td><td></td><td>#1536</td><td>#24DD</td><td>P40</td></tr>
<tr><td></td><td></td><td>#1537</td><td>#24DE</td><td>P40</td></tr>
<tr><td>Note 10</td><td colspan="4">External DASD maximum assumes 17.54 GB LUNs. External DASD cannot exceed the maximum system capacity or the maximum number of disk arms.</td></tr>
</table>

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

Table 6: Summary of the iSeries Model 840

Model	**840**				
Processor feature	**#2416**	**#2417**	**#2418**	**#2419**	**#2420**
Relative system performance (notes 1 and 2) Processor CPW Interactive CPW #1540 (Base) #1541 #1542 #1543 #1544 #1545 #1546 #1547	 10000 120 240 560 1050 2000 4550 10000 -	 13200 120 240 560 1050 2000 4550 10000 -	 10000 120 240 560 1050 2000 4550 10000 -	 16500 120 240 560 1050 2000 4550 10000 16500	 16500 120 240 560 1050 2000 4550 10000 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**	**#0158**	**#0159**
Relative system performance (notes 1 and 2)						
Processor CPW	20200	8000 to 12000	12000 to 16500	16500 to 20200	12000	20200
Interactive CPW					0	0
#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	12/SStar/ 600 Mhz	24/SStar/ 600 Mhz
L2 Cache (MB)	16x4	16x4	16x4	16x4	16x4	16x4
Main storage (GB min/max)	4/128	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	4/16
Minimum operating system level	V5R1	V5R1	V5R1	V5R1	V5R1	V5R1
Processor group (note 8)	P40-P50	P40-P50	P40-P50	P40-P50	P40	P40

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 maximum
Disk storage minimum (GB)	8.58	-	-		
Maximum internal (GB)	1582.4	1582.4	4294.9	37978.2	
Maximum external (GB)	5626.4	6751.6	4260.6	37943.0	
Total maximum (GB) (note 9)	7208.8	8298.9	4294.9	37978.2	
DASD arms maximum (note 9)	205	205		1080	
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	32	-	-	32	
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 Ops Console is used on a #9771 WAN adapter. 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 a base CD-ROM in the migration tower (no feature code).
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.) 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.) 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

<table>
<tr><td>Note 8 (cont.)</td><td>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>Processor feature</th><th>Processor group</th></tr>
<tr><td>#2461</td><td>#1540</td><td>#26D0</td><td>P40</td></tr>
<tr><td></td><td>#1541</td><td>#26D1</td><td>P50</td></tr>
<tr><td></td><td>#1542</td><td>#26D2</td><td>P50</td></tr>
<tr><td></td><td>#1543</td><td>#26D3</td><td>P50</td></tr>
<tr><td></td><td>#1544</td><td>#26D4</td><td>P50</td></tr>
<tr><td></td><td>#1545</td><td>#26D5</td><td>P50</td></tr>
<tr><td></td><td>#1546</td><td>#26D6</td><td>P50</td></tr>
<tr><td></td><td>#1547</td><td>#26D7</td><td>P50</td></tr>
<tr><td></td><td>#1548</td><td>#26D8</td><td>P50</td></tr>
<tr><td>#0158</td><td></td><td>#0158</td><td>P40</td></tr>
<tr><td>#0159</td><td></td><td>#0159</td><td>P40</td></tr>
</table></td></tr>
<tr><td>Note 9</td><td>External DASD maximum assumes 17.54 GB LUNs. External DASD cannot exceed the maximum system capacity or the maximum number of disk arms.</td></tr>
</table>

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

Table 7: Summary of the iSeries Model 890

Model	890			
Processor feature	**#2487**	**#2488**	**#0197**	**#0198**
Relative system performance (note 1) Processor CPW Interactive CPW #1576 (Base) #1577 #1578 #1579 #1581 #1583 #1585 #1587 #1588 #1591	 20200-29300 120 240 560 1050 2000 4550 10000 16500 20200	 29300-37400 120 240 560 1050 2000 4550 10000 16500 20200 37400	 29300 0	 37400 0
Number/type/speed of processor	16 - 24/POWER4/ 1.3 GHz	24 - 32/POWER4/ 1.3 GHz	24/POWER4/ 1.3 GHz	32/POWER4/ 1.3 GHz
L2 Cache (MB)	1.5 MB/chip set	1.5 MB/chip set	1.5 MB/chip set	1.5 MB/chip set
L3 Cache (MB)	128 MB/MCM	128 MB/MCM	128 MB/MCM	128 MB/MCM
Main storage (GB Min-Max)	16-192	24-256	16-192	24-256
Main storage cards (Min/Max)	4/6	6/8	4/6	6/8
Minimum operating system level	V5R2	V5R2	V5R2	V5R2
Processor group (note 5)	P50-P60	P50-P60	P50	P50

Numbers are for all processors	Base system #9094	PCI Expansion Tower #5074	PCI Tower #8093	New system maximum	LPAR system maximum
Disk storage minimum (GB)	17.54	-	-		
Maximum internal (GB)	1582.2	1582.2	3164.4	71972.52	
Maximum external (GB) (note 4)	5625.6	6750.72	12376.32	71937.36	
Total maximum (GB)	7208.8			71972.52	
DASD arms maximum	205	237	442	2047	
Internal arms	45	45	90	2047	
External LUNs (note 4)	160	192	352	2046	
Diskette (8 or 5 ¼-inch)	N/A	N/A	N/A	N/A	
Communication lines (note 3)	38	52	90	480	
Twinax workstation controllers	9	11	20	180	
Twinaxial devices	360	440	800	7200	
Internal CD-ROM/DVD-RAM (note 2)	2	2	4	26	48
Internal tape	1	2	3	26	48
External CD-ROM/DVD-RAM	8	11	19	52	96
External tape)	9	11	20	52	96
Tape libraries maximum	8	11	19	52	96
Optical libraries	9	11	20	52	96
Physical packaging					
External HSL/HSL-2 ports	16	-	-	16	
External HSL/HSL-2 loops	8			14	
Optical HSL loops		-	-	12	
PCI towers	47	-	-	47	
External xSeries Server	32	-	-	32	
SPD towers	N/A	N/A	N/A	N/A	
PCI adapter card slots	14	14	28	672	
Maximum PCI IOA cards	11	11	15	528	
LAN ports	7	8	15	128	
Integrated xSeries Servers	2	2	4	32	
Cryptographic processor	8	8	8	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.
Note 2	There must be one DVD-RAM in the #9094 Base PCI I/O Enclosure.
Note 3	One line is used if #5544 System Console on Ops Console is used. One line might be used if the #5546 or #5548 System Console on LAN is selected and the #0367 Operations Console PCI Cable must be connected.
Note 4	Assumes 35.16 GB LUNs on external storage. Cannot exceed the new system maximum for capacity or number of arms.
Note 5	See the following table.

Model 890 processor				
Interactive feature	**#2487**	**#2488**	**#0197**	**#0198**
None			#25D3	#25D5
Processor group	P50	P50	P50	P50
#1576	#2AF0	#2AD0		
Processor group	P60	P50		
#1577	#2AF1	#2AD1	#1577	
#1578	#2AF2	#2AD2	#1578	
#1579	#2AF3	#2AD3	#1579	
#1581	#2AF5	#2AD5	#1581	
#1583	#2AF7	#2AD7	#1583	
#1585	#2AF9	#2AD9	#1585	
#1587	#2AFB	#2ADB	#1587	
#1588	#2AFC	#2ADC	#1588	
#1591		#2ADF	#1591	

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

Table 8: Summary of the iSeries Models SB2 and SB3

Model	SB2	SB3	
Processor feature	**#2315**	**#2316**	**#2318**
Relative system performance (note 1) Processor CPW Interactive CPW	7350 N/A	10000 N/A	16500 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 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 Physical minimum (GB) Physical maximum (GB) Logical maximum (RAID-5 protection)	 4 34.3 70.1 52.6	 6 34.3 105.2 87.7	 8 34.3 140.3 122.7

	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 Twinaxial devices	1 28	1 28	1 28	1 28	1 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 Ops Console is used on a #9771 WAN adapter. 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 is usable to attach towers. Other ports and loops are usable for clustering only.

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

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

AS/400e Server 250

AS/400e Server 250

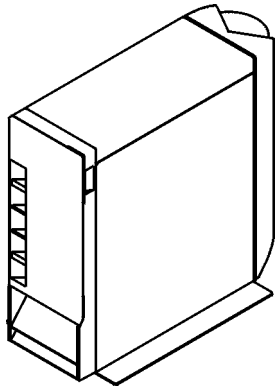
6

iSeries Model 250 packages

The Model 250 is an entry-level server sized for the small business customer. This chapter describes the iSeries Model 250 package models and the AS/400e server models.

iSeries Model 250

The Model 250 System Unit is a PCI-only based unit.



AS/400e Server 250 System Unit

iSeries Model 250 packages

Two package offerings are available for the iSeries Model 250. The packages correspond to the AS/400e Server 250 processors but provide specific configurations when ordered from IBM. The defined hardware configurations cannot be modified when ordered. However, additional features supported by the Model 250 may be added later through an IBM Business Partner.

The two packages are:

- #0297 Entry Package (CCIN 2295, 50/15 CPW)
- #0298 Growth Package (CCIN 2296, 75/20 CPW)

  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.

Both packages offer the following features:

- 256 MB of Memory (CCIN 3002)
- 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

- Two #6818 17.54 GB 10k RPM Disk Units with Disk Level Mirroring (#0040) activated
- #9771 Base PCI 2-Line WAN with Modem
- One CD-ROM unit (CCIN 6321)
- One #6382 4 GB ¼-inch Cartridge Tape Unit
- One #2838 PCI 100/10 Mbps Ethernet IOA
- #9720 Base PCI WAN/Twinaxial IOA option for Twinaxial Console

Note: The #9771 and #9720 support attachment of a communications cable. If a cable is required, it must be obtained from an IBM Business Partner after the initial order.

- The following V5R1 software products are always preloaded and included with the Model 250 packages:
  - 5769-SS1 OS/400 Base
  - 5769-QU1 Query
  - 5769-ST1 DB2 Query Manager and SQL Development Kit for AS/400
  - 5769-XW1 AS/400 Client Access Family

    The PPS processor group for processor-based packaged software (PPS) supports these four programs only when ordered as part of this package. Processor-based programs, other than these four, are charged at the P05 processor group when ordered for a Model 250 Package.

The iSeries Model 250 Packages are Customer Setup (CSU).

Model 250 PCI cards and features

The Model 250 is a Peripheral Component Interconnect (PCI)-based technology system. SPD cards do not attach to the 250 models. There are several types of PCI cards, each of which requires a specialized slot on the Model 250 backplane. The number of PCI cards that can be supported in a Model 250 depends on the number of controllers in the system.

The placement of PCI cards follows special rules. Consult the "PCI card placement rules for the iSeries server" chapter of the *IBM @server iSeries and AS/400e System Builder*, SG24-2155, and “PCI card technology” on page 326 before you propose any configuration.

Most features for the Model 250 are CIF. Non-CIF features include:

- #2748 PCI RAID Disk Unit Controller (*withdrawn from marketing* on 02 July 2002)
- #2763 PCI RAID Disk Unit Controller
- #7102 System Expansion Unit (*withdrawn from marketing* on 02 July 2002)
- Processor upgrades

Refer to Chapter 22, “Customer Install Features (CIF)” on page 445, 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

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. Refer to the number of active sessions in the table on page 140 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 140 for workstation considerations.

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

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

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

Use care in the selection of the controllers. Follow the configuration rules.

#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 is supported. This adapter also supports a single communication line. See “#9720 Base PCI WAN/Twinaxial IOA” on page 117.

#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 is supported. The #2746 is specified when additional PCI twinaxial workstation controllers are required and can be installed in either high- or low-speed slots.

Multifunction I/O processor (MFIOP)

A base MFIOP is standard on all Model 250 servers.

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 Two-Line WAN IOA, #2746 PCI Twinaxial Workstation IOA, or #9720 Base PCI WAN/Twinaxial IOA. C09 can also support a #2723 PCI Ethernet IOA or #2724 PCI 16/4 Mbps Token Ring IOA if C03 does not contain a #2838 PCI 100/10 Mbps Ethernet IOA.
- **Low-speed PCI slot (C08):** Supports #0398 Operations Console Package (CCIN 2745 and CCIN 0367) or #9720 Base 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 PCI Integrated Netfinity Server is installed in slots C02/C04, then C03 may be used for a #2723 PCI Ethernet IOA, #2724 PCI 16/4 Mbps Token Ring IOA, #2838 PCI 100/10 Mbps Ethernet IOA, or #2761 Integrated Analog Modem.
- **Reserved Slots (C02/C04):** The MFIOP supports #2866 PCI Integrated Netfinity Server in slots C02/C04 only if no card is installed in high-speed slot C03.

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

Communications

The following adapters support communications on the Model 250:

- #9720 Base PCI WAN/Twinaxial IOA
- #2745 PCI Two-Line WAN 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 20-ft. (6m) PCI cable
- #0349 V.24/EIA232 50-ft. (15m) PCI cable
- #0353 V.35 20-ft./6m PCI cable
- #0354 V.35 50-ft./15m PCI cable
- #0356 V.36 20-ft./6m PCI cable
- #0359 X.21 20-ft./6m PCI cable
- #0360 X.21 50-ft./15m PCI cable
- #0365 V.24/EIA232 80-ft./24m PCI cable
- #0367 Operations Console PCI Cable (not supported by configurator)

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

#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 20-ft. (6m) PCI cable. The #9720 also supports Twinaxial workstation controllers (see “Workstation controllers” on page 114). The #9720 is supported for migration only.

Notes:

- The #2720 Base PCI WAN/Twinaxial IOA can be ordered manually to change the console from Operations Console. The administrative sales records should be for RPO to show a #9720 Base PCI WAN/Twinaxial IOA installed.
- The #9720 and #2720 were *withdrawn from marketing* on 02 July 2002.

#9771 Base PCI 2-Line WAN with Modem

The #9771 is a two-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 via a telephone cable.

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

- #0348 V.24/EIA232 20-ft. (6m) PCI cable
- #0349 V.24/EIA232 50-ft. (15m) 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
- #0367 Operations Console 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 the wizard (5769-XE1 SF64217). Then use Operations 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 offer 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`

Fax is supported on the V.90 port with V5R1.

The #9771 supports the #5544 System Console on Ops Console on the RVX port of the #9771 Base PCI Two-Line WAN with integrated modem with OS/400 V5R1.

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 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).

You can find rules for individual communication cards (adapters or processors), with an explanation of the applicable feature description, in the *IBM @server iSeries and AS/400e 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 *IBM @server iSeries and AS/400e System Builder*, SG24-2155, and the iSeries *Information Center* at:

`http://www.ibm.com/eserver/iseries/infocenter`

Select **your location-> your language of choice-> Overview and What’s New**.

For general communications performance considerations, refer to the online document *iSeries Performance Capabilities Reference*, SC41-0607.

Local area networks and asynchronous transfer mode

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

- #9738 PCI 100/10 Mbps Ethernet IOA

Other adapters supporting LAN attachments are:

- #2838 PCI 100/10 Mbps Ethernet IOA

#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 iSeries server to attach to standardized 100 Mbps high-speed Ethernet LANs and allows attachment to existing 10 Mbps Ethernet LANs. This adapter comes with an RJ45 connector for attachment to UTP-5

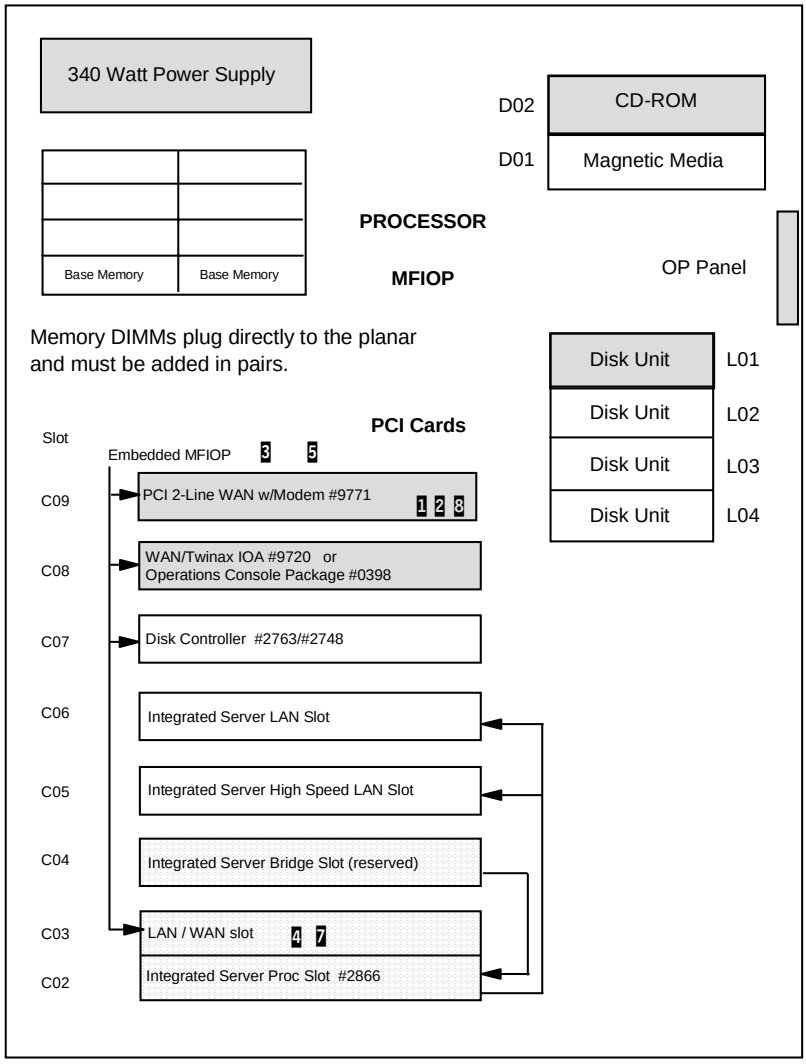
media. It requires one high-speed PCI card slot. The Ethernet /IEEE 802.3 IOA is capable of operating in half or full duplex mode. Cabling for 10 Mbps must be CAT-3 or CAT-5, and cabling for 100 Mbps must be CAT 5 that meets or exceeds Industry Standard EIA/TIA T568A or T568B.

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 #2866 PCI Integrated Netfinity Server 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 is 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, and #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.

Uninterruptable Power Supply (UPS)

The Model 250 does not have an internal battery backup unit (BBU). An external UPS is recommended to protect the system unit and any external components against utility power outages. The configurator adds a country (region)-specific UPS by default. The 9910 Models 080, 140, and 180 from the 9406 Model 170 may be used although the continuously powered main storage (CPM) is not supported.

Disk units

A maximum of 4 disk units is supported on the Model 250 packages. There is no support for an external disk on the Model 250.

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

Feature	Size	RPM	Maximum
#6818	17.54 GB	10000	4

For disk unit descriptions, refer to “PCI disk units” on page 348.

Disk storage controllers

#2763 PCI RAID Disk Unit Controller

See Chapter 18, “I/O adapters and controllers” on page 325.

Internal disk, tape, and CD-ROM support

For information on internal disk, refer to Chapter 19, “Internal disk, tape, CD-ROM, and DVD-RAM storage” on page 347.

For information on the base CD-ROM drive, refer to “Internal tape, CD-ROM, and DVD-RAM” on page 358.

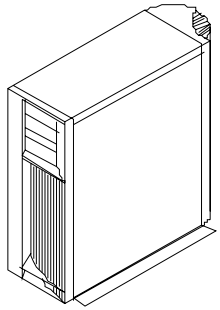
iSeries Server 270

iSeries Server 270

7

iSeries Model 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 a five times 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 the supports 850 MHz or 1 GHz 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 does not support concurrent maintenance
- Embedded Base PCI IOP

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

  – Support for #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 #5540, #5544, #5546, or #5548 System Console specify code.
- Hot plug PCI capability on the #2434 processor.

The following must be purchased:

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

Model 270 interactive	#2431	#2432	#2434
#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 132 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 PCI Disk Unit Controller may optionally be replaced with one of the following options:

– #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 Disk Unit 10k RPM
– #4318 17.54 GB Disk Unit 10k RPM
– #4319 35.16 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 IOA

  #4746 PCI Twinaxial IOA

– #5544 System Console on Ops Console

  #0367 Operations Console PCI Cable

  - #5546 System Console on 100 Mbps Token Ring

    #2744 PCI 100 Mbps Token Ring IOA

  - #5548 System Console on 100 Mbps Ethernet

    #4838 PCI 100/10 Mbps Ethernet IOA

- Uninterruptible Power Supply (UPS)

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

Model 270 PCI cards and features

The Model 270 is a Peripheral Component Interconnect (PCI) based technology system. SPD cards do not attach to the 270 models. The number of PCI cards that can be supported in a Model 270 depends on the number of controllers in the system.

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)

Refer to Chapter 22, “Customer Install Features (CIF)” on page 445, to determine the CIF status for each supported feature.

The placement of PCI cards follows special rules. Consult the “PCI card placement rules for the iSeries server” chapter of the *IBM @server iSeries and AS/400e System Builder*, SG24-2155, and “PCI card technology” on page 326 before you propose any configuration.

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 high-speed link (HSL) enablement (tower attachment)

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 Model 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 iSeries” on page 49.

The Model 270 supports various levels of interactive performance through the installation of interactive features. The available interactive options are shown in the Model 270 Processor/Interactive Feature Table on page 128.

A feature cross-reference table can be used to relate Processor Feature Code to the processor and interactive features visible in the IBM marketing configurator. The Processor Feature Code is found by displaying the QPRCFEAT system value or in the Hardware Service Manager report. 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 allowed (including mixing stacked (#3025) and unstacked (#3024) memory technology).

Allowable main storage increments (MB)

Processor	Without #2884					With #2884								
Memory increment	#2248	#2250	#2252	#2422	#2423	#2252	#2253	#2423	#2424	#2431	#2432	#2434	#2452	#2454
256	X	X	X	X	X	X	X	X	X	X	X	X	X	X
512	X	X	X	X	X	X	X	X	X	X	X	X	X	X
768	X	X	X	X	X									
1024	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1280	X	X	X	X	X									
1536	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1792	X	X	X	X	X									
2048	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2304	X	X	X	X	X									
2560	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2816	X	X	X	X	X									

Processor / Memory increment	Without #2884					With #2884								
	#2248	#2250	#2252	#2422	#2423	#2252	#2253	#2423	#2424	#2431	#2432	#2434	#2452	#2454
3072	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3328	X	X	X	X	X									
3584	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3840														
4096	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4608						X	X	X	X	X	X	X	X	X
5120						X	X	X	X	X	X	X	X	X
5632						X	X	X	X	X	X	X	X	X
6144						X	X	X	X	X	X	X	X	X
6656						X	X	X	X	X	X	X	X	X
7168						X	X	X	X	X	X	X	X	X
7680												X		X
8192						X	X	X	X	X	X	X	X	X
8704												X		X
9216												X		X
9728												X		X
10240												X		X
10752												X		X
11264												X		X
12288												X		X
12800												X		X
13312												X		X
14336												X		X
16384												X		X

Power and packaging

The Model 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. Continuously powered main storage (CPM) is not supported on the Model 270. An external UPS, combined with improvements in OS/400 management of abnormal IPLs, can provide an equivalent level of power protection and fast recovery in the event of power failure.

The iSeries 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 270 server.

The supported power and packaging features for the 270 models 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 Model 270 is mounted in a rack. See “Model 270 upgrades” on page 145 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 PDU Line Cord
  - See “#0551 iSeries Rack” on page 275 for a complete description of the #0551 iSeries Rack and supported features and specify codes.
- #7002 HSL Enabler
  - The #7002 is an HSL internal flex cable, which enables HSL capability to allow 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, a Record Purpose Only (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 145.

- #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

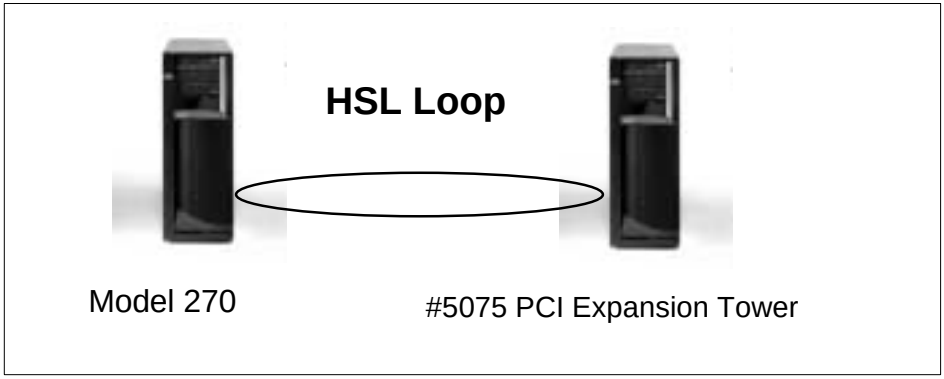
  See “Expansion towers” on page 254 for detailed information.

High-speed link (HSL) on Model 270

The Model 270 has been enhanced to provide an external connection to an expansion tower as shown in the following figure. The 270’s single HSL loop

supports one #5075 PCI Expansion Tower and up to two xSeries servers attached via the Integrated xSeries Adapter. 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.

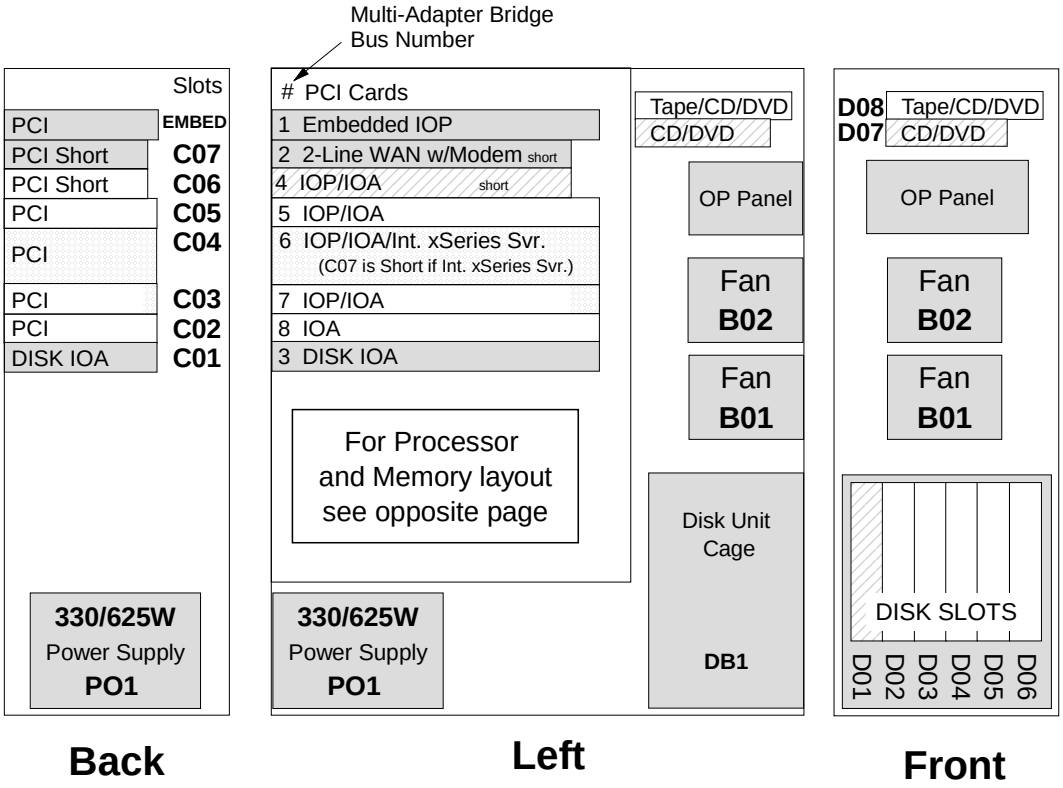
The Model 270s that use the SStar processors can participate in an HSL OptiConnect cluster consisting of one other system and up to four Integrated xSeries Adapter towers or up to two #5075s and two Integrated xSeries Adapter towers or two other systems (V5R2 only) with no towers on that loop.



9406 Model 270 schematics

The following diagrams show the slot and feature card arrangement of the Model 270 system unit, processor, memory cards, and supported expansion units.

Model 270 System Unit



Legend

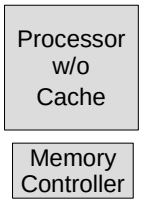
Base Feature

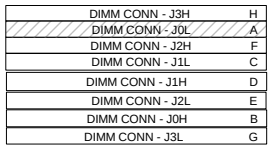
Required Feature

Unavailable if Integrated xSeries Server is installed

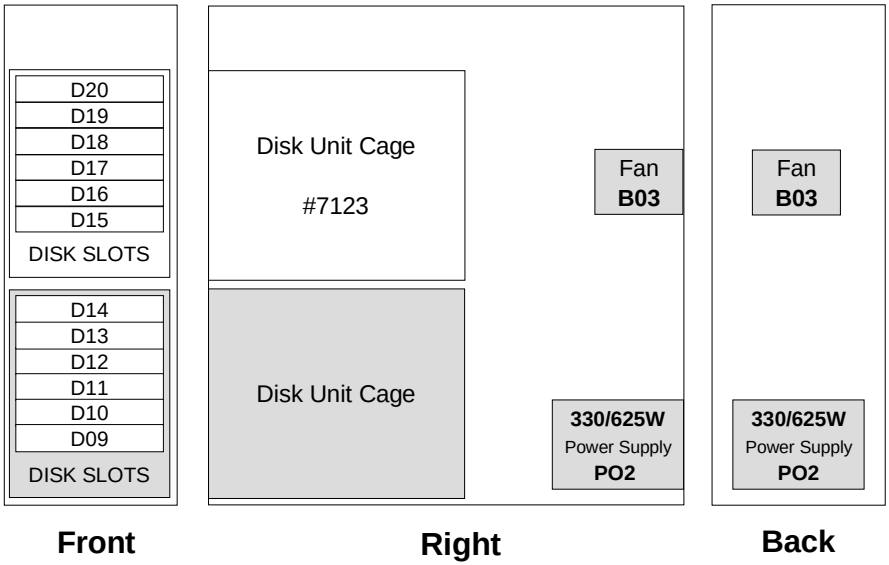
Model 270 Processor and Memory

#2431, #2432, #2452





Model 270 #7104 System Unit Expansion DASD Sidecar



For information on the #5075 PCI Expansion Tower, see “#5075 PCI Expansion Tower” on page 258.

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

5250 Express Data Stream

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*. This section discusses the throughput considerations.

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 Enhanced Twinaxial 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 Enhanced Twinaxial 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

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.

The #0382 Remote Control Panel Cable enables use of the Remote Control Panel function on a PC.

For cable connection details and PC requirements, see the “AS/400 Operations Console Setup Guide”, which is available on the Web at:

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

Consider these points:

- Due to the way EPP Version 1.9 support is implemented for 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 that run the Windows NT 4.0 or Windows 2000 Professional PC operating system.

The #0382 was *withdrawn from marketing* on 02 July 2002.

Note: Some PCs may not support this function due to BIOS or hardware incompatibilities.

I/O processor and I/O adapter support

This section lists the supported IOPs and IOAs. See Chapter 17, “I/O processors” on page 309, and Chapter 18, “I/O adapters and controllers” on page 325, for full descriptions.

Note: PCI configuration rules are quite flexible. See the “PCI card placement rules for the iSeries server” chapter of the *IBM @server iSeries and AS/400e System Builder*, SG24-2155, for configuration rules on placing PCI cards.

LAN/WAN/workstation IOAs

- #2743 1 Gbps PCI Ethernet IOA
- #2744 PCI 100 Mbps Token Ring IOA
- #2760 PCI 1 Gbps Ethernet UTP Adapter
- #2772 PCI Dual WAN/Modem IOA
- #2773 PCI Dual WAN/Modem IOA (ANSI)
- #2805 PCI Quad Modem IOA
- #2806 PCI Quad Modem (CIM)
- #2817 PCI 155 Mbps MMF ATM IOA
- #4745 PCI 2-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 (*withdrawn from marketing* on 02 July 2002)
- #4801 PCI Cryptographic Coprocessor
- #4838 PCI 100/10 Mbps Ethernet IOA
- #5700 PCI 1 Gbps Ethernet IOA
- #5701 PCI 1 Gbps Ethernet UTP 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 (*withdrawn from marketing* on 02 July 2002)
- #4778 PCI RAID Disk Unit Controller

- #9767 Base PCI Disk Unit Controller

Note the following considerations for an Internal Disk Unit Controller configuration:

- The system unit supports up to two disk unit controllers to control disks in the system unit and #7104 System Unit Expansion (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 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 286F, CCIN 286C, CCIN 284E)
- #2842 32 MB PCI IOP
- #2890 PCI Integrated Netfinity Server
- #2891 PCI Integrated xSeries Server
- #2892 PCI Integrated xSeries Server
- #2899 PCI 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 Chapter 19, “Internal disk, tape, CD-ROM, and DVD-RAM storage” on page 347, for full descriptions.

Internal disk units

- #4317 8.58 GB Disk Unit 10k RPM
- #4318 17.54 GB Disk Unit 10k RPM
- #4319 35.16 GB 10k RPM Disk Unit
- #4331 1.6 GB Read Cache Device

Internal tape, CD-ROM, and DVD-RAM

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

Model 270 upgrades

Supported model upgrades within the 270 servers are identified in this table.

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		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 supported when the Model 270 is mounted in a #0551 iSeries Rack due to the availability of “lift covers”.

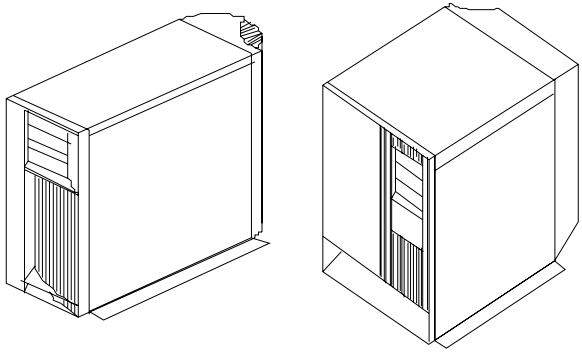
iSeries Dedicated Server for Domino

iSeries Dedicated Server for Domino

8

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 iSeries Models 270 and 820.



Model 270 Model 820

iSeries Dedicated Server for Domino System Units

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 Chapter 7, “iSeries Model 270” on page 127, and Chapter 9, “iSeries Model 820” on page 159.

The iSeries Models 270 and 820 families include processor features for the iSeries Dedicated Server for Domino supported as of OS/400 V5R1. The Dedicated Domino processor capabilities are summarized in the following 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 of processor	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 Interactive CPW Simple Mail Users Mail and Calendaring Users	100 0 3860 2570	200 0 8420 5610	300 0 14840 9890
Number of processors/type of processor	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 servers. The results (reported values) can be used to compare relative performance characteristics of processor features offered for iSeries 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 that reflects the maximum amount of non-Domino workload (10 to 15% of CPU) that can be supported.
  - Interactive CPW is an approximate value that reflects 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 that perform simultaneous interactive tasks are 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:

- Two MB L2 cache
- 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.

- Embedded base IOP (CCIN 286C)
- Common Service Processor (CCIN 25B9)

– #2454 Dedicated Domino processor: SStar 2-way processor includes:

  • Four MB L2 cache
  • 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.

  • Base I/O backplane (CCIN 282F)
  • Embedded base IOP (CCIN 284E)
  • Common Service Processor (CCIN 282F)
  • 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 with 600 MHz Oscillator, Smart Chip VPD Card
  • 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.

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

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

  • One 4 MB L2 with 600 MHz Oscillator, Smart Chip VPD Card
  • 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.

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

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

- One 4 MB L2 with 600 MHz Oscillator, Smart Chip VPD Card
- 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 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 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.

- Base I/O backplane (CCIN 282D)

CIF features

Refer to Chapter 22, “Customer Install Features (CIF)” on page 445, 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 Dedicated Server for Domino 270 Models, refer to the 270 system diagrams on page 138. For processor and memory layout diagrams for the Dedicated Server for Domino 820 Models, refer to the 820 system diagrams on page 174.

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
2456								B	B
2457									B

iSeries Server 820

iSeries Server 820

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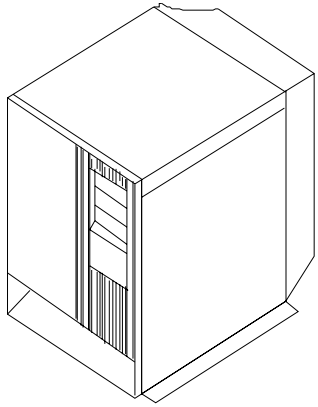
iSeries Model 820

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 820 System

- 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

defaults to 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 determines which feature combinations are to be on the order based on the #5540, #5544, #5546, or #5548 System Console specify code.

  • The console on LAN options require a dedicated LAN adapter. A #0367 Operations Console PCI Cable is added to the order by the marketing configurator. One #0367 Operations Console PCI Cable is required for Console on LAN.

  • #5540 System Console on Twinaxial Workstation IOA

    #4746 PCI Twinaxial IOA

  • #5544 System Console on Ops Console

    #0367 Operations Console PCI Cable

  • #5546 System Console on 100 Mbps Token Ring

    #2744 PCI 100 Mbps Token Ring IOA

  • #5548 System Console on 100 Mbps Ethernet (Default)

    #4838 PCI 100/10 Mbps Ethernet IOA

These required features must be purchased:

► Processor (one must be specified)

  – #0150 processor (SStar 600 Mhz Uni) (1100 CPW)
  – #0151 2-way processor (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)

Model 820 Interactive feature	#0150	#0151	#0152	#2435	#2436	#2437	#2438
	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)

  The #3005 and #3006 *cannot* 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 Disk Unit 10k RPM
  - #4318 17.54 GB Disk Unit 10k RPM
  - #4319 35.16 GB 10k RPM Disk Unit

- Integrated CD-ROM/DVD-RAM
  - #4425 CD-ROM
  - #4430 DVD-RAM
  - #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 IOA

    #4746 PCI Twinaxial IOA

  - #5544 System Console on Ops Console

    #0367 Operations Console PCI Cable

- #5546 System Console on 100 Mbps Token Ring

  #2744 PCI 100 Mbps Token Ring IOA

- #5548 System Console on 100 Mbps Ethernet

  #4838 PCI 100/10 Mbps Ethernet IOA

- Uninterruptible Power Supply

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

The Model 820 server initial installation is Customer Setup (CSU). Model upgrades are performed by IBM service representatives. Refer to Chapter 22, "Customer Install Features (CIF)" on page 445 for CIF designations of individual features.

Model 820 PCI cards and features

All SPD cards are now *withdrawn from marketing* and cannot be ordered. SPD cards are supported in V5R2 only via a migration tower with an upgrade to the 820 system.

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)

Refer to Chapter 22, "Customer Install Features (CIF)" on page 445, to determine the CIF status for each supported feature.

The placement of PCI cards follows special rules. Consult the "PCI card placement rules for the iSeries server" chapter of the *IBM @server iSeries and AS/400e System Builder*, SG24-2155, and "PCI card technology" on page 326 before you propose any configuration.

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 one 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 that reflects the portion of Processor CPW that can be used for workloads performing interactive (5250)-based tasks.

An iSeries 820 server 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.

- Using Operations Navigator (GUI administration functions) is not considered interactive work.

The available interactive options are shown in the table 161.

For a discussion of how these features influence system performance, see “IBM Workload Estimator for iSeries” on page 49.

Use the feature cross-reference table to relate the Processor Feature Code to the processor and interactive features visible in the IBM marketing configurator. Display the QPRCFEAT system value or find within the Hardware Service Manager 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	P20
#0152	none	#0152	P30
#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. 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.

  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.
- Eight slots are 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 Riser 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. If more than eight DIMMs total are required, a #2884 Main Storage Expansion Riser 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.

  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.

  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 Riser Card:

- The #2884 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 #2884 Main Storage Expansion Riser Card is added or ordered.

Allowable main storage increments (MB)

Processor Memory increment	#0150	#0151	#0152	#2395	#2396	#2397	#2398	#2425	#2426	#2427	#2435	#2436	#2437	#2438	#2456	#2457	#2458
256	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
512	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
768	X			X	X			X			X	X			X		
1024	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1280	X			X	X			X			X	X			X		
1536	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1792	X			X	X			X			X	X			X		
2048	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2304	X			X	X			X			X	X			X		
2560	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2816	X			X	X			X			X	X			X		
3072	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3328	X			X	X			X			X	X			X		
3584	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3840	X										X	X			X		
4096	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4352	X										X	X			X		
4608	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
4864	X										X	X			X		
5120	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X

Processor Memory increment	#0150	#0151	#0152	#2395	#2396	#2397	#2398	#2425	#2426	#2427	#2435	#2436	#2437	#2438	#2456	#2457	#2458
5376	X										X	X			X		
5632	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
6144	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
6400	X										X	X			X		
6656	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
7168	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
7680	X	X	X			X	X		X	X		X	X	X	X	X	X
8192	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
8704	X	X	X			X	X		X	X		X	X	X	X	X	X
9216	X	X	X			X	X		X	X		X	X	X	X	X	X
9728	X	X	X			X	X		X	X		X	X	X	X	X	X
10240	X	X	X			X	X		X	X		X	X	X	X	X	X
10752	X	X	X			X	X		X	X		X	X	X	X	X	X
11264	X	X	X			X	X		X	X		X	X	X	X	X	X
11766						X	X		X	X							
12288	X	X	X			X	X		X	X		X	X	X	X	X	X
12800	X	X	X			X	X		X	X		X	X	X	X	X	X
13312	X	X	X			X	X		X	X		X	X	X	X	X	X
14336	X	X	X			X	X		X	X		X	X	X	X	X	X
14848						X	X		X	X							
15360						X	X		X	X							
16384	X	X	X			X	X		X	X		X	X	X	X	X	X
16896		X	X										X	X		X	X
17408		X	X										X	X		X	X
17920		X	X										X	X		X	X
18432		X	X										X	X		X	X
18944		X	X										X	X		X	X

Processor Memory increment	#0150	#0151	#0152	#2395	#2396	#2397	#2398	#2425	#2426	#2427	#2435	#2436	#2437	#2438	#2456	#2457	#2458
19456		X	X										X	X		X	X
19968		X	X										X	X		X	X
20480		X	X										X	X		X	X
20992		X	X										X	X		X	X
21504		X	X										X	X		X	X
22016		X	X										X	X		X	X
24576		X	X										X	X		X	X
25088		X	X										X	X		X	X
25600		X	X										X	X		X	X
26112		X	X										X	X		X	X
26624		X	X										X	X		X	X
27136		X	X										X	X		X	X
27648		X	X										X	X		X	X
28672		X	X										X	X		X	X
29184		X	X										X	X		X	X
29696		X	X										X	X		X	X
30720		X	X										X	X		X	X
32768		X	X										X	X		X	X

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 main storage (CPM) function is not supported on the Model 820. An external UPS, combined with improvements in OS/400 management of abnormal IPLs, can provide an equivalent level of power protection and fast recovery in the event of power failure.

The supported power and packaging features are:

- #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 the #5102 alone as a Miscellaneous Equipment Specification (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`
  - IBM marketing 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.

    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 DASD Expansion Unit 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

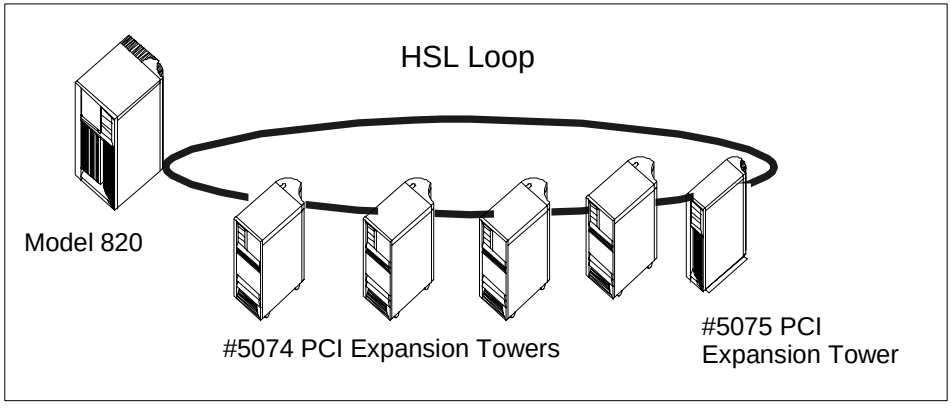
- Prerequisite: #5157 Feature Power Supply

- #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 which can attach up to five of #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 up to eight external xSeries servers. The loop also supports one #5033, #5034, or #5035 Migration Tower I. A migration tower reduces the total number of new I/O towers by one. The Model 820s that use SStar processors can participate in an HSL OptiConnect cluster consisting of one other system and up to four towers in any combination of I/O towers and Integrated xSeries Adapter towers or two other systems (V5R2 only) with no towers on that loop.

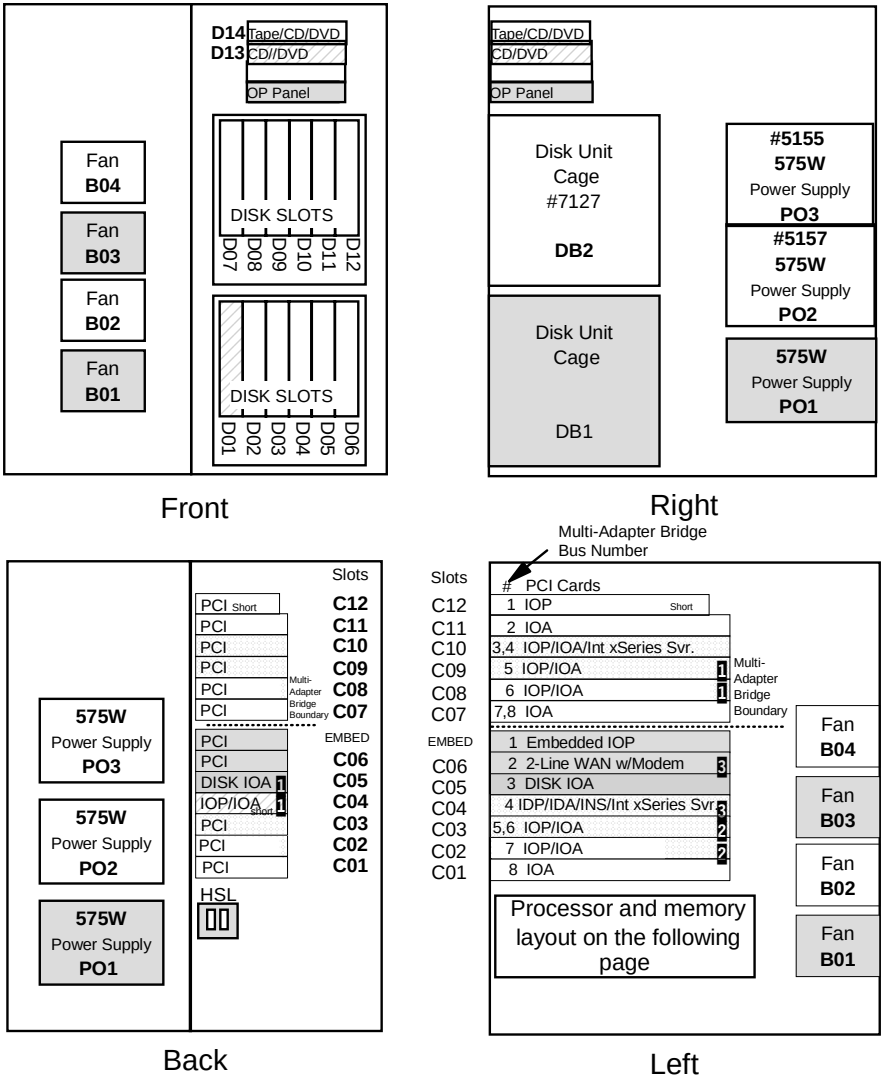
The following figure provides an example of the maximum supported tower configuration of a stand-alone Model 820 (not including external xSeries servers).



9406 Model 820 schematics

The following diagrams show the slot and feature card arrangement of the Model 820 system unit, processor, and memory cards. Schematics of the supported expansion units are found in Chapter 14, “Towers and racks” on page 253.

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.

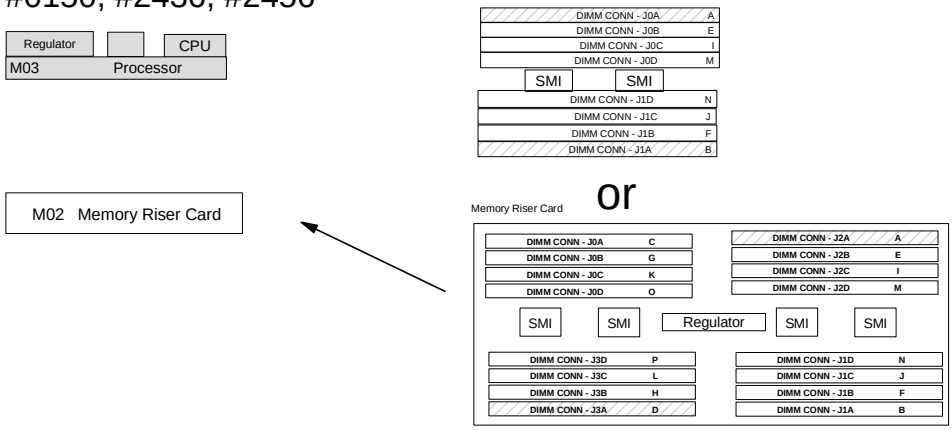
Note 2: If C04 has an Integrated xSeries Server, slot C03 is not available, and slot C02 is available only as a short slot.

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

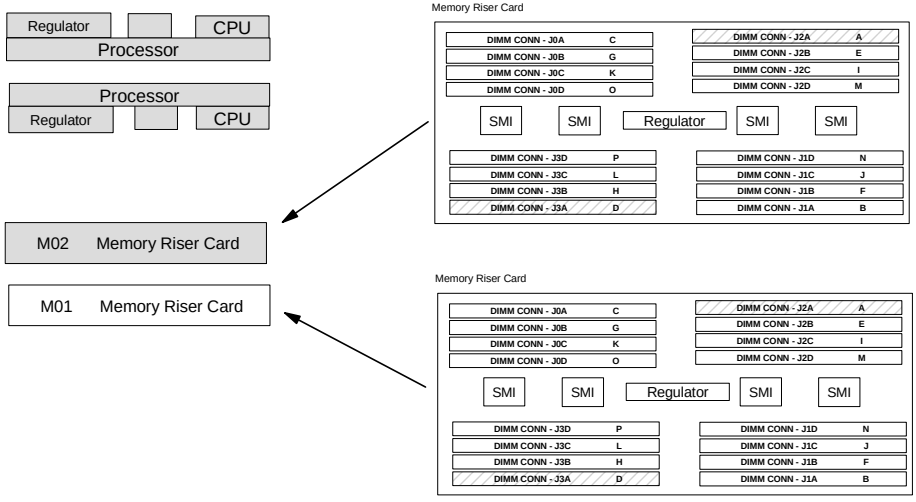
#2435

#0150, #2436, #2456



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



Workstation controllers

Refer to “Workstation controllers” on page 139 for a description of workstation controller support.

Remote control panel

Refer to “Remote control panel” on page 141 for a description of remote control panel support.

I/O processor and I/O adapter support

This section lists the supported IOPs and IOAs. See Chapter 17, “I/O processors” on page 309, and Chapter 18, “I/O adapters and controllers” on page 325, for full descriptions.

Note: PCI configuration rules are quite flexible. See the “PCI card placement rules for the iSeries server” chapter of the *IBM @server iSeries and AS/400e System Builder*, SG24-2155, for configuration rules on placing PCI cards.

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
- #2805 PCI Quad Modem IOA
- #2806 PCI Quad Modem IOA
- #2817 PCI 155Mbps MMF ATM
- #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 (*withdrawn from marketing* on 02 July 2002)
- #4801 PCI Cryptographic Coprocessor
- #4838 PCI 100/10 Mbps Ethernet IOA
- #5700 PCI 1 Gbps Ethernet IOA
- #5701 PCI 1 Gbps Ethernet UTP 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 (*withdrawn from marketing* on 02 July 2002)
- #4778 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 PCI Integrated Netfinity Server (*withdrawn from marketing* on 31 May 2001)
- #2791 Integrated xSeries Server
- #2792 PCI Integrated xSeries Server
- #2799 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 348 and “Internal tape, CD-ROM, and DVD-RAM” on page 358 for full descriptions.

Internal disk units

- #4317 8.58 GB 10k RPM Disk Unit
- #4318 17.54 GB 10k RPM Disk Unit
- #4319 35.16 GB 10k RPM Disk Unit
- #4331 1.6 GB Read Cache Device

Internal tape, CD-ROM, and DVD-RAM

- #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
- #4684 30 GB ¼-inch Cartridge Tape Unit

External towers

These towers attach to the Model 820 using high-speed link:

- #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

See “Expansion towers” on page 254 for full descriptions.

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, 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 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, or #6533 and one port on OLP card #2688 in System Unit Expansion #9364/#5064
#5083	1063M System Unit Expansion	See #5082

Migration tower hardware

To connect migration towers, select one of these features:

- #2686 Optical Link Processor (266 Mbps) (*withdrawn from marketing* on 28 December 2001)
- #2688 Optical Link Processor (1063 Mbps)

For hardware supported in the migration towers, refer to “Migration tower PCI hardware” on page 343 and “Migration tower SPD hardware” on page 344.

Model 820 upgrades

Supported model upgrades for the 820 server are identified in *IBM @server iSeries Supported Upgrades*, REDP0322.

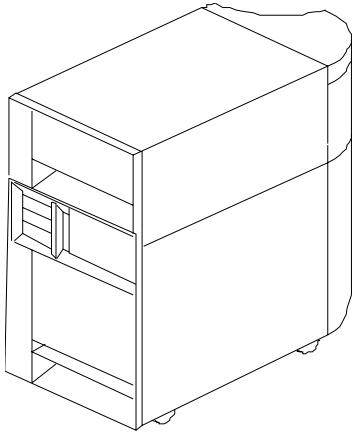
iSeries Server 830

iSeries Server 830

10

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
- Line-cord features
- Main Storage Expansion Card (slot M02) (CCIN 2881)
- Bus Expansion/clock card: Specify one of these features:
  - #9774 Base HSL Ports - 2 Optical/6 Copper: Specify with processor #2400
  - #9777 Base HSL Ports - 8 Copper: Specify with processor #2400
  - #9752 Base HSL Ports - 8 Copper: Specify with processors #0153, #2402, #2403, #2349, and #2351
  - #9758 Base HSL Ports - 2 Optical/6 Copper: Specify with processors #0153, #2402, #2403, #2349, and #2351

- PCI and CSP Card (CCIN 28AA)
- Bus Adapter (CCIN 2681)
- Operator Panel with key stick (CCIN 247A)
- #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 determines which feature combinations will be on the order based on the #5540, #5544, #5546, or #5548 System Console specify code.

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)
  - #2349 4/8-way POD (IStar 540 Mhz) (4200/7350 CPW) requires V5R1
  - #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 before you place an order for #2351 or #1605 POD Activation.
  - #0153 8-way base processor: No interactive (IStar 540 Mhz) (7350 CPW); requires V5R1
- Interactive card (one must be specified for non-base processors)

Model 830 Processor feature	**#2400**	**#2402**	**#2403**	**#2349**	**#0153**
Relative system performance (note 1)	1850	4200	7350	4200/7350	7350
Processor CPW					
Interactive CPW					
None					0
#1531 (Base)	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 #0153, #2403, 2349 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 - 1 GB 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 Disk Unit 10k RPM
  - #4318 17.54 GB Disk Unit 10k RPM
  - #4319 35.16 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 IOA

    #4746 PCI Twinaxial IOA
  - #5544 System Console on Ops Console

    #0367 Operations Console PCI Cable
  - #5546 System Console on 100 Mbps Token Ring
    - #2744 PCI 100 Mbps Token Ring IOA
    - #0367 Operations Console PCI Cable
  - #5548 System Console on 100 Mbps Ethernet

- #4838 PCI 100/10 Mbps Ethernet IOA
- #0367 Operations Console PCI Cable

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

Model 830 PCI cards and features

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

All SPD cards are now *withdrawn from marketing* and cannot be ordered. SPD cards are supported in V5R2 only via a Migration Tower with an upgrade to the 830 system.

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.

Refer to Chapter 22, “Customer Install Features (CIF)” on page 445, to determine the CIF status for each supported feature.

The placement of PCI cards follows special rules. Consult the "PCI card placement rules for the iSeries server" chapter of the *IBM @server iSeries and AS/400e System Builder*, SG24-2155, and “PCI card technology” on page 326 before you propose any configuration.

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 Chapter 3, “Workload and performance” on page 47.

Interactive features

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

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

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

For a discussion of how these features influence system performance, see Chapter 3, “Workload and performance” on page 47.

A feature cross-reference table provided on the iSeries server can be used to relate the Processor Feature Code to the processor and interactive features visible in the IBM marketing configurator. The Processor Feature Code is found by displaying the QPRCFEAT system value or in the Hardware Service Manager

report. The Processor Feature Code is used when ordering software license keys. Or refer to the Model 830 processor/interactive feature table on page 182.

Processor group is determined by a combination of the processor and interactive feature. This table provides a cross reference for the Model 830.

	Model 830 processor				
Interactive feature	**#2400**	**#2402**	**#2403**	**#2349**	**#0153**
None					#245D
#1531	#23C1	#23D1	#23D8	#24D8	
Processor group	P20	P30	P40	P30	P30
#1532	#23C2	#23D2	#23D9	#24D9	
#1533	#23C3	#23D3	#23DA	#24DA	
#1534	#23C4	#23D4	#23DB	#24DB	
#1535	#23C5	#23D5	#23DC	#24DC	
#1536		#23D6	#23DD	#24DD	
#1537			#23DE	#24DE	
Processor group	P30	P40	P50	P40	P30

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 is 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 octals 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.
- For Miscellaneous Equipment Specification (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.
- 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.

For the #0153, #2403, #2349 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.

Allowable main storage increments (MB)

Version/Release Memory increment	V4R5	V5R1	V5R2
1024	X	X	X
3072	X	X	X
5120	X	X	X
7168	X	X	X
9216	X	X	X
11264	X	X	X
13312	X	X	X

Version/Release Memory increment	V4R5	V5R1	V5R2
2048	X	X	X
4096	X	X	X
6144	X	X	X
8192	X	X	X
10240	X	X	X
12288	X	X	X
14336	X	X	X

Version/Release Memory increment	V4R5	V5R1	V5R2
15360	X	X	X
17408	X	X	X
19456	X	X	X
21504	X	X	X
23552	X	X	X
25600	X	X	X
27648	X	X	X
29696	X	X	X
31744		X	X
33792		X	X
35840		X	X
37888		X	X
39936		X	X
41984		X	X
44032		X	X
46080		X	X
48128		X	X
50176		X	X
52224		X	X
54272		X	X
56320		X	X
58368		X	X
61440		X	X

Version/Release Memory increment	V4R5	V5R1	V5R2
16384	X	X	X
18432	X	X	X
20480	X	X	X
22528	X	X	X
24576	X	X	X
26624	X	X	X
28672	X	X	X
30720	X	X	X
32768	X	X	X
34816		X	X
36864		X	X
38912		X	X
40960		X	X
43008		X	X
45056		X	X
47104		X	X
49152		X	X
51200		X	X
53248		X	X
55296		X	X
57344		X	X
59392		X	X
65536		X	X

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 main storage (CPM) is not supported on the Model 830. An external UPS can allow the system to run uninterrupted for longer than 30 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 supported power and packaging features are:

- Processor Enclosure
  - Bulks (1100 watt) (CCIN 515B) (quantity two)
  - Regulator (CCIN 27AA with Processors #2400 and #2402, CCIN 27AB with Processor #2403)
- #9074 Base I/O Tower
  - Bulks (765 watt) (CCIN 515A) (quantity two)
  - AC Input/Charger
  - Batteries (quantity four)
- #5103 Dual Line Cords - 830 CEC
  - 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.
  - If the #9074 has a #5101 30 Disk Unit Expansion installed, the #5101 must be converted to a #5111.
  - OS/400 V5R1 (with PTFs) or later is required. Refer to Informational APAR II12950 at:

    `http://as400service.rochester.ibm.com/supporthome.nsf/document/10000035`
  - IBM marketing 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 274 for a description of the #0550 iSeries Rack.

#5101 30 Disk Unit Expansion

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

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 (with PTFs) or later is required. Refer to Informational APAR II12950 at:

`http://as400service.rochester.ibm.com/supporthome.nsf/document/10000035`

#9074 Base I/O Tower

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

One internal high-speed link (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 Base 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 or hot swap power supplies. The #9074 is capable of controlling Ultra2 SCSI disk units. The 11 PCI IOAs are supported (driven) by the #9943 Base PCI IOP and by #2843 PCI IOPs or #2791 PCI Integrated xSeries Server.

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 Unit Expansion.

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

High-speed link on Model 830

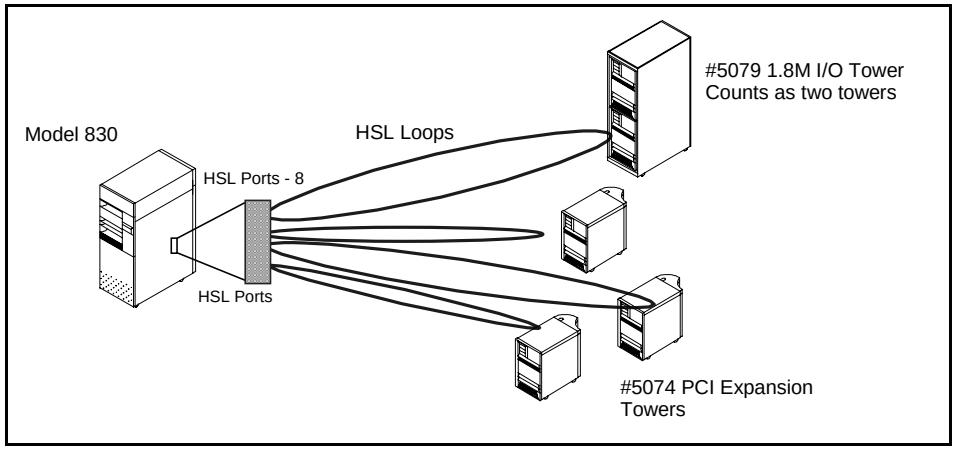
The Optical Fiber HSL Loop extends the distance between the 830 system unit and the I/O units from a limit of 15 meters prior to V5R2, to a maximum of 250 meters. The extra length can help to improve data reliability and protection.

The Model 830 supports up to four HSL loops, one of which can be an Optical Fiber HSL Loop.

Optical and copper HSL cables may not be intermixed within a loop. Each loop supports the attachment of up to four #5074 I/O towers (with the #5079 counting as two #5074s), #5078 PCI Expansion Units, #0578 PCI Expansion Units in Rack, and up to eight external xSeries servers, with a maximum total of nine towers in any combination of I/O towers and external xSeries servers per loop. Only #5074, #5079, #0578, and #5078 may be attached to the Optical Fiber HSL loop. The Model 830 supports up to 21 towers.

The Model 830 supports the #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. Two of the loops on the 830 can be used to participate in HSL OptiConnect clusters consisting of one other system and up to four towers in any combination of I/O towers and Integrated xSeries Adapter towers or two other systems (V5R2 only) with no towers on that loop.

The following figure shows the Model 830 and five connected towers. For further details, see *AS/400e to IBM @server iSeries Migration: A Guide to System Upgrades at V4R5 and V5R1*, SG24-6055.

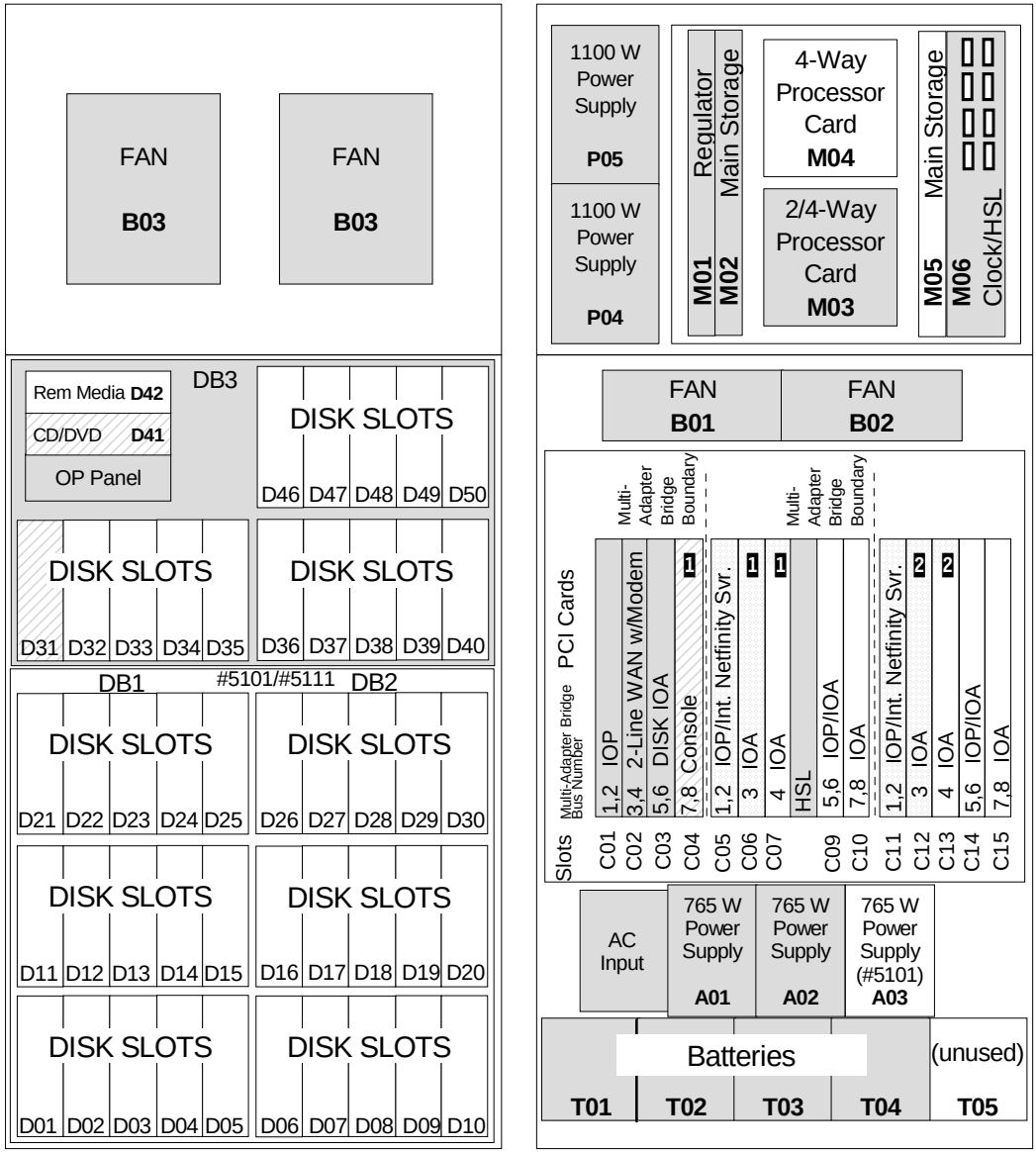


9406 Model 830 schematics

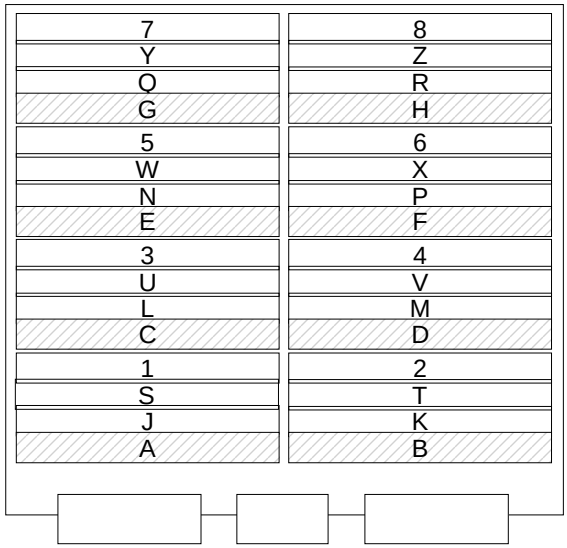
The following diagrams show the slot and feature card arrangement of the Model 830 system unit, processor, and memory cards. Schematics of the supported expansion units are found in Chapter 14, “Towers and racks” on page 253.

Model 830 System Unit (n-way)

#0153, #2400, #2402, #2403, #2349, #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.

Workstation controllers

Refer to “Workstation controllers” on page 139 for a description of workstation controller support.

Remote control panel

Refer to “Remote control panel” on page 141 for a description of remote control panel support.

I/O processor and I/O adapter support

This section lists the supported IOPs and IOAs. See Chapter 17, “I/O processors” on page 309, and Chapter 18, “I/O adapters and controllers” on page 325, for full descriptions.

Note: PCI configuration rules are quite flexible. See the “PCI card placement rules for the iSeries server” chapter of the *IBM @server iSeries and AS/400e System Builder*, SG24-2155, for configuration rules on placing PCI cards.

LAN/WAN/workstation IOAs

- #2742 PCI Two-Line WAN IOA (requires V5R2)
- #2743 PCI 1 Gbps Ethernet IOA
- #2744 PCI 100 Mbps Token Ring IOA
- #2760 PCI 1 Gbps Ethernet UTP IOA
- #2772 Dual WAN/Modem Adapter
- #2773 Dual WAN/Modem Adapter
- #2793/#2794 Two-Line WAN IOA with Modem (requires OS/400 V5R2)
- #2805 PCI Quad Modem IOA
- #2806 PCI Quad Modem IOA
- #2817 PCI 155 Mbps MMF ATM
- #2849 10/100 Ethernet Adapter (requires OS/400 V5R2)
- #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 (*withdrawn from marketing* on 02 July 2002)
- #4801 PCI Cryptographic Coprocessor
- #4838 PCI 100/10 Mbps Ethernet IOA
- #5700 PCI 1 Gbps Ethernet IOA
- #5701 PCI 1 Gbps Ethernet UTP 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

- #2790 PCI Integrated Netfinity Server (*withdrawn from marketing* on 31 May 2001)
- #2791 Integrated xSeries Server
- #2792 PCI Integrated xSeries Server
- #2799 Integrated xSeries Server
- #2843 PCI IOP (64 MB)
- #9943 Base PCI IOP

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 348 and “Internal tape, CD-ROM, and DVD-RAM” on page 358 for full descriptions.

Internal disk units

- #4317 8.58 GB Disk Unit 10k RPM (*withdrawn from marketing* 3 December 2001)
- #4318 17.54 GB Disk Unit 10k RPM
- #4319 35.16 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 Unit
- #4483 16 GB ¼-inch Cartridge Tape Unit
- #4486 25 GB ¼-inch Cartridge Tape Unit
- #4487 50 GB ¼-inch Cartridge Tape Unit
- #4684 30 GB ¼-inch Cartridge Tape Unit

External towers

These towers attach to the Model 830 via 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 1.8 M I/O Tower

See “Expansion towers” on page 254 and “Migration towers” on page 264 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
#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 #9364/#5064 System Unit Expansion or in #5077 Migration Tower II
#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 II
#5073	1063M System Unit Expansion Tower	One port on #2688 OLP card in #9364/#5064 System Unit Expansion or in #5077 Migration Tower II
#5082	1063M System Unit Expansion Tower	One of #6502, #6512, #6530, #6532, or #6533 and one port on #2688 OLP card in #9364/#5064 System Unit Expansion or in #5077 Migration Tower II
#5083	1063M System Unit Expansion	See #5082

Migration tower hardware

To connect migration towers, select one of these features:

- #2686 Optical Link Processor (266 Mbps) (*withdrawn from marketing* on 28 December 2001)
- #2688 Optical Link Processor (1063 Mbps)

For hardware supported in the migration towers, refer to “Migration tower PCI hardware” on page 343 and “Migration tower SPD hardware” on page 344.

Model 830 upgrades

Supported model upgrades for the 830 server are identified in *IBM @server iSeries Supported Upgrades*, REDP0322.

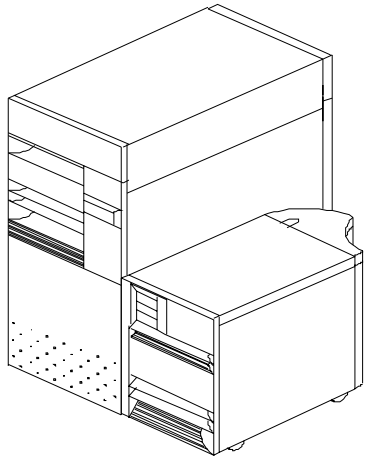
iSeries Server 840

iSeries Server 840

11

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 1.8 M I/O Rack
- Line-cord 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)
- 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 #5540, #5544, #5546, or #5548 System Console specify code.

These features are required:

- Processor (one must be specified)
  - #2352 Model 840 8/12-Way POD (SStar 600 Mhz) (9000/12000 CPW)
  - #0158 Model 840 12-Way Processor (SStar 600 Mhz) (12000 CPW) (V5R1 required)
  - #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)
  - #0159 Model 840 24-Way Processor (SStar 600 Mhz) (20200 CPW) (V5R1 required)
- Interactive card (one must be specified)

Model 830 Processor feature	**#2461**	**#2352**	**#2353**	**#2354**	**#0158**	**#0159**
Relative system performance (note 1)	20200	9000/ 12000	12000/ 16500	16500/ 20200	12000	20200
Processor CPW						
Interactive CPW					0	0
#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		

- 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 65536 MB
- #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 Disk Unit 10k RPM
  - #4318 17.54 GB Disk Unit 10k RPM
  - #4319 35.16 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 IOA

    #4746 PCI Twinaxial IOA

  - #5544 System Console on Ops Console

    #0367 Operations Console PCI Cable

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

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

Model 840 PCI cards and features

The 840 processors support four 32-bit and ten 32/64-bit PCI slots.

All SPD cards are now *withdrawn from marketing* and cannot be ordered. SPD cards are supported in V5R2 only via a migration tower with an upgrade to the 840 system.

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.

Refer to Chapter 22, “Customer Install Features (CIF)” on page 445, to determine the CIF status for each supported feature.

The placement of PCI cards follows special rules. Consult the “PCI card placement rules for the iSeries server” chapter of the *IBM @server iSeries and AS/400e System Builder*, SG24-2155, and “PCI card technology” on page 326 before you propose any configuration.

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)
- #0158 12-way Processor (SStar 600 Mhz)
  - Processor Capacity Card (CCIN 246F)
  - Processor 0 (CCIN 246F)
  - Processor 1 (CCIN 246F)
  - Processor 2 (CCIN 246F)
- #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 Capacity Card (CCIN 2461)
  - Processor 0 (CCIN 246F)
  - Processor 1 (CCIN 246E)
  - Processor 2 (CCIN 246E)
  - Processor 3 (CCIN 246E)
- #0159 24-way Processor (SStar 600 Mhz)
  - Processor Capacity Card (CCIN 246F)
  - Processor 0 (CCIN 246F)
  - Processor 1 (CCIN 246F)
  - Processor 2 (CCIN 246F)
  - Processor 3 (CCIN 246F)

Note: Capacity Upgrade on Demand (CUoD) is described in Chapter 3, “Workload and performance” on page 47.

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 (5250)-based tasks.

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

For a discussion of how these features influence system performance, see Chapter 3, “Workload and performance” on page 47.

The available interactive options are shown in the table on page 202.

A feature cross-reference table can be used to relate the Processor Feature Code to the processor and interactive features visible in the IBM marketing configurator. The Processor Feature Code is found by displaying the QPRCFEAT system value or in the Hardware Service Manager report. 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.

	840					
Interactive feature	**#2352**	**#2353**	**#2354**	**#2461**	**#0158**	**#0159**
None					#0158	#0159
#1540	#26B0	#26B8	#26C0	#26D0		
Processor group	P40	P40	P40	P40	P40	P40
#1541	#26B1	#26B9	#26C1	#26D1		
#1542	#26B2	#26BA	#26C2	#26D2		
#1543	#26B3	#26BB	#26C3	#26D3		
#1544	#26B4	#26BC	#26C4	#26D4		

840						
Interactive feature	**#2352**	**#2353**	**#2354**	**#2461**	**#0158**	**#0159**
Processor group	P50	P50	P50	P50		
#1545	#26B5	#26BD	#26C5	#26D5		
#1546	#26B6	#26BE	#26C6	#26D6		
#1547		#26BF	#26C7	#26D7		
#1548			#26C8	#26D8		

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:

- #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.

Allowable main storage increments (MB)

Version/Release Memory increment	V4R5	V5R1	V5R2
4096	X	X	X
12288	X	X	X
20480	X	X	X
28672	X	X	X
36864	X	X	X
45056	X	X	X
53248	X	X	X
65536	X	X	X
98304	X	X	X
131072		X	X

Version/Release Memory increment	V4R5	V5R1	V5R2
8192	X	X	X
16384	X	X	X
24576	X	X	X
32768	X	X	X
40960	X	X	X
49152	X	X	X
57344	X	X	X
81920	X	X	X
114688		X	X

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 main storage (CPM) is not supported on the Model 840. An external UPS can allow the system to run uninterrupted for longer than 30 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.

The supported power and packaging features are:

- 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 (region) 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 (region) 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 1.8 M I/O Rack.

- 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 Miscellaneous Equipment Specification (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.
- The #5105 is required for dual line cord capability for the upper unit in the #8079.
- Prerequisite: If the #9079 or #8079 has #5101 30 Disk Unit Expansion 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

– IBM marketing configurator users can refer to this Web site for ordering information:

  http://w3-1.ibm.com/sales/systems/ibmsm.nsf/MainFrameset?OpenForm&cdoc=idlcinstall

#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.

The #5150 was *withdrawn from marketing* on 02 July 2002.

#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 high-speed link (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 Base 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 or hot swap power supplies.

The #9079 is capable of controlling Ultra2 SCSI disk units.

The 11 PCI IOAs are supported (driven) by the #9943 Base PCI IOP and by #2843 PCI IOP or #2791 PCI Integrated xSeries Server.

The mounting for the first 15 disk units is included in the #9079 Base I/O Tower. The mounting for the next 30 disk units is optional by ordering #5101 30 Disk Unit Expansion.

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 Unit Expansion

The #5101 is a disk unit expansion enclosure feature for the #5074 PCI Expansion Tower, the #9074 Base I/O Tower, 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 Controller are required to support 30 disk units.

#5111 30 Disk Expansion with Dual Line Cord

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:

- The #5104 when ordered for a Model 840 system unit
- The #5105 when ordered for a stand-alone #5074 I/O Tower or the top unit in a #8079
- The #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`

#8079 Optional Base 1.8 M 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 1.8 M 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 1.8 M I/O Rack.

The #8079 has a #9943 Base PCI IOP and a #9778 Base 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 or hot swap power supplies.

The #8079 is capable of controlling Ultra2 SCSI disk units.

The 22 PCI IOAs are supported (driven) by two #9943 Base PCI IOPs and #2843 PCI IOP, #2790 PCI Integrated Netfinity Server, or #2791/#2799 PCI 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 #4748 PCI RAID Disk Unit Controller.

If the top enclosure is to be attached to a different system than what was initially ordered, Record Purpose Only (RPO) remove the #0574 specify code from the initial ordered machine and add it to the target machine.

High-speed link on the Model 840

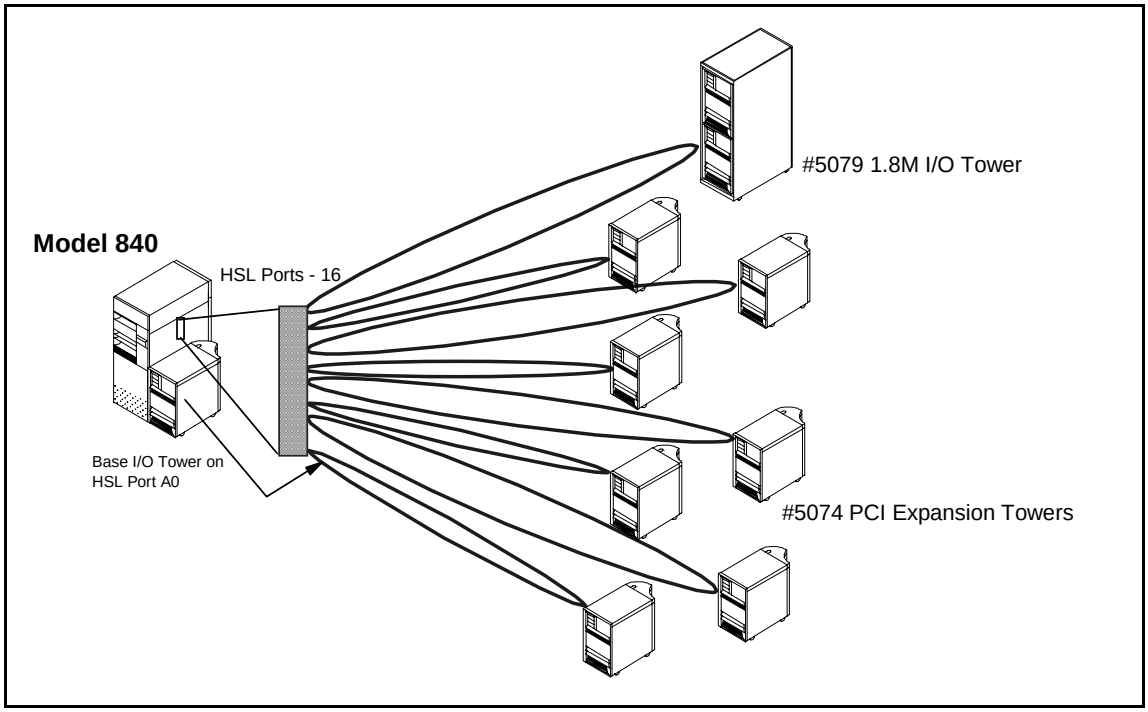
The Optical Fiber HSL Loop extends the distance between the 840 system unit and the I/O units from a limit of 15 meters prior to V5R2, to a maximum of 250 meters. The extra length can help to improve data reliability and protection.

The Model 840 supports up to eight HSL loops, two of which can be Optical Fiber HSL loops.

Optical and Copper HSL cables may not be intermixed within a loop. Each loop supports the attachment of up to six #5074 PCI Expansion Towers (with the #5079 counting as two #5074s), #5078 PCI Expansion Unit, #0578 PCI Expansion Unit in Rack, and up to eight external xSeries servers with a maximum total of nine towers in any combination of I/O towers and external xSeries servers per loop.

The Model 840 supports up to 39 towers. Only #5074, #5079, #0578, and #5078 may be attached to the Optical Fiber 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. Four of the loops on the 840 can be used to participate in HSL OptiConnect clusters consisting of one other system and up to four towers in any combination of I/O towers and Integrated xSeries Adapter towers or two other systems (V5R2 only) with no towers on that loop.

The base I/O tower is on the first loop. The following figure shows the Model 840 and nine connected towers.

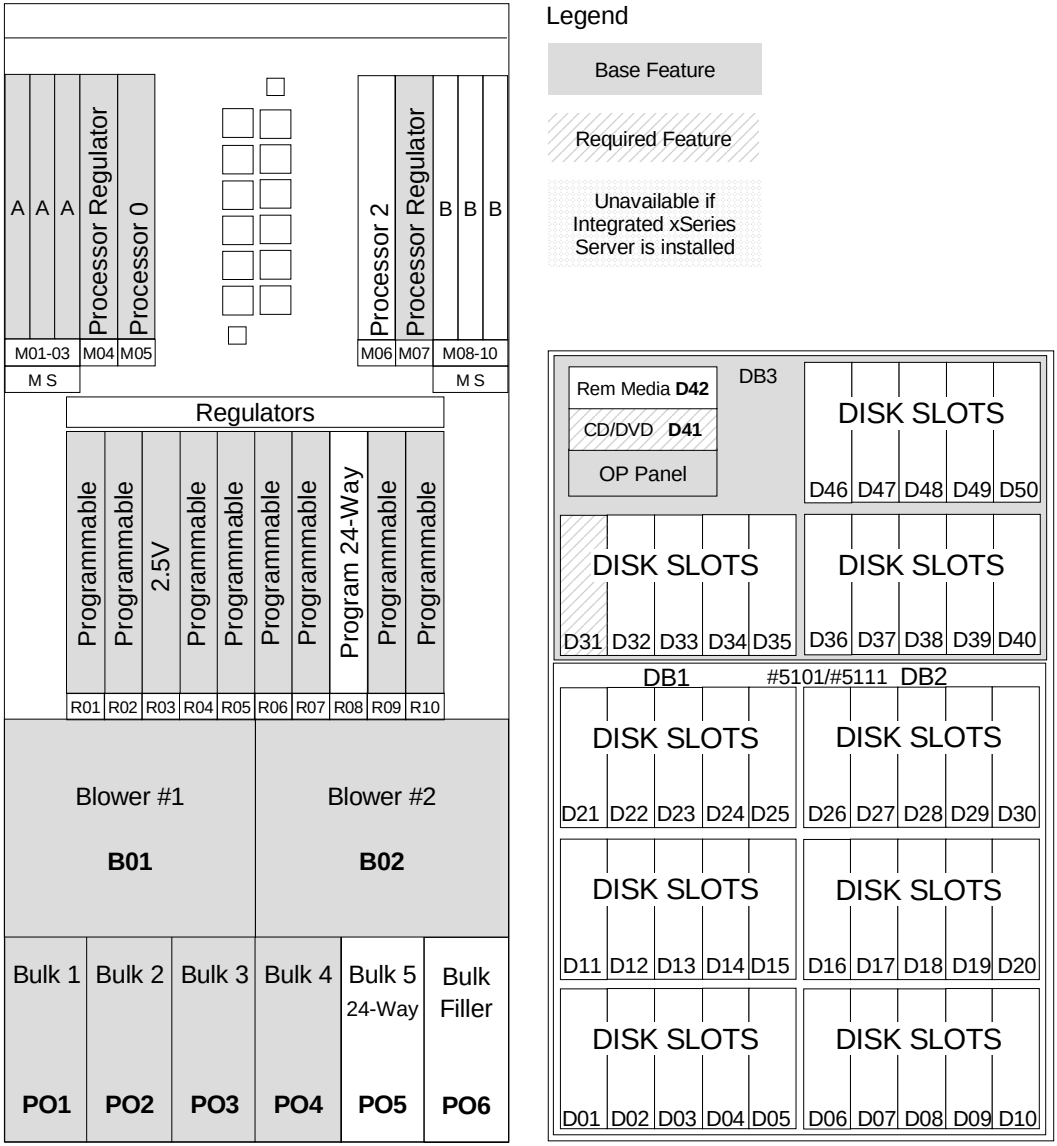


9406 Model 840 schematics

The following diagrams show the slot and feature card arrangement of the Model 840 system unit and processors. Schematics of the supported expansion units are found in Chapter 14, “Towers and racks” on page 253.

Model 840 System Unit (n-way)

#0158, #0159, #2352, #2353, #2354, #2461 Processors



Front

Model 840 System Unit (n-way)

#0158, #0159, #2352, #2353, #2354, #2461 Processors

Legend

Base Feature

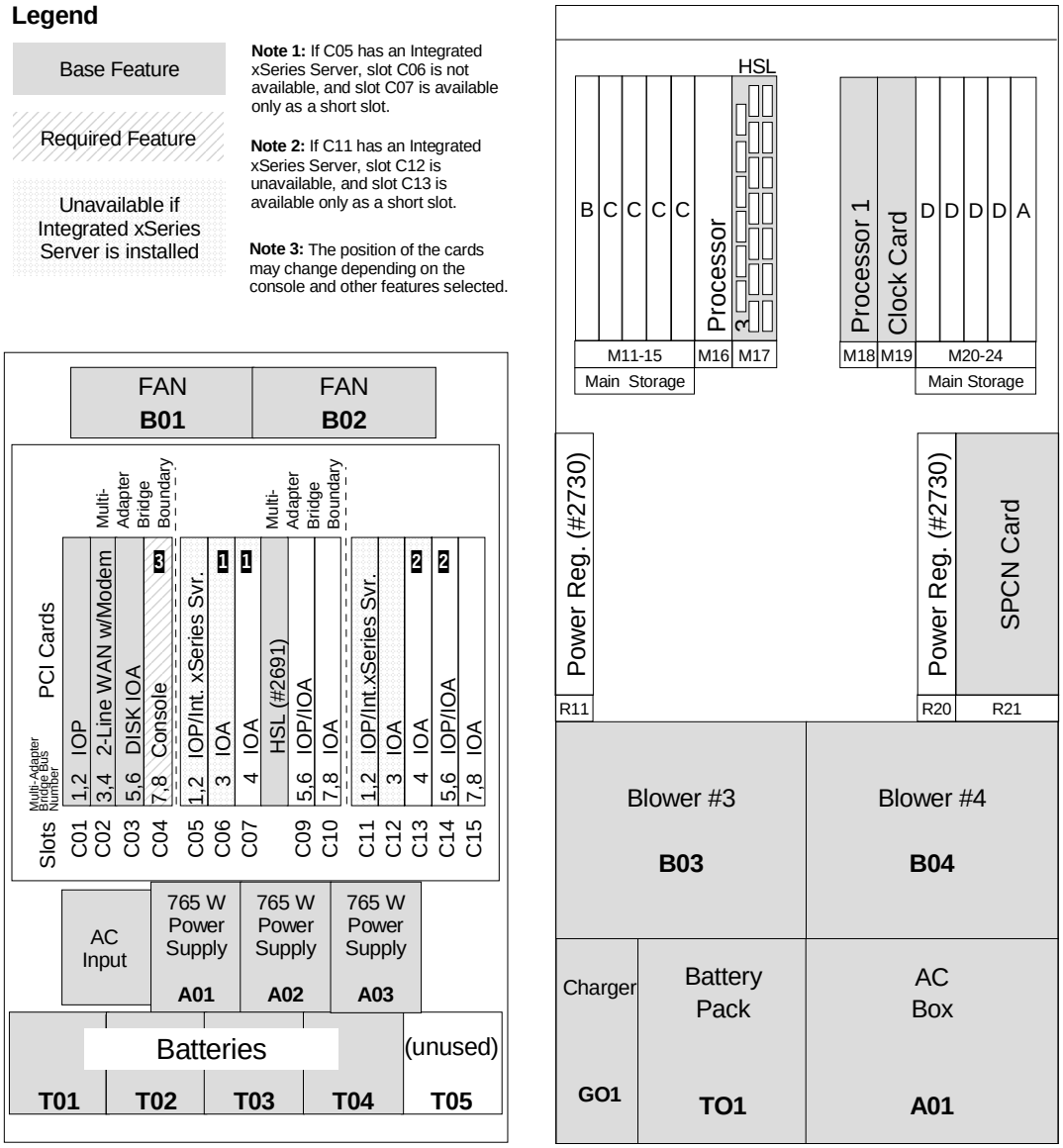
Required Feature

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.

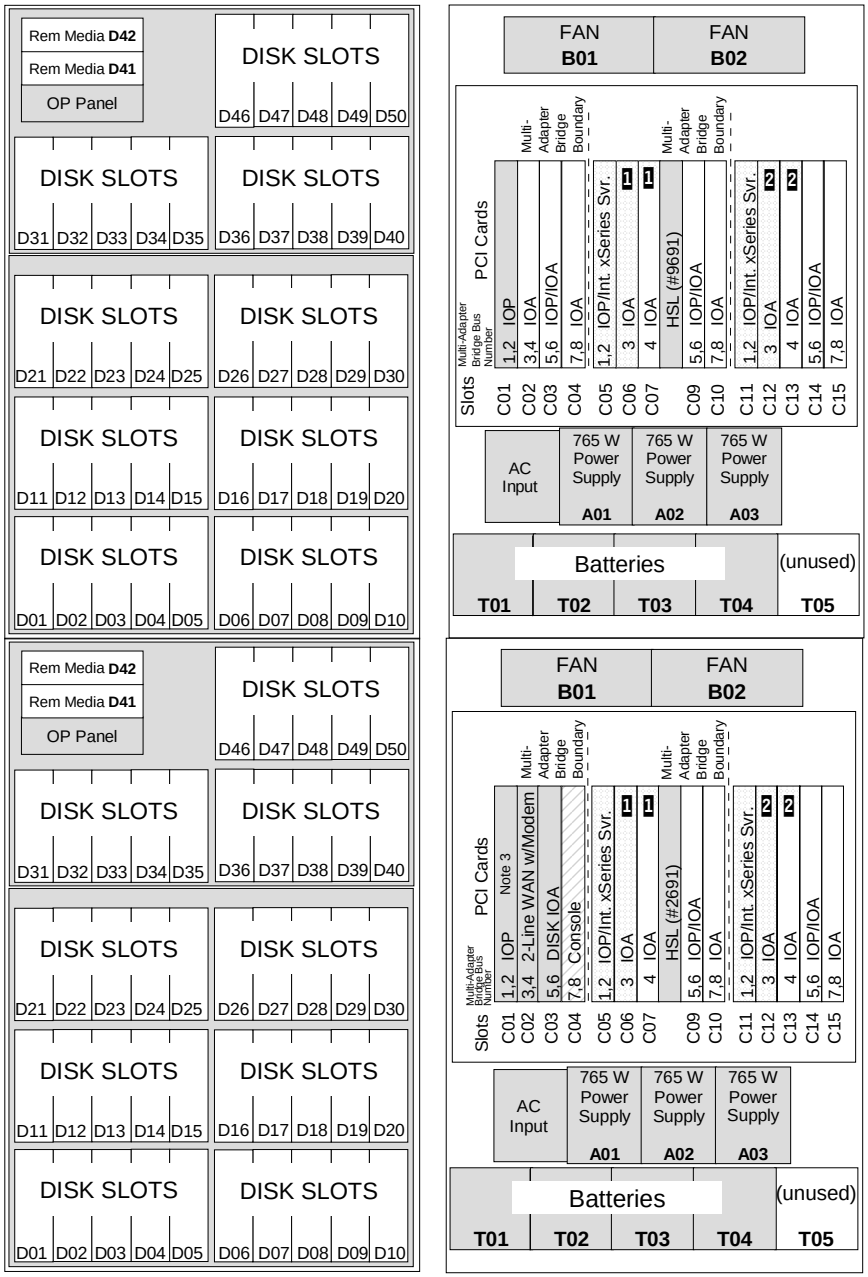
Note 3: The position of the cards may change depending on the console and other features selected.



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.

Workstation controllers

Refer to “Workstation controllers” on page 139 for a description of workstation controller support.

Remote control panel

Refer to “Remote control panel” on page 141 for a description of remote control panel support.

I/O processor and I/O adapter support

This section lists the supported IOPs and IOAs. See Chapter 17, “I/O processors” on page 309, and Chapter 18, “I/O adapters and controllers” on page 325, for full descriptions.

Note: PCI configuration rules are quite flexible. See the “PCI card placement rules for the iSeries server” chapter of the *IBM @server iSeries and AS/400e System Builder*, SG24-2155, for configuration rules on placing PCI cards.

LAN/WAN/workstation IOAs

- #2742 Two-Line WAN IOA*
- #2743 1 Gbps PCI Ethernet IOA
- #2744 PCI 100 Mbps Token Ring IOA
- #2760 PCI 1 Gbps Ethernet UTP Adapter
- #2772 PCI Dual WAN/Modem IOA
- #2773 PCI Dual WAN/Modem IOA
- #2793/#2794 Two-Line WAN IOA with Modem*
- #2805 PCI Quad Modem IOA
- #2806 PCI Quad Modem (CIM)
- #2817 PCI 155 Mbps MMF ATM IOA
- #2849 10/100 Mbps Ethernet Adapter*
- #4745 PCI 2-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 (*withdrawn from marketing* on 02 July 2002)
- #4801 PCI Cryptographic Coprocessorr
- #4838 PCI 100/10 Mbps Ethernet IOA
- #5700 PCI 1 Gbps Ethernet IOA

- #5701 PCI 1 Gbps Ethernet UTP IOA
- #9771 Base PCI 2-Line WAN with Modem

* Requires OS/400 V5R2

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)
- #2791 PCI Integrated xSeries Server
- #2792 PCI Integrated xSeries Server
- #2799 PCI Integrated xSeries Serverr
- #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 348 and “Internal tape, CD-ROM, and DVD-RAM” on page 358 for full descriptions.

Internal disk units

- #4317 8.58 GB Disk Unit 10k RPM
- #4318 17.54 GB Disk Unit 10k RPM
- #4319 35.16 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 Unit
- #4483 16 GB ¼-inch Cartridge Tape Unit
- #4486 25 GB ¼-inch Cartridge Tape Unit
- #4487 50 GB ¼-inch Cartridge Tape Unit
- #4684 30 GB ¼-inch Cartridge Tape Unit

External towers

These towers attach to the Model 840 via high-speed link (HSL).

- #5074 PCI Expansion Tower
- #5077 Migration Tower II
- #0578 PCI Expansion Unit in Rack
- #5078 PCI Expansion Unit
- #5079 1.8 M I/O Tower

See “Expansion towers” on page 254 for full descriptions.

The expansion towers and units in this table can attach to the Model 840 using the #5077 Migration Tower II.

Feature	Description	Prerequisites
#5043	Primary rack converted to secondary rack (migrated)	--
#5044	System Unit Expansion Rack (migrated)	#2686 Optical Link Processor
#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 #2688 on OLP card in the #5077 Migration Tower II
#5066	1.8m I/O Tower	See #5065
#5072	1063M System Unit Expansion Tower	One port on #2688 OLP card 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, or #6533 and one port on #2688 OLP card in the #5077 Migration Tower II
#5083	1063M System Unit Expansion	See #5082

Migration tower hardware

To connect migration towers, select one of these features:

- #2686 Optical Link Processor (266 Mbps) (*withdrawn from marketing* on 28 December 2001)
- #2688 Optical Link Processor (1063 Mbps)

For hardware supported in the migration towers, refer to “Migration tower PCI hardware” on page 343 and “Migration tower SPD hardware” on page 344.

Model 840 upgrades

Supported model upgrades for the 840 server are identified in *IBM @server iSeries Supported Upgrades*, REDP0322.

iSeries Server 890

iSeries Server 890

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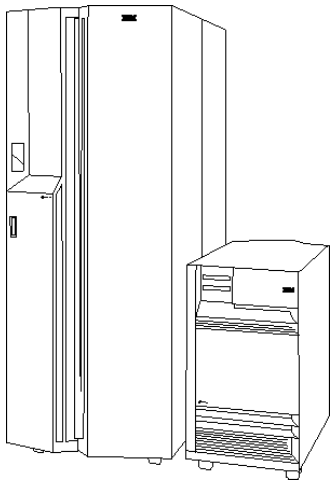
iSeries Model 890

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 890

- System unit (CEC) and #9094 Base PCI I/O Enclosure or #8093 Optional 1.8 M I/O Rack
- Line cord features (one for the #9094 or two for the #8093. The 890 CEC has no line cord features. It ships with a watertight cord. See the Information Center Web site for receptacle specifications.)
- Clock card (CCIN 25C2)
- Pass-through card (CCIN 272D) (two on the #2487/#0197 and one on the #2488/#0198)
- PCI and CSP card (CCIN 28AA)
- Operator Panel with key stick (CCIN 247A)
- #9730 Base HSL-2 Ports - 4 Copper (CCIN 273B)
- #9943 Base PCI IOP

- Provides support for #4778 PCI RAID Disk Unit Controller for up to 15 disk units, the required DVD-RAM, and a feature internal tape or a feature DVD-ROM
- Provides support for a base Console/Workstation IOA

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

Required features include:

- Processor (one must be specified)
  - #2487 Model 890 16/24-way Capacity Upgrade on Demand (CUoD) (POWER4 1.3 Ghz)
  - #2488 Model 890 24/32-way Capacity Upgrade on Demand (POWER4 1.3 Ghz)
  - #0197 Model 890 24-way (POWER4 1.3 Ghz)
  - #0198 Model 890 32-way (POWER4 1.3 Ghz)
- Interactive card (one must be specified for non-base processors)

  See the interactive feature table on page 230.
- Main storage
  - #3015 - 8 MB Main Storage Card (inside)
  - #3016 - 8 MB Main Storage Card (outside)
  - #3017 - 32 MB Main Storage Card (inside)
  - #3018 - 32 MB Main Storage Card (outside)
  - #3020 - 4 GB Main Storage Card (inside)
  - #3021 - 4 GB Main Storage Card (outside)
  - #3035 - 16 MB Main Storage Card (inside)
  - #3036 - 16 MB Main Storage Card (outside)
- #4778 PCI RAID Disk Unit Controller
  - 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:

    - #4318 17.54 GB Disk Unit 10k RPM
    - #4319 35.16 GB 10k RPM Disk Unit
- #4430 DVD-RAM (Integrated)

- System Console/Communications Adapter

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

  – #5540 System Console on Twinaxial Workstation IOA

    #4746 PCI Twinaxial IOA

  – #5544 System Console on Ops Console

    #0367 Operations Console PCI Cable

  – #5546 System Console on 100 Mbps Token Ring

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

  – #5548 System Console on 100 Mbps Ethernet

    • #2849 10/100 Mbps Ethernet Adapter or
    • #4838 PCI 100/10 Mbps Ethernet IOA

  – #0367 Operations Console PCI Cable

The 890 server initial installation and model upgrades are performed by IBM Service Representatives.

Model 890 PCI cards and features

The 890 processors support four 32-bit and ten 32/64-bit PCI slots.

SPD cards are not supported on a Model 890. Since migration towers cannot attach to the Model 890, all SPD cards in systems or towers migrating to the 890 server must be replaced with PCI card equivalents.

These functions do not have equivalent function PCI cards for the Model 890:

- 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.
- Link Problem Determination Aids (LPDA-1): 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.

Refer to Chapter 22, “Customer Install Features (CIF)” on page 445, to determine the CIF status for each supported feature.

The placement of PCI cards follows special rules. Consult the “PCI card placement rules for the iSeries server” chapter of the *IBM @server iSeries and AS/400e System Builder*, SG24-2155, and “PCI card technology” on page 326 before you propose any configuration.

Processor features

- #2487 Model 890 16/24-way Processor on Demand (POD) (POWER4 1.3 Ghz)
  - Processor Capacity Card (CCIN 2487)
  - Processor 0 (CCIN 25D5)
  - Processor 1 (CCIN 25D5)
  - Processor 2 (CCIN 25D5)
- #2488 Model 890 24/32-way Processor on Demand (POD) (POWER4 1.3 Ghz)
  - Processor Capacity Card (CCIN 2488)
  - Processor 0 (CCIN 25D5)
  - Processor 1 (CCIN 25D5)
  - Processor 2 (CCIN 25D5)
  - Processor 3 (CCIN 25D5)
- #0197 Model 890 24-way Base Processor (POWER4 1.3 Ghz)
  - Processor Capacity Card (CCIN 0197)
  - Processor 0 (CCIN 25D5)
  - Processor 1 (CCIN 25D5)
  - Processor 2 (CCIN 25D5)
- #0198 Model 890 32-way Base Processor (POWER4 1.3 Ghz)
  - Processor Capacity Card (CCIN 0198)
  - Processor 0 (CCIN 25D5)
  - Processor 1 (CCIN 25D5)
  - Processor 2 (CCIN 25D5)
  - Processor 3 (CCIN 25D5)

Note: Capacity Upgrade on Demand (CUoD) is described in Chapter 3, “Workload and performance” on page 47.

Interactive features

The Model 890 supports various levels of interactive performance through the installation of interactive features.

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

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

For a discussion of how these features influence system performance, see Chapter 3, “Workload and performance” on page 47.

A feature cross-reference table can be used to relate the Processor Feature Code to the processor and interactive features visible in the IBM marketing configurator. The Processor Feature Code is found by displaying the QPRCFEAT system value or in the Hardware Service Manager report. 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 of the interactive and processor features, and identifies the associated CPW rating and processor group for each combination.

Processor	Interactive feature	CPW	Processor feature	Processor group
#2487	#1576	120	#2AF0	P50
	#1577	240	#2AF1	P60
	#1578	560	#2AF2	P60
	#1579	1050	#2AF3	P60
	#1581	2000	#2AF5	P60
	#1583	4550	#2AF7	P60
	#1585	10000	#2AF9	P60
	1587	16500	#2AFB	P60
	1588	20200	#2AFC	P60
#2488	#1576	120	#2AD0	P50
	#1577	240	#2AD1	P60
	#1578	560	#2AD2	P60
	#1579	1050	#2AD3	P60
	#1581	2000	#2AD5	P60
	#1583	4550	#2AD7	P60
	#1585	10000	#2AD9	P60
	#1587	16500	#2ADB	P60
	#1588	20200	#2ADC	P60
	#1591	37400	#2ADF	P60
#0197	None	N/A	#25D3	P50
#0198	None	N/A	#25D5	P50

Main storage

All main storage cards on the Model 890 must be added in pairs of the same capacity and technology. Six slots are available for main storage cards in the #2487 and #0197 processors. Eight slots are available for main storage cards in the #2488 and #0198 processors. The slots are arranged in groups of “inner” and “outer” slots. The 24-way has four inner slots and two outer slots. The 32-way has four inner and four outer slots. Inner slots are filled first.

Important: Fill all slots. An exception is allowed for 16 GB cards on a 24-way processor and for 24 GB cards on a 32-way processor.

Mixed memory pairs must be adjacent capacities on each Model 890, for example:

- OK = four 8s and two 16s
- Not OK = four 8s and two 32s

Maximum of two card sizes on each Model 890, for example:

- OK = four 8s and four 16s
- Not OK = two 8s and four 16s and two 32s

The available main storage features are:

- #3015 - 8 GB Main Storage Card (inside) (DRAM)
- #3016 - 8 GB Main Storage Card (outside) (DRAM)
- #3017 - 32 GB Main Storage Card (inside) (DRAM)
- #3018 - 32 GB Main Storage Card (outside) (DRAM)
- #3020 - 4 GB Main Storage Card (inside) (DRAM)
- #3021 - 4 GB Main Storage Card (outside) (DRAM)
- #3035 - 16 GB Main Storage Card (inside) (DRAM)
- #3036 - 16 GB Main Storage Card (outside) (DRAM)

Allowable main storage increments (MB)

Processor **Memory increment**	**#2487/#0197**	**#2488/#0198**
4 GB		
8 GB	Y *	Y *
16 GB	Y	Y *
24 GB	Y	Y
32 GB	Y	Y
40 GB	Y	Y
48 GB	Y	Y
56 GB	-	Y
* Not recommended for most configurations.		

Processor Memory increment	#2487/#0197	#2488/#0198
64 GB	Y	Y
80 GB	Y	Y
98 GB	Y	Y
112 GB	-	Y
160 GB	Y	Y
192 GB	Y	Y
224 GB	-	Y
256 GB	-	Y
* Not recommended for most configurations.		

Power and packaging

The Model 890 supports Hot Plug and Concurrent Add of PCI cards, disk units, and removable media devices. Batteries are not included or are available in the system unit (CEC) or the #9094 Base PCI I/O Enclosure. The customer must rely on UPS for line fault protection.

The supported power and packaging features are:

- System Unit (CEC)
  - Bulk Power Regulator (CCIN CQ02)
  - Two required with 24-way processor feature
  - Four required with 32-way processor feature
  - Bulk Power Controller (CCIN RGA1)
  - Two required with all processor features
  - Bulk Power Distribution (CCIN RGA2)
  - Two required with 24-way and 32-way processor features
  - Distributed Converter Assembly (CCIN DCA1)
  - Two DCAs are “base”
  - Two DCAs added with 24-way processor feature (total of four DCAs)
  - Three DCAs added with 32-way processor features (total of five DCAs)
  - Capacitor Card (CCIN 274F): One is “base”
  - One Capacitor Card is added with 24-way and 32-way processor features (total of two)
- #9094 Base PCI I/O Enclosure

- One AC input box
- Two 840-watt power supplies

#9094 Base PCI I/O Enclosure

The #9094 is the base I/O tower shipped on the Model 890. The #9094 supports up to 45 disk units, up to eleven PCI IOAs, and one additional removable media unit.

Select two (any combination) of these HSL-2 cables:

- #1482 - 3.5m Copper HSL-2 Cable
- #1483 - 10m Optical HSL-2 Cable
- #1485 - 15m Copper HSL-2 Cable

The #1485 - 15m Copper HSL-2 Cable can be used on any HSL-2 port of the Model 890.

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 or two line cords for the #9094 Base PCI I/O Enclosure.

The #9094 has a #9943 Base PCI IOP and a required #4778 PCI RAID Disk Unit Controller. It has PCI slots for 11 PCI IOAs, space for up to 45 disk units (15 are “base”, 30 additional with the #5107/#5117), space for two removable media devices, one battery backup, and redundant and hot swap power supplies.

The #9094 is capable of controlling Ultra2 SCSI disk units.

The 11 PCI IOAs are supported (driven) by the base #9943 Base PCI IOP and by #2843 PCI IOPs, or #2799 PCI Integrated xSeries Server features.

The mounting for the first 15 disk units is included in the #9094 Base PCI I/O Enclosure. The mounting for the next 30 disk units is optional by ordering feature code #5107 30 Disk Expansion or #5117 30-Disk Expansion with Dual Line Cord.

The #9094 also supports one additional removable media devices (internal tape, CD-ROM, or DVD-RAM). These removable media devices are supported by the #4778.

#5107/#5117 30-Disk Expansion with Dual Line Cord

The #5107 is a disk unit expansion enclosure feature for the #9094 Base PCI I/O Enclosure. The #5107 includes two 15 disk unit enclosures, one 840-watt power supply, backplanes and cables. A #4778 PCI RAID Disk Unit Controller is required to support the 15 disk units in each of the two disk unit enclosures included with #5107. Two #4778 PCI RAID Disk Unit Controllers are required to support 30 disk units.

The #5117 is a #5107 with a #5114 dual line cord.

#8093 Optional 1.8 M I/O Rack

The #8093 is a optional base I/O rack shipped on the Model 890 instead of the #9094 Base PCI I/O Enclosure. The #8093 supports up to 90 disk units, up to 22 PCI IOAs, and up to three additional removable media units. A #8093 is a #9094 Base PCI I/O Enclosure with a #5074 (#0574 Specify Code) tower package in a rack.

For the #8093, select two (any combination) of these HSL-2 cables:

- #1482 - 3.5m Copper HSL-2 Cable
- #1483 - 10m Optical HSL-2 Cable
- #1485 - 15m Copper HSL-2 Cable

You must also select two (any combination) of these HSL to HSL-2 cables:

- #1474 - 6m HSL to HSL-2 Cable
- #1475 - 10m HSL to HSL-2 Cable

If a #2739 Optical Bus Adapter is used in the #5074 or the top one-half of the #8093, select any two of:

- #1470 - 6m Optical HSL Cable
- #1471 - 30m Optical HSL Cable
- #1472 - 100m Optical HSL Cable
- #1473 - 250m Optical HSL Cable

Select any two of these SPCN cables:

- #0369 100m Optical SPCN Cable
- #1463 - 2m SPCN Cable
- #1464 - 6m SPCN Cable
- #1465 - 15m SPCN Cable
- #1466 - 30m SPCN Cable
- #1468 - 250m Optical SPCN Cable

Specify two line cords for the #8093 Optional 1.8 M I/O Rack.

The #8093 has two #9943 Base PCI IOP and a #4778 PCI RAID Disk Unit Controller. It has PCI slots for up 22 PCI IOAs, space for up to 90 disk units (the #5107 is installed in the bottom unit; the #5101 is installed in the top unit), space for four removable media devices, two battery backups, and redundant and hot swap power supplies.

The #8093 is capable of controlling Ultra2 SCSI disk units.

The 22 PCI IOAs are supported (driven) by two #9943 Base PCI IOPs and #2843 PCI IOPs, or #2799 PCI Integrated xSeries Servers.

The #8093 also supports up to three additional removable media devices (internal tape or DVD-ROM). These removable media devices are supported by a #4778.

If the top enclosure is to be attached to a different system than what was initially ordered, remove for RPO the #0574 specify code from the initial ordered machine and add it to the target machine.

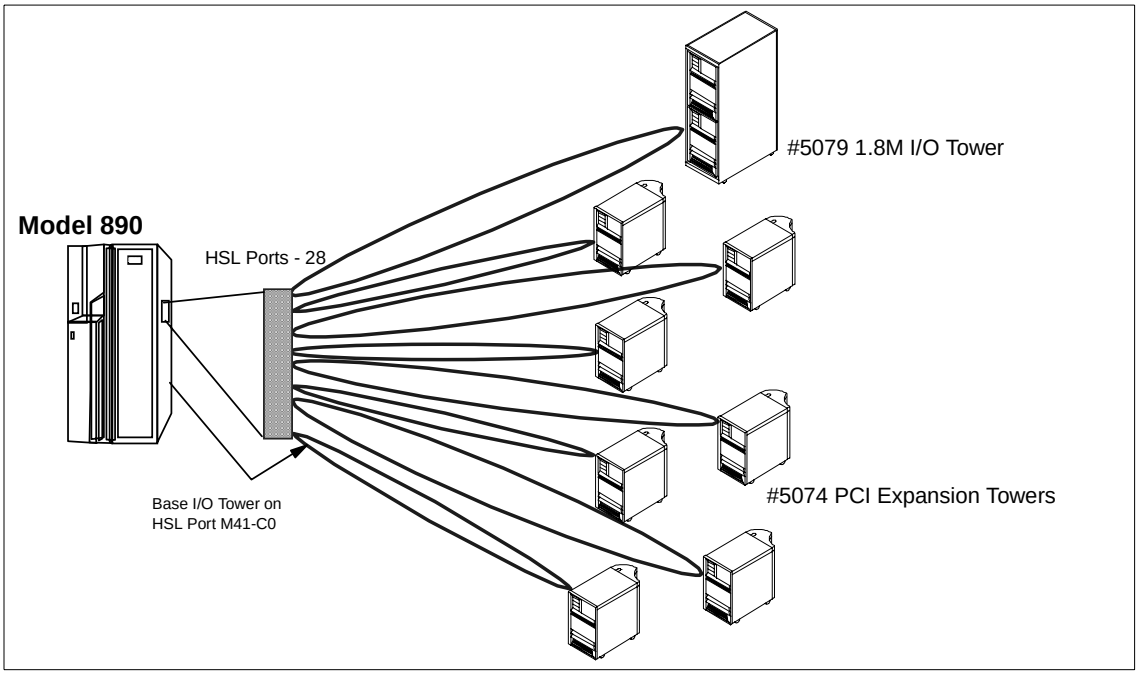
High-speed link (HSL) on Model 890

The Optical Fiber HSL Loop extends the distance between the 890 system unit and the I/O units from a limit of 15 meters prior to V5R2, to a maximum of 250 meters. The extra length can help to improve data reliability and protection.

The Model 890 supports up to 14 HSL loops of which 12 can be optical fiber.

Optical and Copper HSL cables may not be intermixed within a loop. Each loop supports the attachment of up to six #5074 I/O towers (with the #5079 counting as two #5074s), #5078 PCI Expansion Units, #0578 PCI Expansion Unit in Rack, and up to eight external xSeries servers with a maximum total of nine towers in any combination of I/O towers and external xSeries servers per loop.

The Model 890 supports up to 47 towers. Only #5074, #5079, #0578, and #5078 may be attached to the optical fiber HSL loop. No migration towers are supported on the Model 890. All 14 of the loops on the 890 can be used to participate in HSL OptiConnect clusters consisting of one other system and up to four towers in any combination of I/O towers and Integrated xSeries Adapter towers or two other systems (V5R2 only) with no towers on that loop.

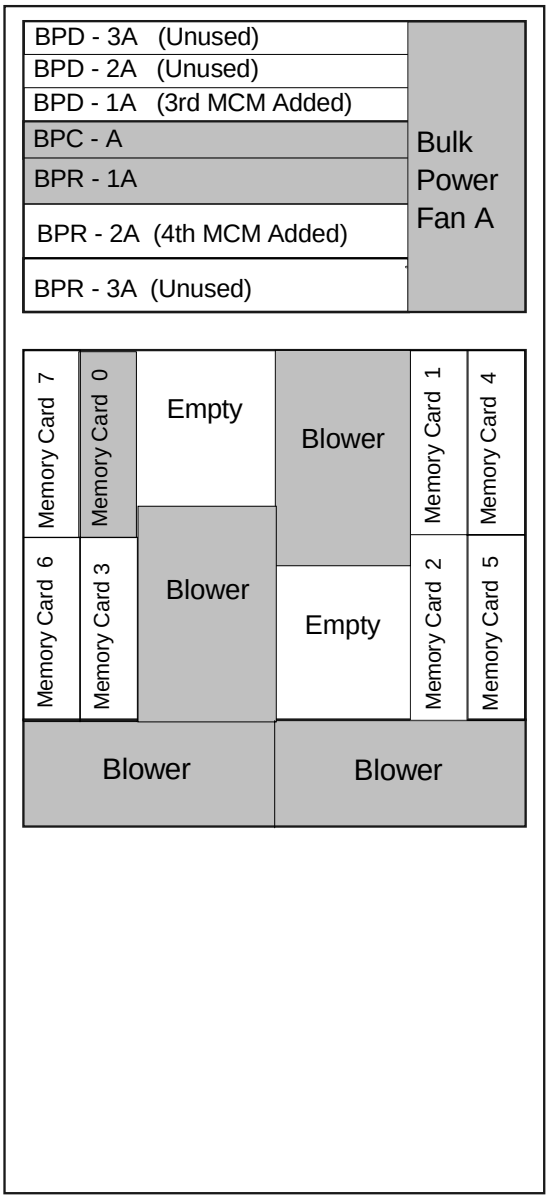


9406 Model 890 schematics

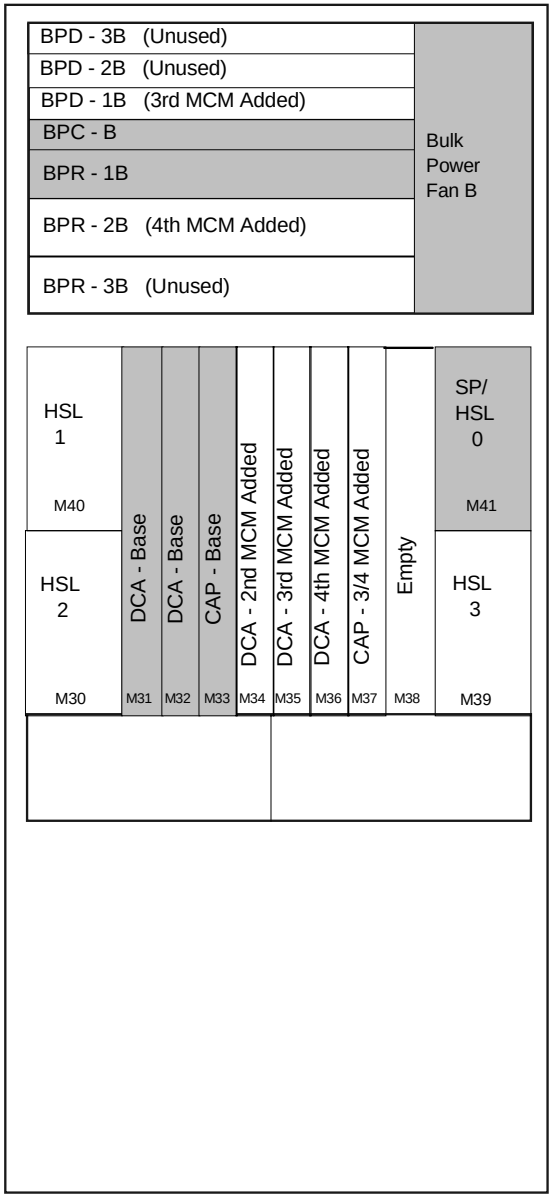
The following diagrams show the slot and feature card arrangement of the Model 890 system unit, base enclosure, and rack. Schematics of any supported expansion units are found in Chapter 14, “Towers and racks” on page 253.

Model 890 System Unit (n-way)

#0197, #0198, #2487, #2488 Processors



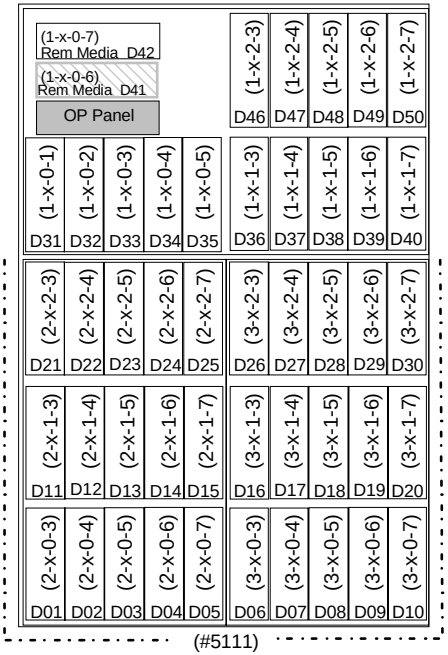
Front



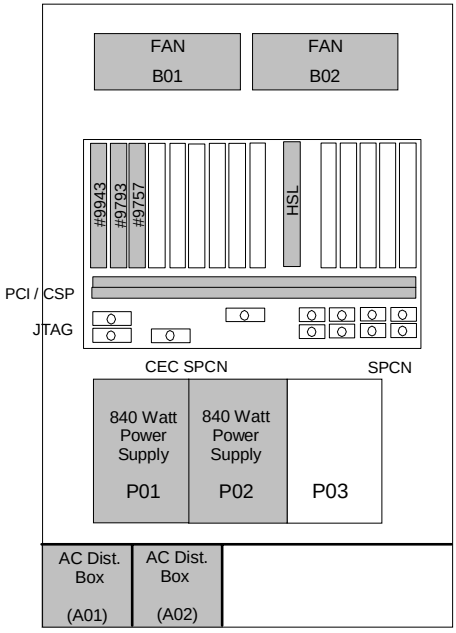
Back

#9094 Base PCI I/O Enclosure

#0197, #0198, #2487, #2488 Processors



FRONT



BACK

DASD plug sequence for optimum performance: D31, D36, D46, D32, D37, D47, ... D50, (add 2nd adaptor), D01, D11, D21, D02, ... D25, (add 3rd Adaptor), D06, D16, D26, D07, ... D30.

Note: The drive addresses shown are iSeries addresses since this is now an iSeries-only tower. This differs from past versions of this figure.

= "Base" feature

= Required Feature

LEGEND

(W-X-Y-Z)
Kn

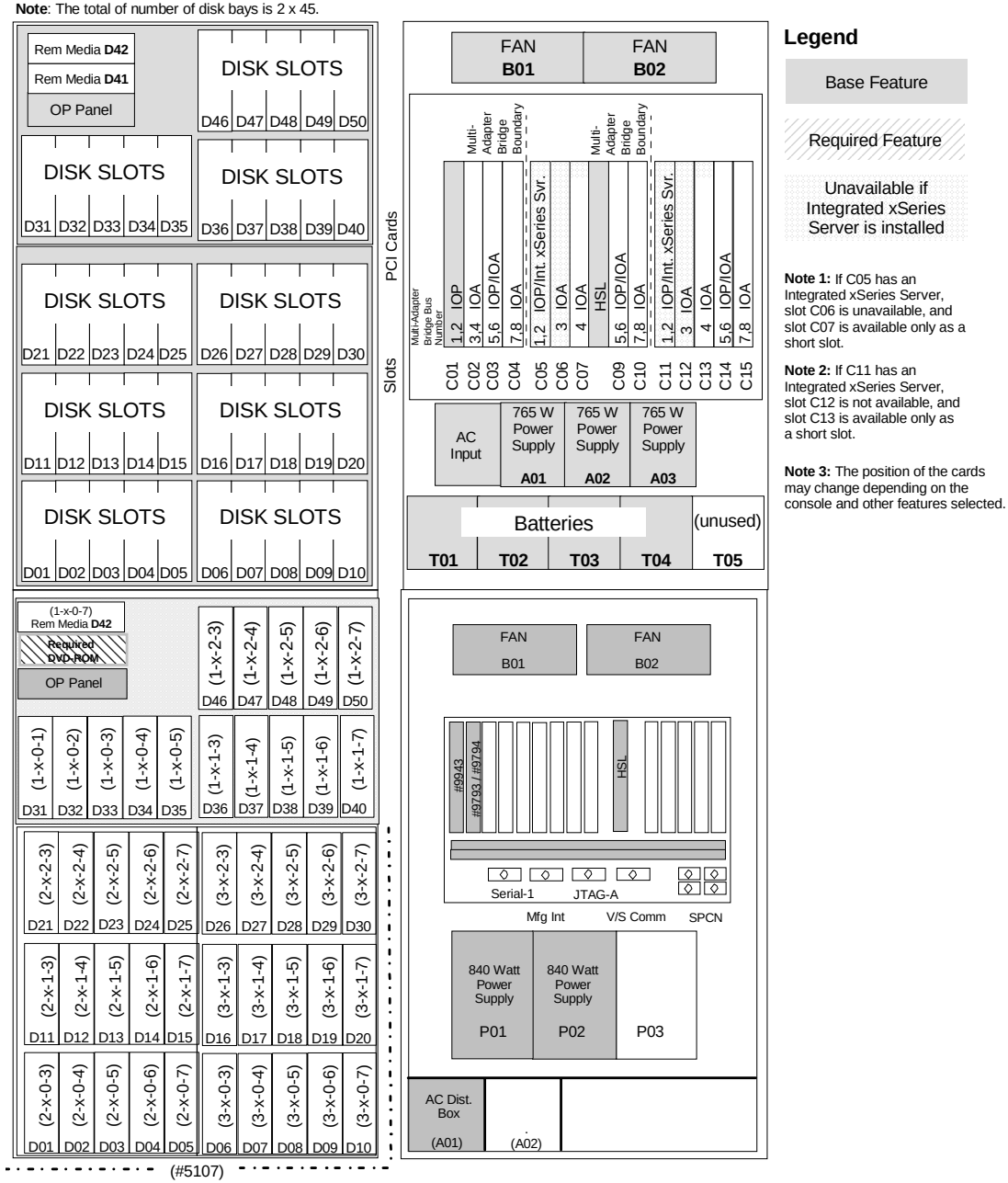
W = DSCard Address
X = IOA number
Y = SCSI bus number
Z = AS/400 Drive Address

Kn = PHYSICAL ADDRESS

See PCI-X Card Cage Layout for details of PCI-X card slots

#8093 Optional Base Rack

Note: The 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.

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

Workstation controllers

Refer to “Workstation controllers” on page 139 for a description of workstation controller support.

Remote control panel

Refer to “Remote control panel” on page 141 for a description of remote control panel support.

I/O processor and I/O adapter support

This section lists the supported IOPs and IOAs. See Chapter 17, “I/O processors” on page 309, and Chapter 18, “I/O adapters and controllers” on page 325, for full descriptions.

Note: PCI configuration rules are quite flexible. See the “PCI card placement rules for the iSeries server” chapter of the *IBM @server iSeries and AS/400e System Builder*, SG24-2155, for configuration rules on placing PCI cards.

LAN/WAN/workstation IOAs

- #2743 1 Gbps PCI Ethernet IOA
- #2744 PCI 100 Mbps Token Ring IOA
- #2760 PCI 1 Gbps Ethernet UTP Adapter
- #2742 Dual WAN/Modem Adapter
- #2772 PCI Dual WAN/Modem IOA
- #2773 PCI Dual WAN/Modem IOA
- #2793 PCI Two Line Wan IOA with on integrated modem
- #2794 PCI Two Line Wan IOA with on integrated modem
- #2805 PCI Quad Modem IOA
- #2806 PCI Quad Modem (CIM)
- #2817 PCI 155 Mbps MMF ATM IOA
- #2849 10/100 Mbps Ethernet Adapter*
- #4745 PCI 2-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 (*withdrawn from marketing* on 02 July 2002)
- #4801 PCI Cryptographic Coprocessorr
- #4805 PCI Cryptographic Accelerator

- #4838 PCI 100/10 Mbps Ethernet IOA
- #5700 PCI 1 Gbps Ethernet IOA
- #5701 PCI 1 Gbps Ethernet UTP IOA
- #9773/#9774 Base PCI 2-Line WAN with Modem

* Requires OS/400 V5R2

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)
- #2791 PCI Integrated xSeries Server
- #2792 PCI Integrated xSeries Server
- #2799 PCI Integrated xSeries Serverr
- #9943 Base PCI IOP (64 MB)

Internal disk, tape, CD-ROM, and DVD-RAM support

This section lists the supported internal disks, tape drives, DVD-ROMs, and DVD-RAMs. See “PCI disk units” on page 348 and “Internal tape, CD-ROM, and DVD-RAM” on page 358 for full descriptions.

Internal disk units

- #4318 17.54 GB Disk Unit 10k RPM
- #4319 35.16 GB 10k RPM Disk Unit

Internal tape, CD-ROM, and DVD-RAM

- #4425 CD-ROM
- #4430 DVD-RAM

- #4482 4 GB ¼-inch Cartridge Tape Unit
- #4483 16 GB ¼-inch Cartridge Tape Unit
- #4486 25 GB ¼-inch Cartridge Tape Unit
- #4487 50 GB ¼-inch Cartridge Tape Unit
- #4684 30 GB ¼-inch Cartridge Tape Unit

External towers

These towers attach to the Model 890 via high-speed link (HSL).

- #5074 PCI Expansion Tower
- #0578 PCI Expansion Unit in Rack
- #5078 PCI Expansion Unit
- #5079 1.8 M I/O Tower
- #8093 Optional 1.8 M I/O Rack
- #9094 Base PCI I/O Enclosure

See “Expansion towers” on page 254 for full descriptions.

Model 890 upgrades

Supported model upgrades for the 890 server are identified in *IBM @server iSeries Supported Upgrades*, REDP0322.

Upgrades to iSeries Server 8xx

Upgrades to iSeries Server 8xx

13

Upgrades to iSeries servers

Upgrades to iSeries servers are supported to the 820, 830, 840, and 890 models, as well as within the iSeries 8xx product line. Customers with AS/400e 720, 730, and 740 servers can upgrade to the iSeries 820, 830, 840, and 890 models.

Upgrades are not available into the Model 270 from any earlier models, nor can the Model 270 be upgraded into the 820, 830, 840, or 890 models.

Upgrades to the iSeries 820, 830, and 840 servers can involve a housing change to a tower from a CEC of an installed AS/400e system. In some cases, an existing system CEC (on an AS/400e 740 system, for example) is converted into an I/O tower for the 820, 830, or 840 server. All towers attached to the existing 740 system CEC remain untouched.

The SB1 model cannot be upgraded to other models. AS/400 CISC models, AS/400e 6xx, Sxx, and prior RISC models cannot be upgraded to the iSeries 820, 830, 840, and 890 models.

Supported iSeries model upgrades are identified in the following table.

	Model 820	**Model 830**	**Model 840**	**Model 890**
Model 720	Y	Y		
Model 730		Y	Y	

	Model 820	Model 830	Model 840	Model 890
Model 740		Y	Y	Y
Model 820	Y	Y	Y	
Model 830		Y	Y	Y
Model 840			Y	Y
Model 890				Y

The supported processor upgrade path for each model of the current iSeries product line is documented in *IBM @server Supported iSeries Upgrades,* REDP0322. This Redpaper is updated as additional upgrade paths are announced or withdrawn. You can find this Redpaper on the IBM Redbooks Web site at:

`http://www.redbooks.ibm.com/`

Refer to the redbook *AS/400e to IBM @server iSeries Migration: A Guide to System Upgrades at V4R5 and V5R1*, SG24-6055, for guidance on upgrading to the iSeries server models.

For software considerations, refer to Chapter 24, “Supported upgrade paths” on page 545, and “Current release to previous release support” on page 546.

Interactive Performance Reduction option for iSeries servers

In some cases, a supported upgrade path involves a reduction in Interactive CPW ratings. AS/400e 720, 730, and 740 customers who do not want to keep their current interactive card may reduce their interactive capacity by one level when upgrading to an iSeries 820, 830, 840, or 890 server. This can lower the price paid for the upgrade.

For example, a customer with a 1050 Interactive CPW (Interactive Feature #1510) upgrading to 8xx server can choose a model with a lower Interactive CPW level (for example, 560). Customers choosing this reduction option are required to repurchase (at full price) any additional Interactive CPW upgrade in the future.

Customers are encouraged to review current Interactive CPW utilization with PM/400, Management Central, PATROL for iSeries - Predict, or AS/400 Performance Tools, prior to ordering an interactive performance reduction option.

Upgrade scenarios

To help you understand what is involved in upgrading to the iSeries 820, 830, 840, and 890 servers, this section lists the overall steps involved for typical scenarios.

- **From an AS/400e Model 720, 730, or 740 server**

  a. Perform a model upgrade.
  b. Do a processor feature conversion.
  c. Do an interactive card feature conversion.

- **From within the Model 820, 830, 840, or 890 iSeries product line**

  Once upgraded to an 820, 830, 840, or 890 iSeries server, performance upgrades are made through processor or interactive feature conversions, as:

  a. Perform a model upgrade.
  b. Do a processor feature conversion.
  c. Depending on the “from” and “to” models, an interactive card feature conversion may also be required.

Migration considerations

When migrating to iSeries models from earlier models, keep these considerations in mind:

- Most I/O supported on OS/400 V4R1 or later are also supported on the 8xx models:
  - Features currently supported in the AS/400e 720, 730, and 740 servers remain valid (release dependency rules apply) when migrating to iSeries 820, 830, and 840 servers by using a migration tower. Some of the features supported on earlier models cannot be ordered on new 8xx servers. Migration towers are not supported on the Model 890.
  - Features unique to the iSeries 820, 830, 840, and 890 servers are installed only in the server system unit and expansion units.
  - Features unique to the “upgrade from” models are installed in migration and expansion towers, which are attached to 820, 830, and 840 servers.
- AS/400e 730 or 740 main storage features do not migrate.
- Some AS/400e Model 720 main storage features migrate to iSeries 820 and 830 servers.

Example Model 720 to Model 820 upgrade

An AS/400e Model 720 to iSeries Model 820 upgrade scenario is described to exemplify these migration considerations.

The steps in a typical upgrade are to:

1. Ship the new 820 system.
2. Remove the existing processor from the 720 CEC.
3. Convert the installed 720 system unit to a #5034 or #5035 Migration Tower I:
   - Convert to #5034 if the 720 system unit has 10 DASD positions.
   - Convert to #5035 if the 720 system unit has 15 DASD positions.
   - The 720 power supply is used on the #5034/#5035.
   - The 720 line cord is used on the #5034/#5035.
   - Replace the existing 720 planar with a new planar.
   - Modify the operator panel of the 720 system.
   - Add new microcode to the operator panel.
   - Add internal HSL, J-TAG, and ISO cables/assemblies.
4. Memory
   - Main storage DIMMs migrate (32 MB DIMMs do not migrate) from the installed 720 system CEC to the 820 CEC.
   - Base CCIN 3001 (64 MB) does not migrate and belong to the customer.
   - Base CCIN 3002 (256 MB) migrates to 820 CEC. The marketing configurator adds 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.
5. A new power supply is shipped with the 820 system.
6. A new line cord is shipped with the 820 system.
7. HSL and SPCN cables are shipped (they must be ordered since they are not included in migration tower conversion).
8. The installed DASD remains with and in the #5034/#5035.
9. The installed workstation adapters remain with and in the #5034/#5035.
10. The installed LAN adapters remain with and in the #5034/#5035.
11. The installed expansion towers remain attached (if desired) to the #5034/#5035.
12. The modem is not changed.
13. If any mirroring specify codes exist, they are migrated and apply to the entire 820 system (“old” side and new).
14. If the #0044 exists, it is migrated but is treated as #0044 on the “old side” and as #0041 on the new side.

RISC-to-RISC Data Migration (#0205)

The #0205 specify code is used when a customer orders a new (RISC) iSeries server to replace an existing AS/400e RISC-based system. The #0205 is orderable on the initial order of an iSeries 270, 820, 830, 840, or 890 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.

HSL and Towers

HSL and Towers

14

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 890 supports up to 47 towers. For information on the number and types of towers supported by each iSeries server, see Chapter 5, “iSeries and AS/400e servers” on page 77.

#5074 PCI Expansion Tower

The #5074 is attached to Models 820, 830, 840, and 890 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 Base Optical Bus Adapter to provide the high-speed link (HSL) interface to the system. The configurator adds the #9691 to the order. The #5074 contains two buses.

#5074 PCI Expansion Towe

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.

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 (internal tape, CD-ROM, or DVD-RAM), one battery backup, and redundant or hot swap power supplies.

The 11 PCI IOAs are supported (driven) by a #2843 PCI IOP, #9943 Base PCI IOP, #2790 PCI Integrated Netfinity Servers, or #2791/#2799 PCI Integrated xSeries Server.

The #5074 can contain Ultra2 SCSI disk units that are controlled by a #4748/#4778 PCI RAID Disk Unit Controllerr. The removable media devices are

supported by the same #4748#4778 PCI RAID Disk Unit Controller, which supports the first set of 15 disk units.

The #5074 PCI Expansion Tower supports four 32-bit and seven 32/64-bit PCI slots.

The mounting for the first 15 disk units is included in the #5074 PCI Expansion Tower (base). The mounting for the next 30 disk units is optional by ordering a #5101 30 Disk Unit Expansion.

The #5074 also supports up to two removable media devices (internal tape, CD-ROM, or DVD-RAM).

On new orders, select one line cord with each #5074 PCI Expansion Tower.

#5105 Dual Line Cords: 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 1.8 M I/O Rack. 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 Miscellaneous Equipment Specification (MES) for a #5074, an additional 14xx line cord is required, for a total of two line cords on the #5074.

If the #5074 has a #5101 30 Disk Unit Expansion 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`

IBM marketing 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 Unit Expansion

The #5101 is a disk unit expansion enclosure feature for the #5074 PCI Expansion Tower, the #9074 Base I/O Tower, 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 or the top unit in a #8079
- #5106 for the unit in a #5079 where this expansion enclosure is to be installed

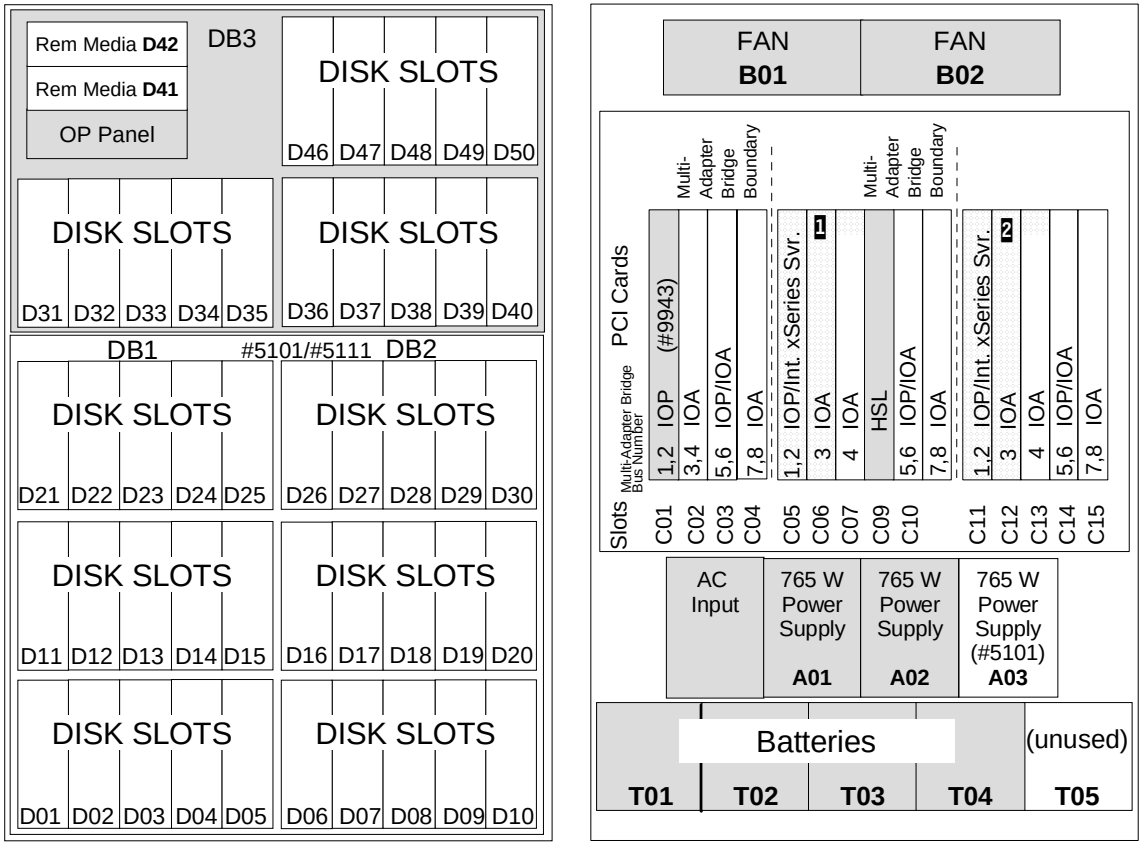
OS/400 V5R1 and supporting PTFs are required. Refer to Informational APAR II12950 at:

`http://as400service.rochester.ibm.com/supporthome.nsf/document/10000035`

Expansion tower schematics

#5074 PCI Expansion Tower

Note: Total number of disk bays is 45.



Front

Back

Legend

Base Feature

Required Feature

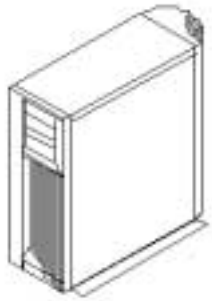
Unavailable if Integrated xSeries Server is installed

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

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. Feature #2842 (when attached to a Model 270) or the #2843 (when attached to a Model 820) PCI IOP 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.



#5075 PCI Expansion Tower

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 281.

Select one of these SPCN cables per Model 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. A maximum of one disk unit controller is allowed within a #5075.

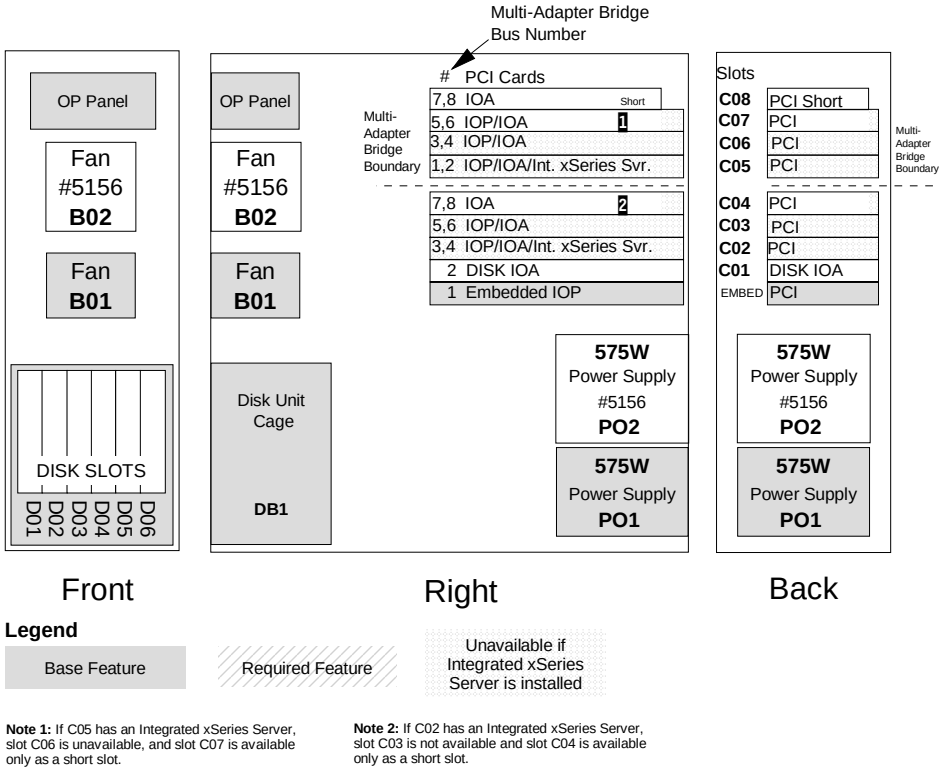
On new orders, specify one line cord with each #5075 PCI Expansion Tower. Marketing configurators default to the line cord type of the system, if the system unit line cord type is not the #1413.

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, the #2890 PCI Integrated Netfinity Server, or the #2891/#2899 PCI Integrated xSeries 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, the #2790 PCI Integrated Netfinity Server, or the #2891/#2899 PCI Integrated xSeries Servers.

The #5075 PCI Expansion Tower is not supported on Model 830 systems. When performing a Model 820 to Model 830 upgrade, the #5075 can be converted to a #5074. Some features in the #5075 are migrated or converted to the #5074 at no charge. Other features allowed in the #5075 are not supported in the #5074 and must be replaced. See “Upgrade options for #5065, #5066, and #5075 Expansion Towers” on page 273 for a complete discussion of the #5075 to #5074 feature conversion.

#5075 PCI Expansion Tower



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 #2248, #2250, #2422, and #2431 processors of the Model 270.

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 remove for RPO the #7102 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 is not supported by iSeries Models SB2 and SB3.

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 on which the #5074/#9079 is mounted, 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 the table on page 281.

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.

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.

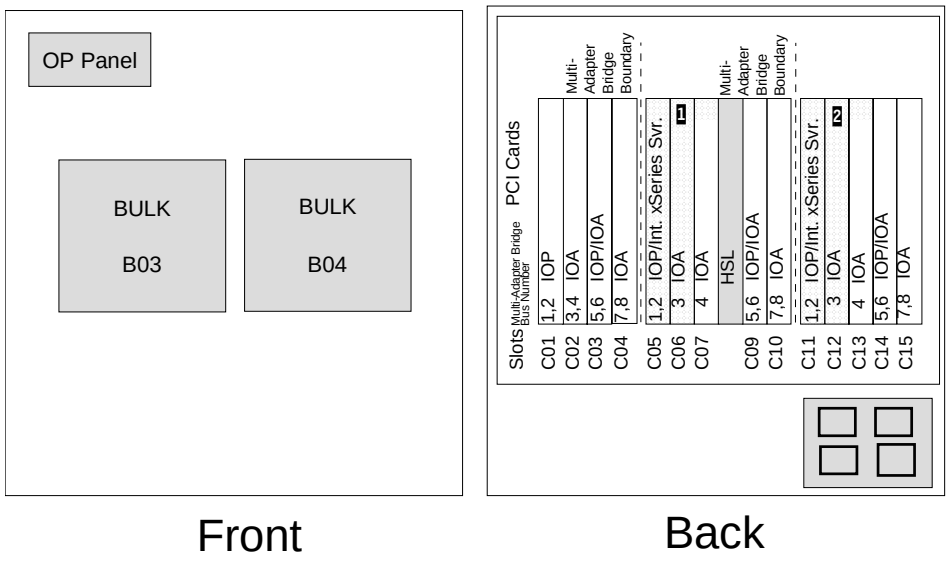
The #5078 includes two electrical cables to connect to a #5074/#9079 power source.

The 11 PCI IOAs are supported (driven) by feature #2843 PCI IOPs, the #2790 PCI Integrated Netfinity Server, or the #2791/#2799 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 274 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 1.8 M I/O Tower

The #5079 1.8 M I/O 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.

#5079 1.8m PCI I/O Expansion Tower

The #5079 is capable of controlling Ultra2 SCSI disk units and 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.

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.

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 an 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 the table on page 281.

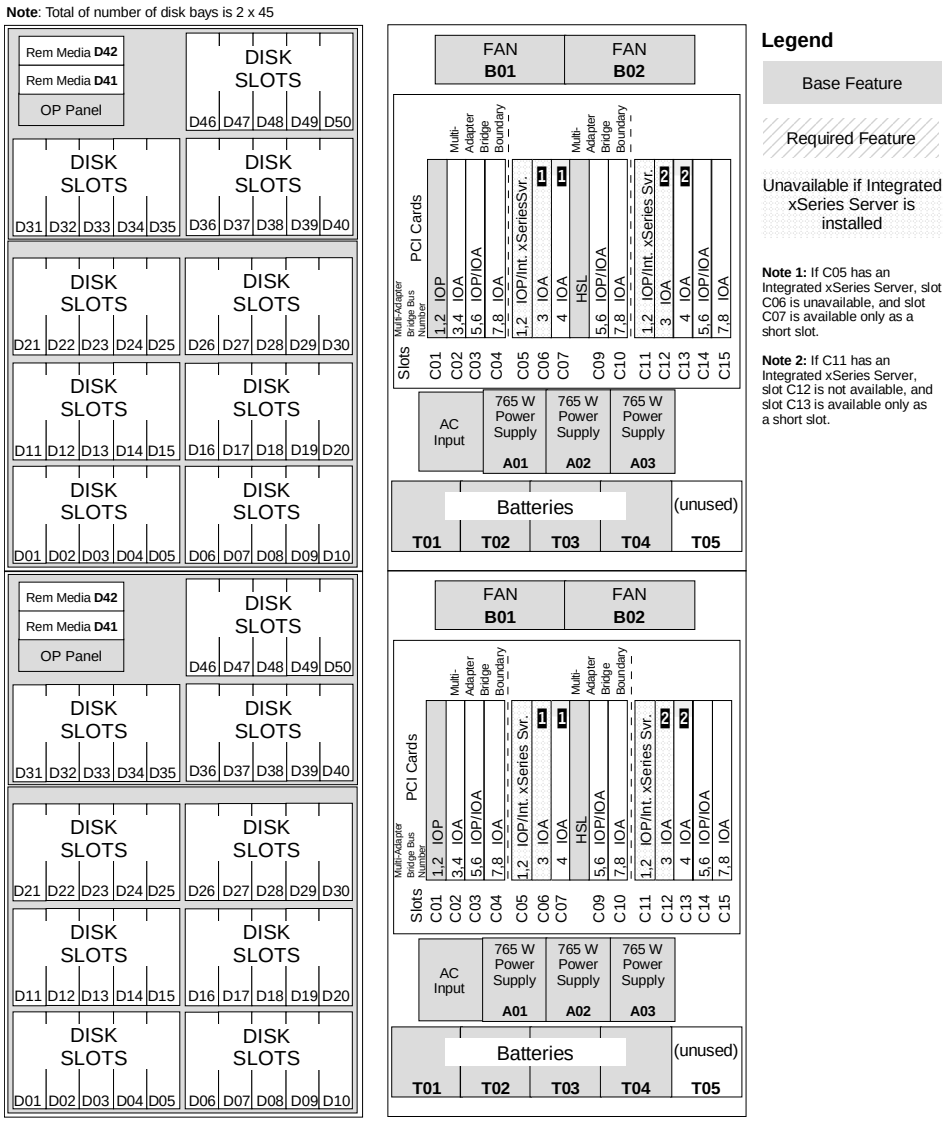
Select two of these SPCN cables per tower:

- #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. On new orders, select two line cords with each #5079 1.8m PCI I/O Expansion Tower.

At least one #0574 specify feature must be ordered for any #5079 initial order.

#5079 PCI Expansion Tower



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.

If the #5079 has any #5101 30 Disk Unit Expansion installed, the #5101 must be converted to a #5111.

OS/400 V5R1 (with PTFs) or later is required. Refer to Informational APAR II12950 at:

`http://as400service.rochester.ibm.com/supporthome.nsf/document/10000035`

IBM marketing 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

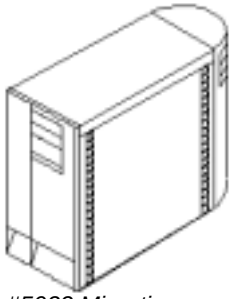
Migration towers are the result of an upgrade from an AS/400e 6xx, 7xx, or Sxx model to an iSeries 820, 830, or 840 model. All the I/O and disk units in the former system unit and any attached towers remain accessible to the upgraded system through the connection of the migration tower to the HSL loop.

One migration tower is supported on each Model 820, 830 and 840. Migration towers are not supported by the 270 and 890 models.

Configuration rules for towers are fully described in Chapter 4 “Migration rules” of the redbook *AS/400e to IBM @server iSeries Migration: A Guide to System Upgrades at V4R5 and V5R1*, SG24-6055.

#5033 Migration Tower I (600/S10 System Unit)

The #5033 is a converted AS/400e 600/S10 system unit/CEC tower. It is 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 or device slots in this tower. “V4R5 only” feature cards and internal devices are not allowed in the #5033. The #5033 is for upgrade migration purposes only. It cannot be ordered separately.



#5033 Migration Tower 1

A maximum of one #5033 can attach to an iSeries 820 or 830 server.

Select any two supported HSL cables for the #5033. A list of HSL cables is shown in the table on page 281.

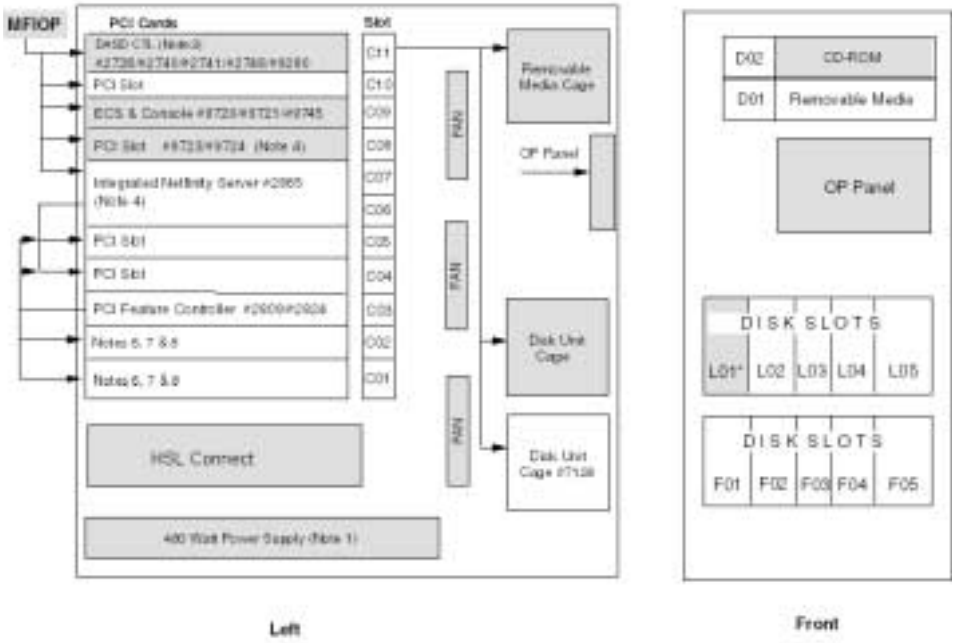
Select one of these SPCN cables:

- #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 *IBM @server iSeries and AS/400e System Builder*, SG24-2155.

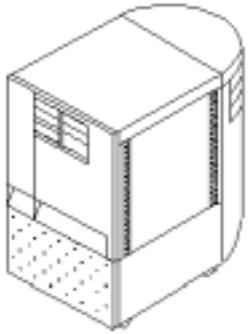
The #5033 is mutually exclusive with #5034, #5035, and #5077.

Migration tower schematics



#5034 Migration Tower I (10 disk S20/620, 720 system)

The #5034 is a converted AS/400e 620, S20, or 720 (with 10 possible internal CEC disk unit positions) system unit tower and any existing #5064 or #9364 System Unit Expansion. It is used for migrating existing PCI and SPD cards, existing disk units, and existing removable media devices, along with any attached PCI/SPD towers to iSeries 820 and 830 Models.



#5034/#5035 Migration Tower I

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.

The #5034 is for upgrade migration purposes only. It cannot be ordered separately.

A maximum one #5034 can attach to an iSeries 820 or 830 server. Attaching additional PCI/SPD towers to the #5034 after migration is not allowed.

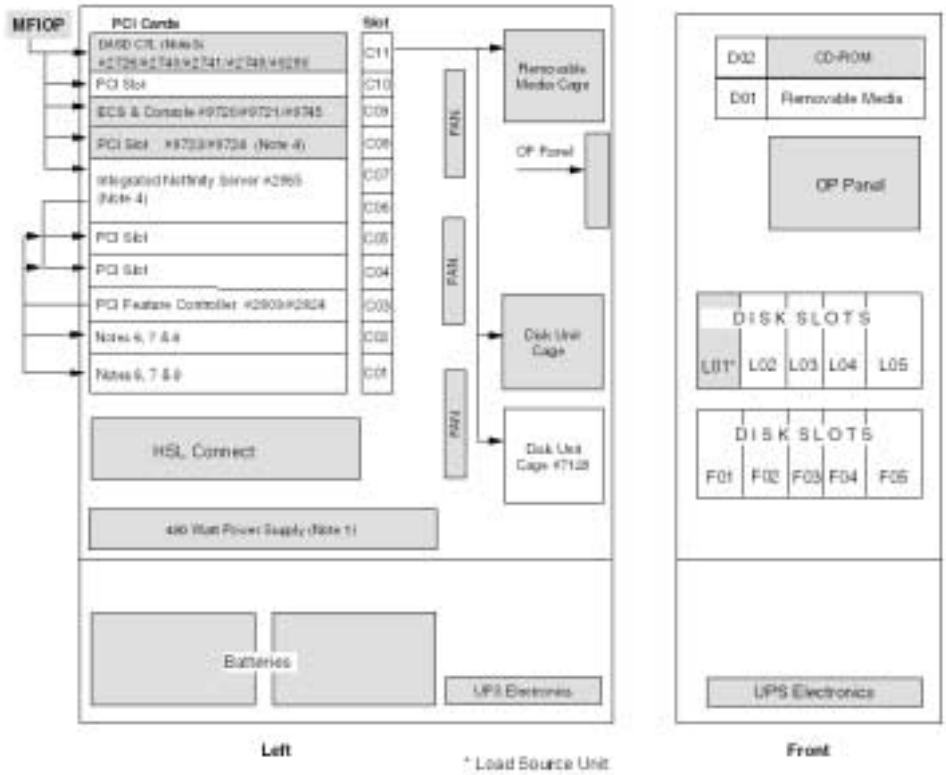
Select any two supported HSL cables for the #5034. A list of HSL cables is shown in the table on page 281.

Select one of these SPCN cables:

- #1463 - 2m SPCN Cable
- #1464 - 6m SPCN Cable
- #1465 - 15m SPCN Cable
- #1466 - 30m SPCN Cable

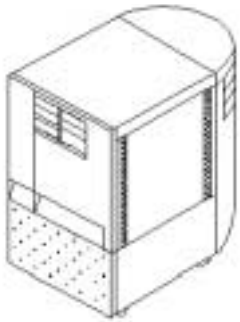
The existing system unit/CEC line cord should be used. Available line cord options are identified in the *IBM @server iSeries and AS/400e System Builder*, SG24-2155.

The #5034 is mutually exclusive with #5033, #5035, and #5077.



#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 System Unit Expansion, 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.



#5034/#5035 Migration Tower I

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 IBM @server iSeries Migration: A Guide to System Upgrades at V4R5 and V5R1*, SG24-6055, for more information.

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 supported HSL cables for the #5035. A list of HSL cables is shown in a table on page 281.

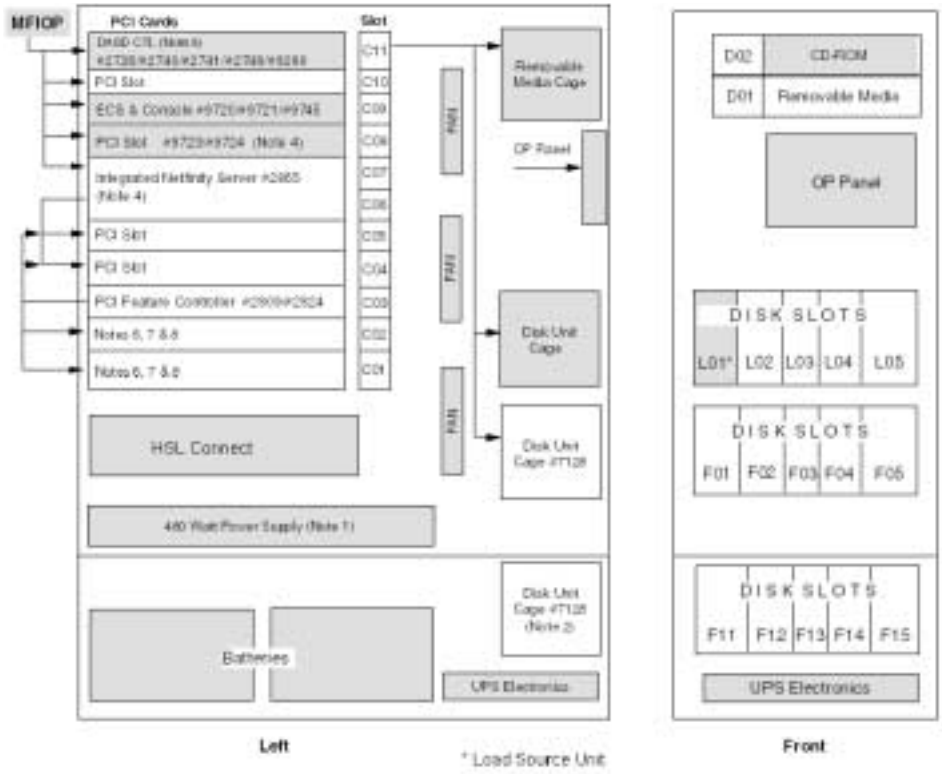
Select one of these SPCN cables:

- #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 *IBM @server iSeries and AS/400e System Builder*, SG24-2155.

The #5035 is mutually exclusive with #5033, #5034, and #5077.

Note: The #1462 - 15m Copper 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 that 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 Storage Expansion Unit installed, by default, the #5077 is shipped with a #9057 Storage Expansion Unit. The #9057 may be removed from the order. If upgrading from a Model 640, S30, or 730 with the #5055 installed, a #5055 to #9057 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 the #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 may be ordered for the #5077. There is no HSL redundancy unless both #2695s are installed.

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 #9057, and removable media devices in the #5077.

Select one of these HSL cables if the #5077 has only the base optical link card installed.

Select one or two supported HSL cables for the #5077 if the #5077 has one or two #2695 Optical Bus Adapters installed. A list of HSL cables is shown in the table on page 281.

Select one of these SPCN cables:

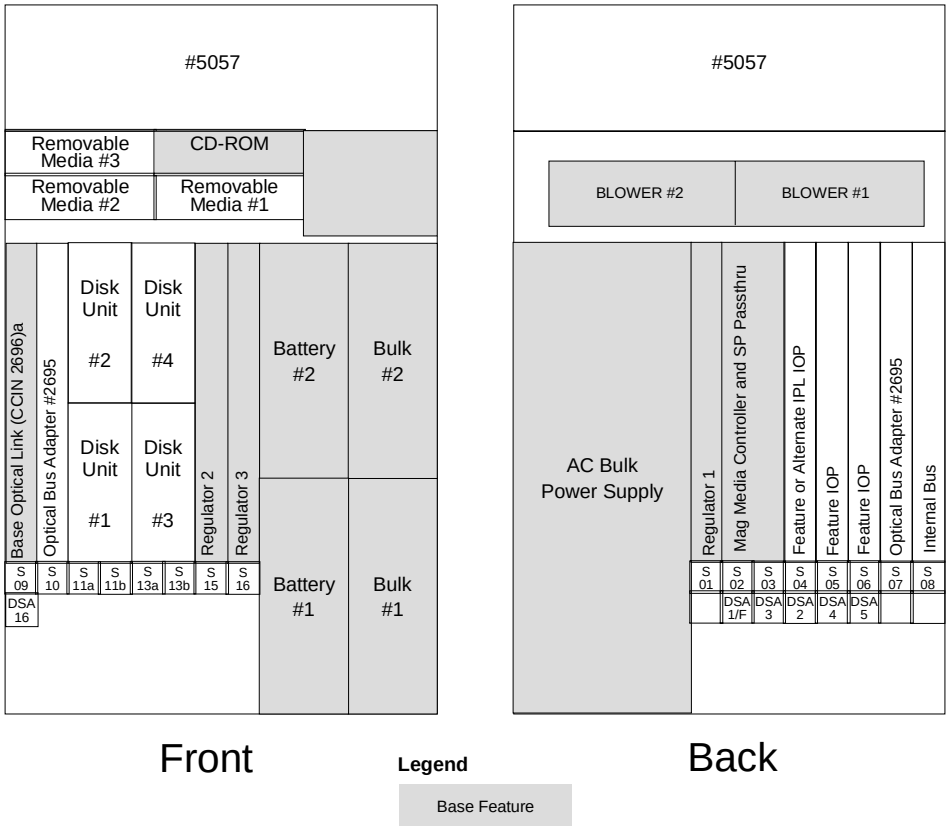
- #1463 - 2m SPCN Cable
- #1464 - 6m SPCN Cable
- #1465 - 15m SPCN Cable
- #1466 - 30m SPCN Cable

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 *IBM @server iSeries and AS/400e System Builder*, SG24-2155.

The #5077 may be ordered to support SPD OptiConnect for 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 #9057 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 #9077 (or #9057).

The #5077 is mutually exclusive with #5033, #5034, and #5035.

#5077 Migration Tower II



#5057/#9057 Storage Expansion Unit

The #5057 provides space for up to 16 disk units on the #5077 Migration Tower II. The #9057 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 #9057.

The #5057 was *withdrawn from marketing* on 02 July 2002.

SPD expansion towers

the expansion towers and units in this table can attach to the iSeries 820, 830, and 840 Models via the #5034 or #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
#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 Tower	See #5082

SPD expansion tower I/O features

#2686 Optical Link Processor (266 Mbps)

The #2686 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.

The #2686 was *withdrawn from marketing* on 28 December 2001.

#2688 Optical Link Processor (1063 Mbps)

The #2688 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 the #5065, #5066, and #5075 Expansion 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 1.8 M I/O 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 in the iSeries 820, 830, and 840 models.

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 830 Model installed. The #0550 is ordered as a feature of the Model 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 included in the 830 server.

The IBM marketing 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 Model 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 iSeries Rack.

#0551 iSeries Rack

The #0551 iSeries Rack is an empty 1.8-meter rack that provides a total of 36 EIA units of space. The #0551 can 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 iSeries Rack
- A #0551 Rack with one iSeries 270 Model
- A #0551 Rack with two iSeries 270s Models
- A #0551 Rack with a #5074/#9079 Base I/O Tower
- A #0551 Rack with one to four #0578 PCI Expansion Unit in Rack

The IBM marketing configurator does not manage rack space in the #0551 iSeries Rack.

Up to four Power Distribution Units 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 Lower Unit in Rack Specify
  - The #0121 is only valid on the initial order of an iSeries Model 270. It indicates that the server is to be installed in the lower position of a #0551 iSeries 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 Model 270 to mount in a #0551 iSeries Rack.
  - The 270 server and the #7104 may be powered by the Power Distribution Unit, if installed, using the #1422 PDU Line Cord. If no PDU is installed, a valid country-specific line cord must be ordered.

    Two line cords are required.
  - Certain upgrade paths are not supported when an iSeries Model 270 is installed in an #0551 iSeries Rack. You can find information on supported upgrade paths in “Model 270 upgrades” on page 145.
- #0122 Upper Unit in Rack Specify
  - The #0122 is only valid on the initial order of an iSeries Model 270 and indicates that the server is to be installed in the upper position of a #0551 iSeries 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 iSeries Rack. This leaves six EIA units available at the top of the rack for additional devices.
  - Each iSeries Model 270 is an independent system.
  - Feature #7104 System Unit Expansion is required in order for an iSeries server 270 to mount in a #0551 iSeries Rack.
  - The 270 server may be powered by the Power Distribution Unit, if installed, using #1422 PDU Line Cord. If no PDU is installed, a valid 14-foot country-specific line cord must be ordered.

    Two line cords are required.
  - Certain upgrade paths are not supported when an iSeries Model 270 is installed in a #0551 iSeries Rack. You can find information on supported upgrade paths in “Model 270 upgrades” on page 145.

- #0123 #5074 Lower Unit in Rack Specify
  - The #0123 may be ordered to place a #5074 PCI Expansion Tower in a #0551 iSeries 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 iSeries Rack. This leaves 18 EIA units available at the top of the rack for additional devices.
  - A #5101 30 Disk Unit Expansion is required in order for a #5074 to mount in a #0551 iSeries Rack.
  - The #5074 PCI Expansion Unit cannot be powered by the Power Distribution Unit. 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 iSeries Rack when shipped from manufacturing as part of an order for an iSeries Model 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 iSeries 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. 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 iSeries Rack (either top or bottom). Mounting hardware (set of sliders and a tray) is included.
  - A #7104 System Unit Expansion is required in an order for an iSeries server 270 to mount in a #0551 iSeries 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 iSeries Rack with available space. See “#5078 PCI Expansion Unit” on page 260 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 iSeries Rack.

– The #0578 occupies eight EIA units in a rack. Up to four #0578s may be mounted in a #0551 iSeries Rack 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 iSeries Rack with a 270 server. However, there is no support for attaching the #0578 to the 270 server.

– The #0578 is not supported for attachment to the iSeries Models SB2 and SB3.

– 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 Copper 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 are required when the #0578s are to be installed in a #0550 or #0551 iSeries Rack.

IBM 9309 Rack Enclosure

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.

iSeries 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 link

HSL fabric

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.

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. The recommendation is to use less than the allowed maximum number of I/O towers on an optical fiber HSL loop to optimize performance.

HSL was initially implemented at OS/400 V5R1 using copper interconnect cables. These cables allow for high-speed and high-quality parallel data transfer. In August 2001, technology was introduced using optical fibers and optical adapters to interconnect the Central Electronic Complex (CEC) and the towers of the iSeries server.

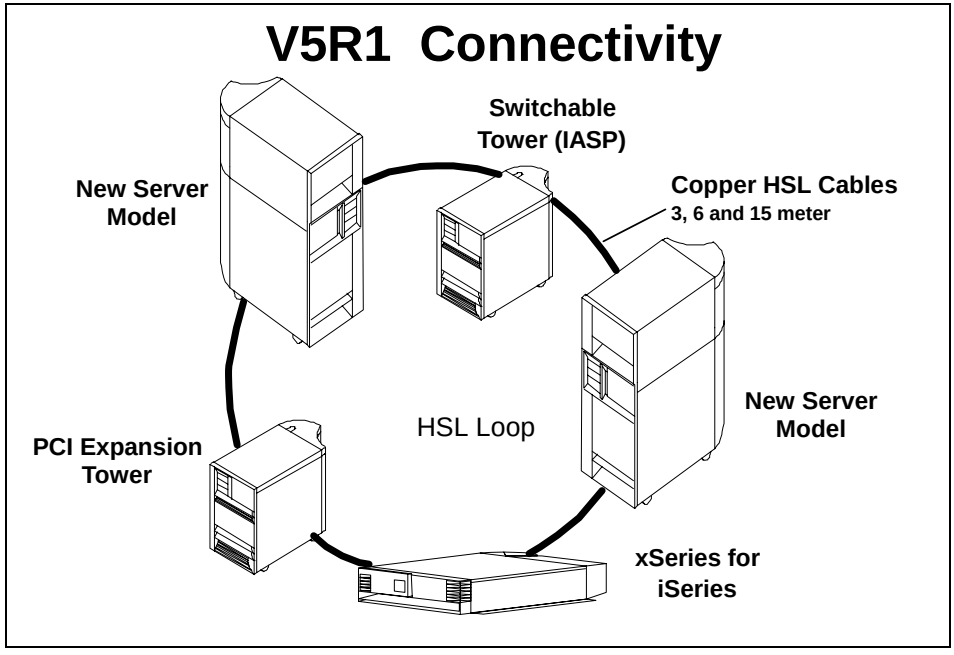
Copper HSL cables have a higher bandwidth compared to the optical HSL cables. The optical cables are available in longer lengths (up to 250m compared to 15m for copper). Optical HSL cables are smaller and easier to work with, particularly during installation.

The longer optical cable lengths extend the distance between I/O units and the Model 830, Model 840, and Model 890 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 HSL adapters
  - Simple HSL Clusters (two iSeries)
  - Complex HSL Clusters (three iSeries with V5R2 only)
  - xSeries for iSeries HSL connectivity
  - Switchable HSL connected tower with IASP

The connectivity of loops is shown in the following figure.



For details, see the product sections within this book or *AS/400e to IBM @server iSeries Migration: A Guide to System Upgrades at V4R5 and V5R1*, SG24-6055.

You can find the base rules for tower placement in the *IBM @server iSeries and AS/400e System Builder*, SG24-2155. HSL rules and migration considerations are described in the redbook*AS/400e to IBM @server iSeries Migration: A Guide to System Upgrades at V4R5 and V5R1*, SG24-6055.

HSL OptiConnect

In system complexes that contain only V5R1 HSL hardware, the HSL OptiConnect loop implementation consists of loops that may contain up to four I/O towers (#5074, #5079, #5075, #5078, #0578s) or external xSeries servers between two iSeries servers.

The same is true for V5R2 scenarios as well. However, V5R2 allows for three iSeries servers to be connected on an HSL OptiConnect loop. When there are three iSeries servers on a loop, there cannot be any I/O towers or external xSeries servers on that loop.

In an HSL OptiConnect loop, external xSeries servers count against the per loop tower limits.

The 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	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 cannot be used on the Model 270, or on HSL port A0 of the Model 820 to directly connect a #5033, #5034, or #5035 Migration Tower I or on port A1 to directly connect a #5075 or #5074 tower. On the Model 820, the #1462 can only be used on HSL port A1 to directly connect a #5033, #5034, or #5035 Migration Tower I.

To allow the connection of expansion towers to an Optical HSL loop, a #2739/#9739 Base Optical Bus Adapter is required for each of the #5074, #0578, and #5078 expansion towers. For the #5079 1.8 M I/O 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`

1519-100 Integrated xSeries Adapter for iSeries (direct attach)

The IBM Integrated xSeries Adapter for iSeries provides a direct high-speed attachment (HSL) 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 for iSeries (1519-100). 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 Model 270 or Model 820, 830, 840, and 890 servers 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 890. The Model 890 has a system limit of 47 total towers. The Model 890 has a system tower that cannot support the maximum number of I/O towers in addition to the maximum number of external xSeries servers.

The maximum external xSeries servers by model are:

- Model 270: System maximum is 2
- Model 820: System maximum is 8
- Model 830: System maximum is 16
- Model 840: System maximum is 32
- Model 890: System maximum is 32

The maximum external xSeries servers per HSL loop by model are:

- Model 270: Maximum per loop is 2 (system limit)
- Model 820: Maximum per loop is 8(system limit)
- Model 830: Maximum per loop is 8(limit on first loop is one, 0 if with migration tower)
- Model 840: Maximum per loop is 8(limit on first loop is five, 0 if with migration tower)
- Model 890: Maximum per loop is 8

For performance and stability reasons, place the external xSeries servers on their own loop if possible or in the middle of an HSL loop. That is, place the external xSeries server between the end of the HSL strings (redundant part of the loop) that attach to each HSL port. We recommend that no I/O tower should communicate with the system by having its data flow through an external xSeries server. However on the Model 820 with a migration tower Integrated xSeries Adapters cannot be adjacent to the migration tower. This means that in some configurations, there are I/O towers with their data flow through an Integrated xSeries Adapter. Do not surround any I/O tower with Integrated xSeries Adapters. Switched towers are required to be adjacent to the alternate system or 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 *AS/400e to IBM @server iSeries Migration: A Guide to System Upgrades at V4R5 and V5R1*, SG24-6055.

You can find the latest information on which xSeries or Netfinity Servers can be ordered on the xSeries server Web site at:

`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.

e-Config uses the #0092 External xSeries Attach to assure that the correct type and number of cables are on the order.

iSeries Server SB2

iSeries Server SB2

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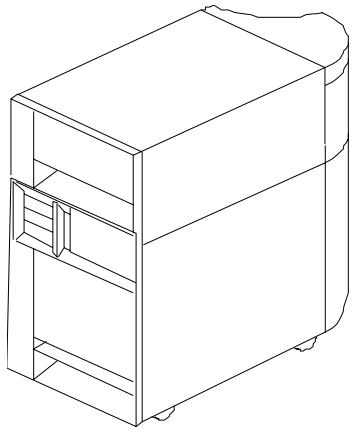
iSeries Model SB2

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 Controllerr

    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 for as system console/communications adapter.
- #9771 Base PCI Two-Line WAN with integrated modem

Note: In countries (regions) where the #9771 is not homologated, the marketing configurator adds a #4745 PCI 2-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 Disk Unit 10k RPM
  - #4318 17.54 GB Disk Unit 10k RPM
- 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 IOA

    #4746 PCI Twinaxial IOA
  - #5544 System Console on Ops Console

    #0367 Operations Console PCI Cable

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

The SB2 server is a Customer Setup system. Refer to Chapter 22, “Customer Install Features (CIF)” on page 445.

Model SB2 PCI cards and features

All SPD cards are now *withdrawn from marketing* and cannot be ordered. SPD cards are supported in V5R2 only via a Migration Tower with an upgrade to the SB2 system.

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.

Refer to Chapter 22, “Customer Install Features (CIF)” on page 445, to determine the CIF status for each supported feature.

The placement of PCI cards follows special rules. Consult the “PCI card placement rules for the iSeries server” chapter of the *IBM @server iSeries and AS/400e System Builder*, SG24-2155, and “PCI card technology” on page 326 before you propose any configuration.

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 main storage (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.

The supported power and packaging features are:

- Processor enclosure
  - Power supply (1100 watt) (CCIN 515B) (quantity two)
  - Regulator (CCIN 278B)
- #9074 Base I/O Tower
  - 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 the #5103 alone as an Miscellaneous Equipment Specification (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

– IBM marketing 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 Tower

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 Base 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 or hot swap power supplies.

The #9074 is capable of controlling Ultra2 SCSI disk units.

The 11 PCI IOAs are supported (driven) by the #9943 Base PCI IOP and by feature #2843 PCI IOPs or a #2791 PCI Integrated xSeries Server.

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 Chapter 10, “iSeries Model 830” on page 181.

I/O processor and I/O adapter support

This section lists the IOPs and IOAs supported by the SB2 server. See Chapter 17, “I/O processors” on page 309, and Chapter 18, “I/O adapters and controllers” on page 325, for full descriptions.

Note: PCI configuration rules are quite flexible. See the “PCI card placement rules for the iSeries server” chapter of the *IBM @server iSeries and AS/400e System Builder*, SG24-2155, for configuration rules on placing PCI cards.

LAN/WAN/workstation IOAs

- #2742 Two-Line WAN IOA
- #2743 1 Gbps PCI Ethernet IOA
- #2744 PCI 100 Mbps Token Ring IOA
- #2760 PCI 1 Gbps Ethernet UTP Adapter
- #2772 PCI Dual WAN/Modem IOA
- #2773 PCI Dual WAN/Modem IOA
- #2793 Two-Line WAN IOA with Modem
- #2794 Two-Line WAN IOA with Modem
- #2805 PCI Quad Modem IOA
- #2806 PCI Quad Modem (CIM)
- #2817 PCI 155 Mbps MMF ATM IOA
- #2849 10/100 Mbps Ethernet Adapter
- #4745 PCI 2-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 (*withdrawn from marketing* on 02 July 2002)
- #4801 PCI Cryptographic Coprocessor
- #4805 Cryptographic Accelerator
- #4838 PCI 100/10 Mbps Ethernet IOA
- #5700 PCI 1 Gbps Ethernet IOA
- #5701 PCI 1 Gbps Ethernet UTP 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 PCI Integrated Netfinity Server
- #2791 PCI Integrated xSeries Server
- #2792 PCI Integrated xSeries Server
- #2799 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 348 and “Internal tape, CD-ROM, and DVD-RAM” on page 358 for full descriptions.

Internal disk units

- #4317 8.58 GB Disk Unit 10k RPM
- #4318 17.54 GB Disk Unit 10k RPM
- #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 Unit
- #4483 16 GB ¼-inch Cartridge Tape Unit
- #4486 25 GB ¼-inch Cartridge Tape Unit
- #4487 50 GB ¼-inch Cartridge Tape Unit

External towers

The #5077 Migration Tower III attaches to the Model SB2 via high-speed link (HSL). See “Expansion towers” on page 254 for a full description.

iSeries Server SB3

iSeries Server SB3

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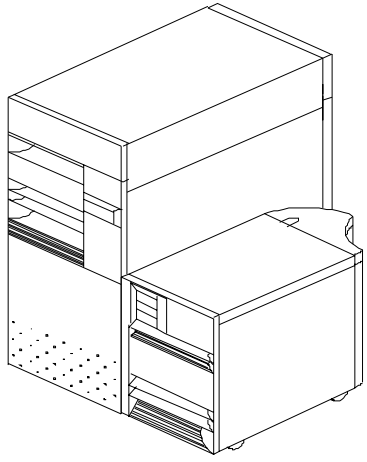
iSeries Model SB3

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:



iSeries Model SB3 System Unit

- 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

  Eight 2048 MB Main Storage Cards (CCIN 319A) installed (16384 MB total)
- Processor #2318

  Twelve 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 the #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 a base console/workstation IOA

    The configurator determines which feature combinations will be on the order based on the #5540, #5544, #5546, or #5548 System Console specify code.
- #9771 Base PCI Two-Line WAN with integrated modem

Note: In countries (region) where the #9771 is not homologated, the marketing configurator adds a #4745 PCI 2-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 the #2316 processor, 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 the #2318 processor, 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 Disk Unit 10k RPM
  - #4318 17.54 GB Disk Unit 10k RPM

- 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 IOA

    #4746 PCI Twinaxial IOA

  - #5544 System Console on Ops Console

    #0367 Operations Console PCI Cable

  - #5546 System Console on 100 Mbps Token Ring

    #2744 PCI 100 Mbps Token Ring IOA

  - #5548 System Console on 100 Mbps Ethernet

    #4838 PCI 100/10 Mbps Ethernet IOA

The SB3 server is a Customer Setup system. Refer to Chapter 22, “Customer Install Features (CIF)” on page 445, for more information.

Model SB3 PCI cards and features

All SPD cards are now *withdrawn from marketing* and cannot be ordered. SPD cards are supported in OS/400 V5R2 only via a migration tower with an upgrade to the SB3 system.

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.

Refer to Chapter 22, “Customer Install Features (CIF)” on page 445, to determine the CIF status for each supported feature.

The placement of PCI cards follows special rules. Consult the "PCI card placement rules for the iSeries server" chapter of the *IBM @server iSeries and AS/400e System Builder*, SG24-2155, and “PCI card technology” on page 326 before you propose any configuration.

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 memory. 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 allows 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.

Continuously powered main storage (CPM) is not supported on the Model SB3. An external UPS is recommended to protect the system unit and any external components against utility power outages. An external UPS can allow the system to run uninterrupted for longer than 30 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 supported power and packaging features are:

- 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 (region) 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 (region) specific usage
- #9079 Base I/O Tower
  - Bulks (765 watt) (CCIN 515A) (quantity two)
  - Batteries (quantity four)
  - AC Input/Charger
- #5104 Dual Line Cords - 840 CEC (and SB3 CEC)
  - 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 Miscellaneous Equipment Specification (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

– IBM marketing 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 Base 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 or 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 Base PCI IOP and by feature #2843 PCI IOPIs or #2791/#2799 PCI Integrated xSeries Servers.

The mounting for the eight disk units is included in the base #9079.

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, it can extend the battery backup time on SB3 models.

The Model SB3 is based on the Model 840. For system diagrams, see “Power and packaging” on page 208.

The #5150 was *withdrawn from marketing* on 02 July 2002.

I/O processor and I/O adapter support

This section lists the supported IOPs and IOAs. See Chapter 17, “I/O processors” on page 309, and Chapter 18, “I/O adapters and controllers” on page 325, for full descriptions.

Note: PCI configuration rules are quite flexible. See the "PCI card placement rules for the iSeries server" chapter of the *IBM @server iSeries and AS/400e System Builder*, SG24-2155, for configuration rules on placing PCI cards.

LAN/WAN/Workstation IOAs

- #2742 Two-Line WAN IOA
- #2743 1 Gbps PCI Ethernet IOA
- #2744 PCI 100 Mbps Token Ring IOA
- #2760 PCI 1 Gbps Ethernet UTP Adapter
- #2772 PCI Dual WAN/Modem IOA
- #2773 PCI Dual WAN/Modem IOA
- #2793 Two-Line WAN IOA with Modem
- #2794 Two-Line WAN IOA with Modem
- #2805 PCI Quad Modem IOA
- #2806 PCI Quad Modem (CIM)
- #2817 PCI 155 Mbps MMF ATM IOA
- #2849 10/100 Mbps Ethernet Adapter
- #4745 PCI 2-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 (*withdrawn from marketing* on 02 July 2002)
- #4801 PCI Cryptographic Coprocessor
- #4805 Cryptographic Accelerator
- #4838 PCI 100/10 Mbps Ethernet IOA
- #5700 PCI 1 Gbps Ethernet IOA
- #5701 PCI 1 Gbps Ethernet UTP IOA
- #9771 Base PCI 2-Line WAN with Modem

Internal disk unit controllers

- #9767 Base PCI 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
- #2768 PCI Magnetic Media Controller

I/O processors

- #2843 PCI IOP (64 MB)
- #2791 PCI Integrated xSeries Server
- #2792 PCI Integrated xSeries Server
- #2799 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 348 and “Internal tape, CD-ROM, and DVD-RAM” on page 358 for full descriptions.

Internal disk units

- #4317 8.58 GB Disk Unit 10k RPM
- #4318 17.54 GB Disk Unit 10k RPM
- #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 Unit
- #4483 16 GB ¼-inch Cartridge Tape Unit
- #4486 25 GB ¼-inch Cartridge Tape Unit
- #4487 50 GB ¼-inch Cartridge Tape Unit

External towers

The #5077 Migration Tower II attaches to the Model SB3 via high-speed link. See “Expansion towers” on page 254 for full a description.

I/O Processor

I/O Processor

17

I/O processors

This chapter discusses PCI system units, PCI and SPD Migration towers, and I/O processors for 270, 820, 830, 840, 890, SB2, and SB3 systems and associated towers.

System unit hardware (PCI)

This section describes the PCI IOPs that are supported by current iSeries and AS/400e models.

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 1 Gbps PCI Ethernet IOA
- #2744 PCI 100 Mbps Token Ring IOA
- #2749 - PCI Ultra Magnetic Media Controller
- #2760 PCI 1 Gbps Ethernet UTP Adapter
- #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
- #2805/#2806 Quad Modem Adapter
- #2817 - PCI 155 MBPS MMF ATM Adapter
- #4745 - PCI WAN IOA

- #4746 - PCI Twinaxial IOA
- #4748 PCI RAID Disk Unit Controller (*withdrawn from marketing* on 02 July 2002)
- #4750 - PCI ISDN BRI U IOA
- #4751 - PCI ISDN BRI S/T IOA
- #4761 PCI Integrated Analog Modem (*withdrawn from marketing* on 02 July 2002)
- #9778/#4778 PCI RAID Disk Unit Controller
- #4801 - PCI Crypto Coprocessor
- #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 for the iSeries server” chapter of the *IBM @server iSeries and AS/400e System Builder*, SG24-2155.

#2843/#9943 PCI IOP

The #2843/#9943 is a PCI I/O processor with 64 MB of memory that drives PCI IOA adapters on Models 820, 830, 840, 890, 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 10 #2843 PCI IOP features may be added to the #5079.

Note: The #9943 may only be on initial system orders or on Miscellaneous Equipment Specification (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 1 Gbps PCI Ethernet IOA
- #2744 PCI 100 Mbps Token Ring IOA
- #2749 - PCI Ultra Magnetic Media Controller
- #2760 PCI 1 Gbps Ethernet UTP Adapter
- #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
- #2805/#2806 Quad Modem Adapter
- #2817 - PCI 155 MBPS MMF ATM Adapter
- #4745 - PCI WAN IOA
- #4746 - PCI Twinaxial IOA
- #4748 PCI RAID Disk Unit Controller (*withdrawn from marketing* on 02 July 2002)
- #4750 - PCI ISDN BRI U IOA
- #4751 - PCI ISDN BRI S/T IOA
- #4761 PCI Integrated Analog Modem (*withdrawn from marketing* on 02 July 2002)
- #9778/#4778 PCI RAID Disk Unit Controller
- #4801 - PCI Crypto Coprocessor (not allowed on CEC base/embedded IOPs)
- #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 for the iSeries server” chapter of the *IBM @server iSeries and AS/400e System Builder*, SG24-2155, for complete rules for placing these PCI cards in configurations.

#2791/#2891 Integrated xSeries Server

The #2791/#2891 Integrated xSeries Server contains an 850 MHz processor and four memory slots in the xSeries IOP.

The #2791 is supported in the CEC of Models 820, 830, 840, 890, 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.

The #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 xSeries 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 is addressable.

At least one memory card in the Netfinity/xSeries IOP is required.

The feature numbers of the server IOP memory cards are:

- #2795 - 128 MB Server Memory
- #2796 - 256 MB Server IOP Memory
- #2797 - 1 GB Server 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 for the iSeries server” chapter of the *IBM @server iSeries and AS/400e System Builder*, SG24-2155, for details and limitations.

The #2791 and #2891 support up to three, in any combination, of these LAN IOA features:

- #2743 1 Gbps PCI Ethernet IOA
- #2760 PCI 1 Gbps Ethernet UTP Adapter
- #4838 PCI 100/10 Mbps Ethernet IOA
- #2744 PCI 100 Mbps Token Ring IOA

One #0225 (1 Gbps Ethernet on the Integrated xSeries Server) is required for each 1 Gbps Ethernet adapter selected to run on the #2791/#2891.

One #0224 (100/10 Mbps Ethernet on the Integrated xSeries Server) is required for each #4838 selected to run on the #2791/#2891.

One #0223 (100 Mbps Token-Ring on the Integrated xSeries Server) is required for each #2744 selected to run on the #2791/#2891.

Native iSeries functions are not supported, and the #2791/#2891 servers do not support external host LAN.

The #2791/#2891 requires three PCI card slots on the system or expansion tower backplane. Two slots are consumed by the #2791. The third slot is reduced to a short card slot, which is then used by the first LAN IOA card.

The #2791/#2891 ships with a keyboard/mouse splitter cable.

The #2791/#2891 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 xSeries IOP memory is required.
- #1700 IPCS Keyboard/Mouse for Windows is the default (in those countries (regions) that offer it).
- A display must be connected to the Integrated xSeries Server to support Windows.
- For a non-US keyboard/mouse and display, see:

  `http://www.iseries.ibm.com/windowsintegration`

#2792/#2892 PCI Integrated xSeries Server

The #2792 and #2892 PCI integrated xSeries Server contain a 1.6 GHz processor and four memory slots in the xSeries IOP.

The #2792 is supported in the CEC of Models 820, 830, 840, and 890, and in the #0578/#5078 PCI Expansion Unit, #5074/#5079 PCI Expansion Tower, and #5075 PCI Expansion Tower when attached to these models.

The feature numbers of the #2792 xSeries IOP memory cards are:

- #0426 - 512 MB Server Memory
- #0427 - 1 GB Server Memory

The #2892 is supported only in the Model 270 system unit and in the and #5075 PCI Expansion Tower when it is attached to the Model 270.

The feature numbers of the #2892 xSeries IOP memory cards are:

- #0446 - 512 MB Server Memory
- #0447 - 1 GB Server Memory

At least two memory cards in the xSeries IOP are required. Allowable main storage increments in MB are:

- 1024
- 2048
- 3072
- 4096

The #2792/#2892 includes one embedded 100/10 Mbps Ethernet LAN controller.

The #2792 and #2892 support up to three, in any combination, of these LAN IOA features:

- #2744 PCI 100 Mbps Token Ring IOA
- #5700 PCI 1 Gbps Ethernet IOA
- #5701 PCI 1 Gbps Ethernet UTP IOA

Native iSeries functions are not supported. The #2791/#2891 servers do not support external host LAN.

The #2792/#2892 requires two PCI card slots on the system or expansion tower backplane. (The card does not reduce a third slot to a short slot.)

The #2792/#2892 ships with a keyboard/mouse splitter cable.

The #2792/#2892 supports only the Windows 2000 and Windows.NET Server operating systems. These points apply:

- #0325 IPCS Extension Cable for Windows is the default (but may be removed).
- A minimum of 1 GB xSeries IOP memory is required.
- #1700 IPCS Keyboard/Mouse for Windows is the default (in those countries (regions) that offer it).
- A display must be connected to the Integrated xSeries Server to support Windows.
- For a non-US keyboard/mouse and display, see:

  `http://www.iseries.ibm.com/windowsintegration`

#2799/#2899 PCI Integrated xSeries Server

The #2799 and #2899 PCI Integrated xSeries Server contain a 1.0 GHz Intel Pentium III processor and four memory slots in the xSeries IOP.

The #2899 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 Server 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 is addressable.

At least one server memory card is required.

The feature numbers of the xSeries IOP memory cards are:

- #2795/#2895 - 128 MB Server Memory
- #2796/#2896 - 256 MB Server Memory
- #2797/#2897 - 1 GB Server 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 for the iSeries server” chapter of the *IBM @server iSeries and AS/400e System Builder*, SG24-2155, for complete rules for placing these PCI cards in configurations.

The #2799/#2899 supports up to three, in any combination, of these LAN IOA features:

- #2743 1 Gbps PCI Ethernet IOA
- #2760 PCI 1 Gbps Ethernet UTP Adapter
- #4838 PCI 100/10 Mbps Ethernet IOA
- #2744 PCI 100 Mbps Token Ring IOA

One #0225 (1 Gbps Ethernet on the Integrated xSeries Server) is required for each 1 Gbps Ethernet adapter selected to run on the #2799/#2899.

One #0224 (100/10 Mbps Ethernet on the Integrated xSeries Server) is required for each #4838 selected to run on the #2799/#2899.

One #0223 (100 Mbps Token-Ring on the Integrated xSeries Server) is required for each #2744 selected to run on the #2799/#2899.

Native iSeries and AS/400e functions are not supported. The #2799/#2899 servers do not support external host LAN.

The #2899 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 then used by the first attached LAN IOA card.

The #2799 requires three PCI card slots on the Model 820, 830, 840, SB2, or SB3 system unit backplane. Two slots are consumed by the #2799, and the third slot is reduced to a short card slot, which is then used by the first LAN IOA card.

The #2799 or #2899 requires three PCI card slots on the expansion tower backplane. Two slots are consumed by the #2799/#2899, and the third slot is reduced to a short card slot, which is then used by the first LAN IOA card.

The #2799/#2899 ships with a keyboard/mouse splitter cable.

The #2799/#2899 supports only the Windows 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 Server Memory is required.
- The #1700 IPCS Keyboard/Mouse for Windows is the default (in those countries (regions) that offer it).
- A display must be connected to the Integrated xSeries Server to support Windows.

For a non-US keyboard/mouse and display, see:

`http://www.iseries.ibm.com/windowsintegration`

The #2799/#2899 PCI Integrated xSeries Server require OS/400 V5R1 (with PTFs) or later. For required PTF information, refer to Informational APAR II13105 at:

`http://www-912.ibm.com/supporthome.nsf/document/10000035`

Migration tower PCI hardware

Some or all of the IOPs described in the following sections were *withdrawn from marketing*. This section is included for reference purposes to assist in planning system upgrades.

#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.

The #2809 was *withdrawn from marketing* on 31 May 2001.

#2824 PCI Feature Controller

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.

The #2824 was *withdrawn from marketing* on 29 December 2001.

#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 is for a bridge card that acts as the interface to the system. The IPCS also comes with a special cable that 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 (*withdrawn from marketing* on 28 December 2001)
- #2862: 128 MB IOP Memory (*withdrawn from marketing* on 28 December 2001)
- #2867: 256 MB IOP Memory (*withdrawn from marketing* on 02 July 2002)

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 (*withdrawn from marketing* on 28 December 2001)
- #2724: PCI 16/4 Mbps Token-Ring IOA (*withdrawn from marketing* on 31 July 2001)
- #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 (regions))
- 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 (regions) outside of the U.S.A, see the Web site at:

`http://www.as400.ibm.com`

The #2865 was *withdrawn from marketing* on 02 July 2002.

Migration tower SPD hardware

All of the IOPs described in the following sections were *withdrawn from marketing*. For a list of withdrawn features, see “Products and features no longer marketed by IBM” on page 899. This section is included for reference purposes to assist in planning system upgrades.

For SPD to PCI migration considerations, refer to:

`http://www.ibm.com/servers/eserver/iseries/support/planning`

#2629 SPD LAN/WAN/Workstation IOP

This adapter uses one SPD slot. It supports up to three of these IOAs:

- #6149 16/4 Mbps Token-Ring IOA
- #6180 Twinaxial Workstation IOA (*withdrawn from marketing* on 31 July 2001)
- #6181 ASCII Workstation Controller (*withdrawn from marketing* on 31 July 2001)

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.

The #2629 was *withdrawn from marketing* on 31 May 2001.

#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.

The #2810 was *withdrawn from marketing* on 31 May 2001.

#6618 Integrated Netfinity Server

The #6618 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 (*withdrawn from marketing* on 28 December 2001)
- #2862 128 MB IOP Memory Card (*withdrawn from marketing* on 28 December 2001)
- #2867 256 MB IOP Memory Card (*withdrawn from marketing* on 02 July 2002)

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) (*withdrawn from marketing* on 28 December 2001 and 02 July 2002 respectively)
- #2724/#9724 PCI 16/4 Mbps Token Ring IOA (*withdrawn from marketing* on 31 July 2001 and 02 July 2002 respectively)
- #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 (regions) and orderable)
- 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 (regions) outside the U.S.A, see the Web site at:

`http://www.as400.ibm.com`

The #6618 was *withdrawn from marketing* on 28 December 2001.

I/O Adapter

I/O Adapter

18

I/O adapters and controllers

This chapter discusses system unit (PCI) and migration tower (PCI and SPD) I/O adapters for 270, 820, 830, 840, 890, SB2, and SB3 processors and associated towers.

Homologation

Homologation is the process to obtain a country's (region's) government approval to ship a device and connect it to the country's (region's) 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 a country's (region's) government organizations, usually Post Telephone and Telegram (PTTs) departments. The following table summarizes the PCI features that may require homologation in certain countries (regions). 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
#2805	PCI Quad Modem IOA
#2806	PCI Quad Modem IOA
#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 original AS/400 systems used System Products Division (SPD) cards to add input/output (I/O) services to the system. SPD cards integrate the processor (IOP) and adapter (IOA) function on a single card.

Early AS/400e models require input/output processors (IOPs) and input/output adapters (IOA) to be in specific slots in the system and expansion towers. If high performance in particular areas is required, a single input/output adapter may

have been assigned to a single IOP. This results in unassigned slots in the tower, leaving valuable slots empty.

PCI I/O architecture separates IOP and IOA functions so that you can add one IOP and have several different IOAs controlled by the one IOP.

PCI architecture provides more flexibility in the placement of IOPs and IOA cards. This results in more efficient use of card slots, potentially resulting in a lower cost of implementation. PCI I/O structure enables customer setup of the server and select features on all models.

The fundamental bus architecture remains unchanged in iSeries servers with the implementation of PCI adapters. PCI architecture offers advantages over other non-iSeries (or non-AS/400e) system structures. The system IOP is architected to offload the main processor, isolate the host from adapter and network errors, and to manage, configure, and service the adapters. On certain models, adding or removing PCI cards can be performed without taking the server down. This allows you to power down a PCI slot and remove the PCI card from the system without powering down the system. This improves the availability of the system and allows you to perform upgrades, maintenance, or repair without impacting the users of the system.

Note: Refer to the individual PCI card descriptions and the system descriptions to see if “hot swapping” of a specific PCI card is supported.

Increased flexibility of configuration, however, adds a degree of complexity to the configuration process. With the implementation of PCI technologies, a full understanding of configuration rules associated with the various I/O features of the iSeries server is required.

PCI card placement rules

There are two sets of rules that govern the placement of PCI cards in the iSeries servers:

- **Hard rules**: Impose restrictions on the type of card, size, and valid slot placement. Hard rules are taken into account by the IBM marketing configurator.
- **Soft rules**: Impose restrictions based on possible performance bottlenecks associated with certain configuration and use. Soft rules depend on the use of the cards and required performance and, therefore, are not supported by the configurator and must be taken into account separately.

For a complete explanation of both *soft* and *hard* rules as well the types of cards and slots supported on each system, refer to the “PCI card placement rules for

the iSeries server" chapter in *IBM @server iSeries and AS/400e System Builder*, SG24-2155.

PCI IOP

There are several types of I/O processor controller cards:

- Integrated IOPs are integrated on the backplane of a system or tower
- PCI IOP 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 IOP

  The Integrated xSeries Server is a special case of a PCI IOP controller card. It drives a select subset of supported PCI IOA cards.

  In the Model 250, the Integrated xSeries Server IOP requires two specialized slots (a processor and bridge slot) and an PCI IOP as well. In the 270, 820, 830, 840, and 890 systems, the Integrated xSeries Server occupies a valid IOP slot in the system and no additional IOP card is required.

PCI IOA

When installed and configured in an OS/400 partition, PCI IOAs have to be driven by a PCI IOP.

There are several types of PCI adapter cards, each of which can require a specialized slot on the system backplane:

- **Low-speed PCI adapter cards**: Low-speed PCI cards require a PCI card slot and a PCI controller to drive them. The 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.

Refer to the system diagrams to determine which slots are supported.

Note: If the card is configured as a dedicated IOA in a Linux partition, then it does not require an IOP and does not support the enhanced functions stated above.

PCI adapter are customer installable features. Refer to Chapter 22, “Customer Install Features (CIF)” on page 445, for a list of CIF features for current iSeries models.

Functions not supported with PCI cards

The following functions do not have equivalent function PCI cards:

- 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.
- Link Problem Determination Aids (LPDA)-1: 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.

System unit hardware (PCI)

PCI IOAs supported by current iSeries and AS/400e models are described in this section.

Refer to Chapter 22, “Customer Install Features (CIF)” on page 445, to determine the CIF status for each supported feature.

#2743 PCI 1 Gbps Ethernet IOA

The #2743 PCI 1 Gbps Ethernet IOA feature allows 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 #2791/#2799 or #2891/#2899 PCI Integrated xSeries Server in V5R1. A #0225 1Gbps Ethernet Specify is needed for each #2743 running under one of these integrated servers.

When used as a Direct Attached Adapter for Linux, the #0601 should be ordered in place of #2743.

#2744 PCI 100 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 #2744/#9744 comes standard with an 8-ft./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 #2791/#2799 or #2891/#2899 PCI Integrated xSeries Server, one #0223 (100 Mbps Token-Ring on Integrated Netfinity Server) is required for each #2744 ordered.

When used as a Direct Attached Adapter for Linux, the #0603 should be ordered in place of #2744.

#2760 1 Gbps/100 Mbps/10 Mbps UTP Ethernet UTP IOA

The #2760 PCI UTP Ethernet IOA feature allows attachment 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 #2791/#2799 or #2891/#2899 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.

When used as a Direct Attached Adapter for Linux, the #0602 should be ordered in place of #2760.

#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. The #2765 is auto-sensing and is fully enabled for 1 Gbps and 2 Gbps. V5R2 is required for 2 Gbps. 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 micron cable.
- The #0372 is a two meter LC-SC Adapter kit that can be used to connect the #2765 to a 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/H11 or E1A/H1A with feature #9510 (on new orders)
- 3590 Models E11/H11 or E1A/H1A 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. The #2766 is auto-sensing and is

fully enabled for 1 Gbps and 2 Gbps. V5R2 is required for 2 Gbps. Each #2766 is shipped with a wrap connector (PN#05N6767). The following 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 micron cable.
- The #0372 is a two meter LC-SC Adapter kit that can be used to connect the #2765 to a 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 resources can ensure more predictable performance.

Important: The #6501 was *withdrawn from marketing* on 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). The #2766 is not supported as a load source IOP in secondary (system is unable to IPL via a #2766), but remote load source mirroring is supported through the #2766.

#2772 and #2773 two line WAN adapters

The #2772 and #2773 are basically the same interface. The #2772 is the non-Complex Impedance Matching (CIM) 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 (region)-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-China (Hong Kong S.A.R.)/New Zealand
- #1021 Modem Cable-Finland/Norway
- #1022 Modem Cable-Netherlands
- #1023 Modem Cable-Swiss
- #1024 Modem Cable-Denmark
- #1025 Modem Cable-U.S./Canada

Cable features supported with the #2773 are:

- #1019 Modem Cable-Australia
- #1020 Modem Cable-China (Hong Kong S.A.R.)/New Zealand

#2805 and #2806 PCI Quad Modem IOA

The #2805 and #2806 are basically the same interface. The #2805 is the non-Complex Impedance Matching (CIM) version of the card. Both are 4-line WAN modem adapters, with four RJ-11 ports that support V.92 56K Async SLIP/PPP and V.34 Fax applications at data rates up to 33.6K via internal modems. Connection to the V.92 ports is via a telephone cable.

The V.92 functions offer increased throughput for upload operations, improved V.44 data compression, and shortened modem synchronization periods. The call waiting and modem-on-hold functions associated with V.92 are not supported. Remote Power-On via ring-indicator, SDLC, and synchronous PPP are not supported.

The #2805 and #2806 cards need country (region)-specific telephone cables (a minimum of one and a maximum of four per card). Feature #2806, the CIM version, is intended for Australia and New Zealand only. The #2805/#2806 require country (region) certification/homologation.

A minimum of one modem cable must be ordered for each #2805/#2806. All modem cables installed on a system must be the same feature number.

Cable features supported with the #2805 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-China (Hong Kong S.A.R.)/New Zealand
- #1021 Modem Cable-Finland/Norway
- #1022 Modem Cable-Netherlands
- #1023 Modem Cable-Swiss
- #1024 Modem Cable-Denmark
- #1025 Modem Cable-U.S./Canada

Cable features supported with the #2806 are:

- #1019 Modem Cable-Australia
- #1020 Modem Cable-China (Hong Kong S.A.R.)/New Zealand

OS/400 V5R1 (with PTFs) or later is required. For required PTF information, availability, and ordering information, refer to Informational APAR II13079 at:

`http://www-912.ibm.com/supporthome.nsf/document/10000035`

#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 is typically used where 155 Mbps speeds are required over distances of less than 2Km, and is capable of supporting both multiple emulated LAN environments and enhanced TCP/IP performance with OS/400 V5R1. The #2817 is a 64-bit card, but is allowed to plug into any 32-bit or 64-bit slot. The #2817 replaces #4816 on orders with OS/400 V5R1 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 and receive path.

#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 20-ft./6m PCI cable
- #0349 V.24/EIA232 50-ft./15m PCI cable
- #0353 V.35 20-ft./6m PCI cable
- #0354 V.35 50-ft./15m PCI cable
- #0355 V.35 80-ft./24m PCI cable
- #0356 V.36 20-ft./6m PCI cable
- #0358 V.36 150-ft./45m PCI cable
- #0359 X.21 20-ft./6m PCI cable
- #0360 X.21 50-ft./15m PCI cable
- #0365 V.24/EIA232 80-ft./24m PCI cable
- #0367 Operations Console cable*

*Only one #0367 Operations Console cable is allowed per #4745. Multiple #0367s can be ordered (but only one allowed per #4745) to serve as consoles for secondary partitions when logical partitioning (#0140) is specified.

#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 is supported.

#4761 Integrated Analog Modem

Restriction: The #4761 supports only the fax functions with V5R2.

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 needing 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 is 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 (region) certification or homologation.

The #4761 was *withdrawn from marketing* on 02 July 2002.

#4801 PCI Cryptographic 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 Cryptographic 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 iSeries 820, 830, 840, and 890 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.

#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 #2791/#2799 or #2891/#2899 PCI Integrated xSeries Server, one #0224 (100/10Mbps Ethernet on Integrated Netfinity Server) is required for each #4838 ordered.

When used as a Direct Attached Adapter for Linux, #0607 should be ordered in place of the #4838.

#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 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
- #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 the wizard (5769-XE1 SF64217). Then use Operations 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`

Fax is supported on the V.90 port with V5R1.

The #9771 WAN adapter supports the #5544 System Console on Ops Console on the RVX port with OS/400 V5R1.

#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 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 is needed for a valid RAID-5 configuration. A maximum of three arrays is 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.

When used as a Direct Attached Adapter for Linux, the #0604 should be ordered in place of the #2763.

#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 later in this section) or RAID-protection is also supported. By moving the hardware jumper, the adapter functions 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 has 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.

This controller requires OS/400 V5R1 or later.

When used as a Direct Attached Adapter for Linux, the #0606 should be ordered in place of the #4778.

#4748/#9748 Base 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 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 a lower 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 is needed for a valid RAID-5 configuration. A maximum of four arrays is allowed, with a maximum of 10 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 #4331 1.6 GB Read Cache Device 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.

When used as a Direct Attached Adapter for Linux, the #0605 should be ordered in place of the #4748.

The #4748/#9748 were *withdrawn from marketing* on 02 July 2002 and 28 December 2001 respectively.

#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-V5R1 processors 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/H11/E1A/H1a 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.

Note: If a #3995 Optical Library Dataserver is attached to a #2749, the #2749 should not be placed under the same IOP that drives the Load Source DASD.

#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
- 7208-345 60 GB External 8mm Tape Drive

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 7208-345
- 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)
- One 7208-345 and one 7210-020 (the two devices are daisy-chained with the 7208-345 physically connected first; no #0120 attachment specify code is required for the 7210-020)
- One 7208-345 and one 7210-025 (the two devices are daisy-chained with the 7208-345 physically connected first)

The #0120 7210-020 Attachment Specify is required for each 7210-020 External CD-ROM Drive to be connected directly (not daisy chained) to the system through a #2768.

Note: If the 7210-020 is to be daisy chained with another external device, this specify code must not be present.

The #0162 Extended Single Ended Attach Specify is required when these devices are directly attached (not second on a daisy-chained string) to an iSeries server via a #2768 PCI Magnetic Media Controller:

- 7329-308 SLR100 ¼-inch Tape Autoloader
- 7210-025 External DVD- RAM Drive

Note: If either of the above devices is daisy chained off another device, the #0162 specify must not be present.

The #2768 PCI Magnetic Media Controller is hot pluggable.

Migration tower PCI hardware

Some or all of the IOAs listed in the following sections were *withdrawn from marketing*. For a complete list of withdrawn features, see “Products and features no longer marketed by IBM” on page 899. This section is included for reference purposes to assist in planning system upgrades.

- #2720/#9720 PCI WAN/Twinaxial IOA
- #2721/#9721 PCI Two-Line WAN IOA
- #2722 PCI Twinaxial Workstation IOA
- #2723/#9723 PCI Ethernet IOA (10 Mbps)
- #2724/#9724 PCI 16/4 Mbps Token-Ring IOA
- #2745/#9745 PCI Two-Line WAN IOA
- #2746 PCI Twinaxial Workstation IOA
- #2750 PCI ISDN BRI U IOA
- #2751 PCI ISDN BRI S/T IOA
- #2761 Integrated Analog Modem
- #2838/#9738 PCI 100/10 Mbps Ethernet IOA
- #2718 PCI Magnetic Media Controller
- #2726 PCI RAID Disk Unit Controller Ultra SCSI
- #2729 PCI Magnetic Media Controller SCSI
- #2740 PCI RAID Disk Unit Controller
- #2741 PCI RAID Disk Unit Compression Controller
- #2748 PCI RAID Disk Unit Compression Controller
- #9728 Base PCI Disk Unit Controller Ultra SCSI

For SPD to PCI migration considerations, refer to:

`http://www.ibm.com/servers/eserver/iseries/support/planning`

Refer to the *IBM @server iSeries and AS/400e System Builder*, SG24-2155, for feature descriptions.

Migration tower SPD hardware

All of the IOAs listed in the following sections were *withdrawn from marketing*. For a list of withdrawn features, see “Products and features no longer marketed by IBM” on page 899. This section is included for reference purposes to assist in planning system upgrades.

See the iSeries Planning site for a discussion of replacement features.

`http://www.ibm.com/servers/eserver/iseries/support/planning`

- #2699/#9699 SPD Two-Line WAN IOA
- #6149 16/4 Mbps Token-Ring IOA
- #6180/#9280 Twinaxial Workstation IOA
- #6181/#9381 Ethernet/IEEE 802.3 IOA (10 Mbps)
- #6501 Tape/Disk Device Controller (SPD)
- #6513 Internal Tape Device Controller (SPD)
- #6533 RAID Disk Unit Controller Ultra SCSI (SPD)
- #6534 Magnetic Media Controller (SCSI SPD)
- CCIN 671A MFIOP with RAID

For SPD to PCI migration considerations, refer to:

`http://www.ibm.com/servers/eserver/iseries/support/planning`

Refer to the *IBM @server iSeries and AS/400e System Builder*, SG24-2155, for feature descriptions.

Internal Storage

Internal Storage

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Internal disk, tape, CD-ROM, and DVD-RAM storage

This chapter discusses disk storage, tape, CD-ROM, and DVD-RAM internal to the system unit or tower complex. It also presents information on speeds, specifications, and feature descriptions, including disk protection and alternate IPL options.

PCI disk units

PCI disk support is summarized in the following table.

PCI internal disks		Bytes	System and expansion units supported						RAID/ Mirror[1]	Minimum OS level[3]
Feature	Description		250	270	8xx	#5074 #5075 #5079	#503x	#5065 #5066		
#1312	1.03 GB Disk Conversion Kit	1					S		B/5	V4R5
#1313	1.96 GB Disk Conversion Kit	1					S		A/4	V4R5
#1322	1.03 GB Disk Conversion Kit	2					S		B/5	V4R5
#1323	1.96 GB Disk Conversion Kit	2					S		A/4	V4R5
#1325	1.03 GB Disk Conversion Kit	2					S		B/5	V4R5
#1326	1.96 GB Disk Conversion Kit	2					S		A/4	V4R5
#1327	4.19 GB Disk Conversion Kit	2					S		C/6	V4R5
#1333	8.53 GB Disk Conversion Kit	2					S		D/7	V4R5
#1334	17.54 GB Disk Conversion Kit	2					S		E/8	V4R5
#1336	1.96 GB Disk Conversion Kit	2					S		A/4	V4R5
#1337	4.19 GB Disk Conversion Kit	2					S		C/6	V4R5
#4308	4.19 GB Disk Unit	2				S[4]		S	F/6	V4R5
#4314	8.58 GB Disk Unit	2		S	S	S			G/7	V4R5
#4317	8.58 GB 10k RPM Disk Unit	2		N	N	N		M	G/7	V4R5
#4318	17.54 GB 10k RPM Disk Unit	2		N	N	N		M	H/8	V4R5
#4319	35.16 GB 10k RPM Disk Unit	2		N	N	N			J/9	V5R1

PCI internal disks		Bytes	System and expansion units supported						RAID/ Mirror[1]	Minimum OS level[3]
Feature	Description		250	270	8xx	#5074 #5075 #5079	#503x	#5065 #5066		
#4324	17.54 GB Disk Unit	2		S	S	S			H/8	V4R5
#4331	1.6 Gb Read Cache Device	2		N	N	N		M		V4R5
#6717	8.58 GB 10K RPM Disk Unit	2		R	R	R		R	G/7	V4R5
#6718	17.54 GB 10K RPM Disk Unit	2		R	R	R		R	H/8	V4R5
#6806	1.96 GB Disk Unit	2					S		A/4	V4R5
#6807	4.19 GB Disk Unit	2					S		C/6	V4R5
#6813	8.58 GB Disk Unit	2	S				M		D/7	V4R5
#6817	8.58 GB 10K RPM Disk Unit[2]	2	N				M		D/7	V4R5
				R	R	R		R	G/7	V4R5
#6818	17.54 GB 10K RPM Disk Unit[2]	2	N				M		E/8	V4R5
				R	R	R		R	H/8	V4R5
#6824	17.54 GB Disk Unit	2	S				M		E/8	V4R5
#6831	1.6 Gb Read cache Device	2	N				M			V4R5
#8617	8.58 GB 10K RPM Disk Unit	2		R	R	R		R	G/7	V4R5
#8618	17.54 GB 10K RPM Disk Unit	2		R	R	R		R	H/8	V4R5
#8813	Opt. Base 8.58 GB Disk Unit	2					S		D/7	V4R5
#8817	Opt. Base 8.58 GB 10k RPM Disk Unit[2]	2					S		D/7	V4R5
				R	R	R		R	G/7	V4R5
#8818	Opt. Base 17.54 GB 10k RPM Disk Unit[2]	2					S		E/8	V4R5
				R	R	R		R	H/8	V4R5

PCI internal disks		Bytes	System and expansion units supported						RAID/ Mirror[1]	Minimum OS level[3]
Feature	**Description**		**250**	**270**	**8xx**	**#5074 #5075 #5079**	**#503x**	**#5065 #5066**		
#8824	Opt. Base 17.54 GB Disk Unit	2					S		E/8	V4R5
#8917	Opt. Base 8.58 GB 10k RPM Disk Unit	2	N						D/7	V4R5
#8918	Opt. Base 17.54 GB 10k RPM Disk Unit	2	N						E/8	V4R5
#8924	Opt. Base 17.54 GB Disk Unit	2	S						E/8	V4R5
#9313	Base 8.58 GB Disk Unit	2	S						D/7	V4R5

Notes:

1. Like lettered disks can be part of the same RAID array, and like numbered disks can mirror each other.
2. Disk unit is not supported on the #6502, #6512,or #6530 Disk Unit Controllers.
3. Minimum OS/400 support level on iSeries.
4. The #4308 is supported on #5074/#5079 when converted from #5065/#5066.

N Available as a new disk.

M Available via Miscellaneous Equipment Specification (MES) only.

R Feature conversion to #4317 or #4318 during an MES upgrade is required to allow mounting of disk units in #5074, #5079, or #5065 towers, or iSeries System Units. Feature conversion is not available when the NEWSYS function of the IBM marketing configurator is used to replace a system. RPQ 847102 may be used in place of feature conversion to obtain mounting hardware and instructions.

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 Conversion Kit	1	S	S [2]	S[2]	S	S	B/5
#1603	1.96 GB Single Disk Conversion 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	8.58 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 10k RPM Disk Unit[5, 6]	2	N	X [3]	X	X [3]	X	D/7
#6718	17.54 GB 10k RPM Disk Unit[5, 6]	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 10k RPM Disk unit[5, 6]	2	S	S [3]	S	S [3]	S	D/7
#8618	Base 17.54 GB 10k RPM Disk Unit[5, 6]	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.
5. Disk unit not supported on #6502, #6512, and #6530 Disk Controllers.
6. Feature conversion to #4317 or #4318 available during the MES upgrade to allow mounting in iSeries System Unit, #5074, #5079, or #5065. Feature conversion is not available when NEWSYS function of the IBM marketing configurator is used to replace a system. RPQ 847102 may be used in place of feature conversion to obtain mounting hardware and instructions.

N Available as a new disk.

S Supported but not orderable.

X Available as a migrated disk.

Disk storage specifications comparison

This section outlines a comparison of disk storage specifications and provides descriptions for disk units that are supported on the iSeries server.

This table shows the specifications of the current and legacy IBM internal disk technologies supported on the iSeries servers.

Disk type	Disk diameter	Capacity	SCSI type	Avg. seek time	Average latency	RPM	Data-rate (burst)	Areal density (M/inch)	Read Ahead Cache
#4308	3.5 inches	4.19 GB	Ultra	R 6.5 ms W 8.0 ms	4.17 ms	7200	40 MB/s	1109 to 1253	1 MB
#4314	3.5 inches	8.58 GB	Ultra	R 6.5 ms W 7.5 ms	4.17 ms	7200	40 MB/s	1109 to 1253	1 MB
#4317	3.5 inches	8.58 GB	Ultra 2	R 5.3 ms W 6.3 ms	2.99 ms	10 K	80 MB/s	1353 to 2024	4 MB
#4318	3.5 inches	17.54 GB	Ultra 2	R 4.9 ms W 5.9 ms	2.99 ms	10 K	80 MB/s	3197 to 3535	2 MB
#4319	3.5 inches	35.16 GB	Ultra 2	R 4.9 ms W 5.9 ms	3.00 ms	10 K	80 MB/s	7040	3.58 MB
#4324	3.5 inches	17.54 GB	Ultra	R 7.0 ms W 8.0 ms	4.17 ms	7200	40 MB/s	3025	1.79 MB

Disk type	Disk diameter	Capacity	SCSI type	Avg. seek time	Average latency	RPM	Data-rate (burst)	Areal density (M/inch)	Read Ahead Cache
#6605	3.5 inches	1.031 GB	SCSI	7.8 ms	4.17 ms	7200	20 MB/s	562	512 KB
#6606	3.5 inches	1.967 GB	SCSI	7.8 ms	4.17 ms	7200	20 MB/s	532	512 KB
#6607	3.5 inches	4.19 GB	SCSI	8.3 ms	4.17 ms	7200	20 MB/s	829	512 KB
#6650	3.5 inches	1.96 GB	SCSI	9.5 ms	5.56 ms	5400	20 MB/s	354	512 KB
#6652	3.5 inches	1.03 GB	SCSI	8.9 ms	5.56 ms	5400	20 MB/s	354	512 KB
#6713	3.5 inches	8.58 GB	Ultra	8.3 ms	4.17 ms	7200	40 MB/s	829	1024 KB
#6714	3.5 inches	17.54 GB	Ultra	8.5 ms	4.17 ms	7200	40 MB/s	1253	1024 KB
#6717	3.5 inches	8.58 GB	Ultra	R 5.3 ms W 6.3 ms	2.99 ms	10 K	40 MB/s	1353 to 2024	4 MB
#6718	3.5 inches	17.54 GB	Ultra	R 4.9 ms W 5.9 ms	2.99 ms	10 K	40 MB/s	3197 to 3535	2 MB
#6806	3.5 inches	1.96 GB	Ultra	7.8 ms	4.17ms	7200	40 MB/s	532	512 KB
#6807	3.5 inches	4.19 GB	Ultra	8.3 ms	4.17ms	7200	40 MB/s	829	512 KB
#6813	3.5 inches	8.58 GB	Ultra	8.3 ms	4.17ms	7200	40 MB/s	829	1024 KB
#6817	3.5 inches	8.58 GB	Ultra	R 5.3 ms W 6.3 ms	2.99 ms	10 K	40 MB/s	1353 to 2024	4 MB
#6818	3.5 inches	17.54 GB	Ultra	R 4.9 ms W 5.9 ms	2.99 ms	10 K	40 MB/s	3197 to 3535	2 MB
#6824	3.5 inches	17.54 GB	Ultra	8.5 ms	4.17ms	7200	40 MB/s	1253	1024 KB
#6906	3.5 inches	1.96 GB	Ultra	7.8 ms	4.17ms	7200	40 MB/s	532	512 KB
#6907	3.5"	4.19 GB	Ultra	8.3 ms	4.17ms	7200	40 MB/s	829	512 KB
#8617	3.5"	8.58 GB	Ultra	R 5.3 ms W 6.3 ms	2.99 ms	10 K	40 MB/s	1353 to 2024	4 MB
#8618	3.5 inches	17.54 GB	Ultra	R 4.9 ms W 5.9 ms	2.99 ms	10 K	40 MB/s	3197 to 3535	2 MB
#8813	3.5 inches	8.58 GB	Ultra	8.3 ms	4.17ms	7200	40 MB/s	829	1024 KB
#8817	3.5 inches	8.58 GB	Ultra	R 5.3 ms W 6.3 ms	2.99 ms	10 K	40 MB/s	1353 to 2024	4 MB
#8818	3.5 inches	17.54 GB	Ultra	R 4.9 ms W 5.9 ms	2.99 ms	10 K	40 MB/s	3197 to 3535	2 MB
#8824	3.5 inches	17.54 GB	Ultra	8.5 ms	4.17ms	7200	40 MB/s	1253	1024 KB

Disk type	Disk diameter	Capacity	SCSI type	Avg. seek time	Average latency	RPM	Data-rate (burst)	Areal density (M/inch)	Read Ahead Cache
#9707	3.5 inches	4.19 GB	Ultra	8.3 ms	4.17ms	7200	40 MB/s	829	512 KB

Other disk related devices

#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.

#6831 1.6 Gb Read Cache Device

The #6831 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 #6831 feature has CCIN 6731.

Disk unit conversion

The DASD units that can be migrated to the 820, 830, 840, or 890 servers, or their supporting towers, include those features that support 80-pin connections and are of 10K RPM or faster.

10k RPM Disk Unit Conversion

On 12 February 2002, support for feature conversion of 10k RPM Disk Units was made available during upgrades to 8xx models. Feature conversion facilitates moving existing disk units to newer HSL expansion towers.

The feature conversions supported are:

- #6717, #6817, #8617, and #8817 to #4317
- #6718, #6818, #8618, and #8818 to #4318

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

Note: On 12 February 2002, this RPQ was replaced with direct support in the IBM marketing configurator to convert #6717, #6817, #8617, and #8817 Disk Units to #4317 Disk Units and #6718, #6818, #8618, and #8818 Disk Units to #4318 Disk Units during MES upgrades. The RPQ remains available for those instances when there is no MES upgrade path available to facilitate the feature conversion.

RPQ 847102 ships the disk mounting hardware and instructions to convert one #6x17/#8x17 disk unit (8.58 GB) to a #4317 or one #6x18/#8x18 disk unit to a #4318. This conversion allows the customer to move 8.5 GB 10K RPM and 17 GB 10K RPM disk units from the current towers to the #5065/#5066 PCI Storage Tower, iSeries Model 270 and 8xx System Units, and #5075/#5074/#5079 PCI Expansion Towers.

After the conversion, process an RPO change to add a #4317 or #4318 feature for each #6x17/#6x18/#8x17/#8x18 feature converted, and remove the appropriate number of #6x17/#6x18/#8x17/#8x18 features.

RPQ 847123 10K RPM DASD Mounting 170 to 270

RPQ 847123 ships the disk mounting hardware and instructions required to convert #6817/#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 10K RPM files from the Model 170 to the Model 270.

After the conversion, process an RPO change to add a #4317 or #4318 feature for each #6x17/#6x18/#8x17/#8x18 feature converted, and remove the appropriate number of #6x17/#6x18/#8x17/#8x18 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
- #0830 - #4319 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 is 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 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								
Feature	**Size**	**250**	**270**	**820**	**830/840/890**	**#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				X			X		M
#4430	DVD-RAM				X			X		
#4482	4 GB ¼”				X			X		M
#4483	16 GB ¼”				X			X		M
#4486	25 GB ¼”				X			X		M
#4487	50 GB ¼”				X			X		
#4525	CD-ROM		X	X						
#4530	DVD-RAM		X	X						
#4582	4 GB ¼”		X	X						
#4583	16 GB ¼”		X	X						
#4584	30 GB ¼”		X	X						

#4586	25 GB ¼”		X	X						
#4587	50 GB ¼”		X	X						
#4684	30 GB ¼”				X					M
#6325	CD-ROM					X	M			
#6380	2.5 GB ¼”					S	S			
#6381	2.5 GB ¼”	X				X	M			
#6382	4 GB ¼”	X				X	M			
#6383	16 GB ¼”	X				X	M			
#6384	30 GB ¼”					M	M			
#6385	13 GB ¼”	S				S	S			
#6386	25 GB ¼”	X				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	
#6484	30 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.

X 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 internal tape read/write compatibilities.

Format	Capacity	Media	2.5 GB[4]	2.5 GB[4]	4 GB	16 GB	13 GB[4]	25 GB	30 GB	50 GB
			#6380	#6381 #6481	#4482 #4582 #6382 #6482	#4483 #4583 #6383 #6483	#6385 #6485	#4486 #4586 #6386 #6486	#4584 #4684 #6384 #6484	#4487 #4587
SLR100	50 GB	SLR100-50GB	--	--	--	--	--	--	--	R/W
	5 GB	SLR100-5GB	--	--	--	--	--	--	R/W	R/W
SLR60	30 GB	SLR60-30GB	--	--	--	--	--	--	R/W	R/W
MLR3 [1]	25 GB	MLR3-25GB	--	--	--	--	--	R/W	R/W	R/W
QIC5010 [1]	16 GB	MLR1-16GB	--	--	--	R/W	R/W	R/W	R/W	R
	13 GB	DC5010	--	--	--	R/W	R/W	R/W	R/W	R
	2 GB	MLR1-2GB	--	--	--	R/W	R/W	R/W	R/W	R
QIC4DC [2]	8 GB	SLR5-4GB	--	--	R/W	R	--	R	R	R
QIC4GB	4 GB	SLR5-4GB	--	--	R/W	R	--	R	R	R
QIC2DC [2]	5 GB	DC9250	--	R/W	R/W	R	--	R	R	
QIC2GB	2.5 GB	DC9250	R/W	R/W	R/W	R	R/W	R	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[5]	--		
QIC525	320 MB	DC6320	R/W	R/W	R/W	--	R/W	--		
QIC120	120 MB	DC6150	R/W	R/W	R/W	--	R/W[5]	--		
QIC24 [3]	60 MB	DC6150	R	R	--	--	--	--		

1. Indicates that the capacity can double typically 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.
5. Use of DC6150 and DC6525 media may shorten the life of the tape drive and require more frequent maintenance.

Cartridge part numbers:

- 50 GB 455 M IBM SLR100 Data Cartridge (35L0968)
- 30 GB with SLR60-30 GB Data Cartridge (19P4209)
- 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 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	2.5 GB 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	4 GB 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

Feature	Description	OS/400 version (minimum)	Compaction algorithm[1]	Supported formats	Data transfer rate (native) [4]	Max capacity (compressed)[2]
#6385 #6485	13 GB 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
#4483 #4583 #6383 #6483	16 GB 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
#4584 #4684 #6384 #6484	30 GB QIC	V4R5	LZ1	SLR60-30GB	4 M/sec	60 GB
				SLR100-5GB	4 M/sec	10 GB
				MLR3	2 M/sec	50 GB
				QIC-5010 16GB	1.5 M/sec	32 GB
				QIC-5010 13GB	1.5 M/sec	26 GB
				QIC-5010 2GB	1.5 M/sec	4 GB
				QIC-4DC[3, 5]	760 K/sec	8 GB
				QIC4GB[5]	380 K/sec	8 GB
				QIC-2DC[3, 5]	600 K/sec	4 GB
				QIC2GB[5]	300 K/sec	4 GB
#4486 #4586 #6386 #6486	25 GB QIC	V4R1	LZ1	MLR3	2 M/sec	50 GB
				QIC-5010	1.5 M/sec	32 GB
				QIC-4DC[3, 5]	760 K/sec	8 GB
				QIC4GB[5]	380 K/sec	8 GB
				QIC2DC[3, 5]	600 K/sec	5 GB
				QIC2GB[5]	300 K/sec	5 GB

Feature	Description	OS/400 version (minimum)	Compaction algorithm[1]	Supported formats	Data transfer rate (native) [4]	Max capacity (compressed)[2]
#4487 #4587	50 GB QIC	V5R1	LZ1	SLR100-50GB	5 M/sec	100 GB
				SLR100-5GB	5 M/sec	10 GB
				MLR3	2 M/sec	50 GB
				QIC-5010 16GB[5]	1.5 M/sec	32 GB
				QIC-5010 13GB[5]	1.5 M/sec	26 GB
				QIC-5010 2GB[5]	1.5 M/sec	4 GB
				QIC-4DC[3, 5]	760 K/sec	8 GB
				QIC4GB[5]	380 K/sec	8 GB
#6390 #6490 #1261	7 GB 8mm	V3R0M5	IDRC	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.
5. These formats only have read-only support on these drives.

Alternate IPL

Throughout this book and in the *IBM @server iSeries and AS/400e 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 between the two concepts.

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 and later 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.

Note: The FC Tape Controller #2765 does not support the alternate IPL device function. A D-mode IPL is required using CD-ROM, DVD-ROM, or another alternate IPL tape device. Then select an FC Tape Controller #2765 I/O adapter to complete the installation or recovery process.

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.

The following table provides a list of alternate IPL devices and their required IOPs.

Specify code	Alternate IPL device	Tape IOP required	Migration tape IOP required
#5502	QIC-3040		
#5503[4]	9347		#6112
#5504	3490 EXX/FXX	#2749	#6501/#6534/2729
#5506[1]	QIC-4000 (default on 270 and 820)	#2768[3]	#2718/#2726/#2740 #2741/#2748/#2778 #6513/#9728
#5507	9348	#2749	#2621/#6534/#2729
#5508 [4]	3422		#2644
#5509[4]	3430		#2644
#5511[2]	3480		#2644
#5512	3490 Cxx	#2749	#2644/#6501/#6534#2729
#5513	3490	#2749	#2644
#5514	8mm	#2749	#2621/#2726/#2729 #2740/#2741/#2748/#2778 #6534/#9728
#5515	3570	#2749	#6501/#6534#2729
#5516[4]	QIC-1000		#2621/#2624/#2726 #2740/#2741/#2748/#2778 #5077/MFIOP/#6513
#5517[2]	QIC-2500	Note 3	#2621/#2726/#2740 #2741/#2748/#2778 #5077/MFIOP/#9728
#5518	QIC-13000	N/A	#2726/#2740/#2741 #2748/#2778/#6513/#9728
#5519	3590	#2749/#2765	#6501/#6534/#2729
#5531	16 /30 GB	Note 3	#2726/#2740/#2741 #2748/#2778/#6513/#9728
#5536[7]	25 GB	Note 3	#2726/#2740/#2741 #2748/#2778/#6513/#9728
#5537	3580	#2749	#2729/#6501/#6534
#5538[5]	DVD-RAM	Notes [6, 8]	N/A
#5599[9]	No save/restore device	N/A	N/A

Notes:
1. Supported for #5006 tape backup (no longer applicable since #5006 was withdrawn on 31 May 2001.
2. Requires migration tower and Boot Manager.
3. Requires one of the following: #2763, #4748, #4778, #9748, #9767, or #9778.
4. Not orderable. Support only.
5. Requires OS/400 V5R1 or later.
6. The device must be located in CEC. DVD-RAM devices are not supported by Boot Manager with OS/400 V5R1.
7. Manufacturer's note: If both #4486/#4586 and #4487/#4587 are on an order, choose #4487/#4587 as the alternate IPL device.
8. Requires one of the following: #2763, #2768, #4748, #4778, #9748, #9767, or #9778.
9. The #5599 is to be used when customer chooses not to order a tape device with this system, due to having an alternate method of save/restore not requiring tape (for example, using communications or LAN).

See the *Backup and Recovery V5R2*, SC41-5304, for more information.

Tape unit technology

4 GB ¼-inch Internal Cartridge Tape Unit Technology

The 4 GB tape technology 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 359.

13 GB ¼-inch Internal Cartridge Tape Unit Technology

Note: The 13 GB QIC units are not supported with V5R2. See the tables in this chapter for compatibility.

16 GB ¼-inch Internal Cartridge Tape Unit Technology

The 16 GB tape technology 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 format and backward read capability to the last three QIC 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 the internal tape read/write compatibilities table on page 359.

25 GB ¼-inch Internal Cartridge Tape Unit Technology

The 25 GB tape technology 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 the internal tape read/write compatibilities table on page 359.

30 GB ¼-Inch Cartridge Tape Unit Technology

The 30 GB ¼-inch Cartridge Tape Unit technology may be used for save/restore, alternate IPL, program distribution, migration, and ¼-inch cartridge tape exchange. The 30 GB tape technology provides 30 GB of storage capacity. With data compression, up to 60 GB can be stored per cartridge, providing unattended backup capability for a broad range of medium sized iSeries servers.

The unit can store data at a rate of 4 MB per second (8 Mb per second with 2:1 compression). It will write 30 GB with IBM SLR60-30GB Data Cartridge (up to 60 GB with compression in SLR60 format), 25 GB with IBM MLR3-25GB Data Cartridge (up to 50 GB with compression in MLR3 format), 16 GB with IBM MLR1-16GB Data Cartridge (up to 32 GB with compression in QIC5010 format) and 2 GB with IBM MLR1-2GB Data Cartridge (up to 4 GB with compression in QIC5010 format). The unit will read 4 GB with SLR5-4GB Data Cartridge (QIC4GB format) and 2.5 GB with IBM DC9250 Data Cartridge (QIC2GB format).

This tape is not compatible with System/36 tape units. For read and write compatibility, refer to the internal tape read/write compatibilities table on page 359.

50 GB ¼-Inch Cartridge Tape Unit Technology

The 50 GB ¼-inch Cartridge Tape Unit technology may be used for save/restore, alternate IPL, program distribution, migration, and ¼-inch cartridge tape exchange. The 50 GB tape technology provides 50 GB 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.T

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 the internal tape read/write compatibilities table on page 359.

Internal tape features

#4482 4 GB ¼-inch Cartridge Tape Unit

Can be mounted in the system unit of iSeries 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 iSeries 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 iSeries 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 iSeries 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 iSeries 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 iSeries Model 270 or 820. The #4583 is a CIF.

#4584 30 GB ¼-inch Cartridge Tape Unit

Can be mounted in the system unit of the iSeries Model 270 or 820. The #4584 is a CIF.

#4586 25 GB ¼-inch Cartridge Tape Unit

Can be mounted in the system unit of the iSeries 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 iSeries Model 270 or 820. The #4587 is a CIF.

#4684 30 GB ¼-inch Cartridge Tape Unit

Can be mounted in the system unit of iSeries Models 830, 840 and 890 and in the #5074/#5079 PCI Expansion Towers. The #4684 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 Storage Device Controller.

#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)

The #6381 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 Lempel Ziv 1 (LZ1), 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 359.

#6382 4 GB ¼-inch Cartridge (QIC)

The #6382 is not compatible with System/36 tape units.

With special compaction using LZ1, 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 the internal tape read/write compatibilities table on page 359.

#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.

#6384 30 GB ¼-inch Cartridge Tape Unit

The #6384 can be used for save/restore, alternate IPL, migration, and ¼-inch cartridge tape exchange using appropriate media and density.

#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.

The #6480 was *withdrawn from marketing* on 02 July 2002.

#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 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.

#6484 30 GB ¼-inch Cartridge Tape Unit

The #6484 can be used for save/restore, alternate IPL, migration, and ¼-inch cartridge tape exchange using appropriate media and density.

#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)*
#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		4.7 GB (R/W)
			DVD-RAM Double-sided		9.2 GB (R/W)

***** 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 the 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.

Prerequisite: A disk unit controller is required in the CEC or tower where the device is mounted. OS/400 V4R5 with PTFs is also required.

#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 #4530 is capable of writing and reading 4.7 GB on a single disk. The #4530 is also capable of reading 650 MB CD-ROM disks.

The #4530 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: A disk unit controller is required in the CEC where the device is mounted. OS/400 V4R5 (with PTFs) or later is required.

#6325 Optional CD-ROM

The #6325 is available on #5072 and #5073 System Unit Expansion Towers for Models Sxx, 6xx, and 7xx.

The #6325 was *withdrawn from marketing* on 02 July 2002.

Prerequisite: The #2624 Storage Device Controller (*withdrawn from marketing* on 28 December 2001) is required.

There is a maximum of one #6325 allowed per I/O tower and Model 740 System Unit and one per Model 730 System Unit.

Using the #6325 limits the use of tape in the same tower to the #6380 and #6390 units.

#6425 Optional CD-ROM

The #6425 is available on Models 720, 620, and S20, or in the #7130 Expansion cage on the #5064/#9364 System Unit Expansiont with a #9329/#9330 PCI Integrated Expansion Unit.

The #6425 was *withdrawn from marketing* on 02 July 2002.

Prerequisites: The #2726/#2740/#2741/#2748 PCI RAID Disk Unit Controller and the #9728 Base PCI RAID Disk Unit Controller are required.

It is not supported together with #9331 Expansion Unit for SPD cards in the #5064/#9364 System Unit Expansion.

IBM 7210 Model 025 External DVD-RAM Drive

For a full description, see , “IBM 7210 Model 025 External DVD-RAM Drive” on page 383

External Storage

External Storage

20

External tape, optical, and disk storage

This chapter describes the external storage media devices marketed today for iSeries servers. “External storage tape and DVD-RAM specifications” on page 378 addresses single tape units of different formats. Then “External tape storage automated library specifications” on page 384 addresses automated libraries with more than one cartridge.

This chapter also includes feature descriptions of the controllers required to attach storage media. A list of controllers supported by each iSeries and AS/400e can be found at “Common magnetic media controllers” on page 887.

You can find further information on iSeries storage on the Web at:

`http://www.ibm.com/storage`

External storage tape and DVD-RAM specifications

This table helps to distinguish the technical characteristics of the external single-drive tape and DVD-RAM devices supported by the iSeries and AS/400e servers marketed today.

Machine model	**3570-C00**	**3580-H11**	**7207-122**	**7208-342**	**7208-345**	**7210-025**
Description	C-XL format 0.31"	LTO Ultrium	QIC ¼"	8mm Mammoth	8mm Mammoth-2	DVD-RAM
Technology	Longitudinal Serpentine	LTO	Longitudinal Serpentine	Helical Scan	Helical Scan	DVD-R/W
Native/ compressed[1]	7 GB 21 GB	100 GB 200 GB	4 GB 8 GB	20 GB 40 GB	60 GB 150 GB	2.6 GB 4.7 GB
Maximum data rate/sec[2]	7 MB/s 15 MB/s	15 MB/s 30 MB/s	380 KB/s 760 KB/s	3 MB/s 6 MB/s	12 MB/s 20 MB/s	CD: 3.6 MB/s DVD: 1.35 MB/s[3] 2.7MB/s[4]
Interface	SCSI Fast/wide differential	HVD Ultra Wide SCSI	Wide SCSI	SCSI Fast/wide differential	LVD/SE Ultra wide SCSI-2	SCSI-2
Compression/ compaction method[6]	LZ1	LZ1	LZ1	IDRC	ALDC	
Controllers supported	#2729 #2749 #6501 #6534	#2729 #2749[5] #6501 #6534	#2718	#6534 #2729	#2718 #2768	#2718 #2768
Minimum release	V3R1	V4R4 V4R5[5]	V4R2 with PTFs	V4R1	V4R5	V5R1
Alternate IPL device specify	#5515	#5537	#5506	#5514	#5514	#5538

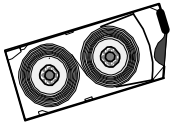
1. The degree of compression that is achieved is highly sensitive to the characteristics of the data being compressed.
2. The actual throughput that is achieved is a function of many components, such as system processor, disk data rate, data block size, data compressibility, I/O attachments, and the 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 tape subsystem supports a compaction algorithm. The algorithms are Improved Data Recording Capability (IDRC), Lempel Ziv 1 (LZ1), or Adaptive Lossless Data Compression (ALDC). These algorithms enable more data to be written to tape up to the maximum shown.

Refer to “External storage tape and DVD-RAM specifications” on page 378 for a comparison of capacity and transfer rates relative to compression options used by the tape device or attachment.

External storage tape devices

This section describes the external storage single-tape devices supported by the current iSeries and AS/400e product line.

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, see “IBM Magstar MP 3570 Tape Cassette Subsystem” on page 388.

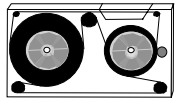
IBM 3580 Model H11 Ultrium Tape Drive

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.

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.

See “IBM 358x Ultrium ATL Solutions with Linear Tape-Open Technology” on page 395 for a complete description of the Ultrium Family of devices.

IBM 7207 Model 122 4 GB External SLR5 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 366 for more information.

It attaches to the iSeries using:

- #2718 PCI Magnetic Media Controller (*withdrawn from marketing* on 02 July 2002)
- #2768 PCI Magnetic Media Controller

For a description of the #2718 and #2768, see Chapter 18, “I/O adapters and controllers” on page 325.

There is also a tape Auto Loader Library that supports QIC media. See “IBM 7329 Model 308 SLR100 Tape Autoloader” on page 387 for more information.

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 the #7501, which includes an additional four 4 GB cartridges over the #9501 package.

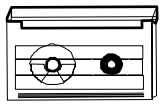
Additional cartridges (#2503) and cleaning cartridges (#2504) can be ordered by Miscellaneous Equipment Specification (MES).

The 7207 Model 122 is available in black only.

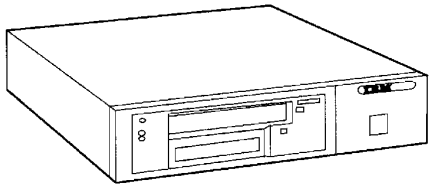
The minimum OS/400 release required is V4R2 with PTFs as stated in Informational APAR II11671.

IBM 7208 Model 342 20 GB External 8mm Tape Drive

The 7208 Model 342 is a stand-alone SCSI 8mm streaming tape drive with the capacity of 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 server in these ways:

- #6534 Magnetic Media Controller (*withdrawn from marketing* on 31 July 2001)
- #2729 PCI Magnetic Media Controller
- #2749 PCI Ultra Magnetic Media Controller

For a description of the #6534, #2729 and #2749, see Chapter 18, “I/O adapters and controllers” on page 325.

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/15 ft.), the #9212 (12m/39 ft.), and the #9218 (18m/59 ft.).

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.

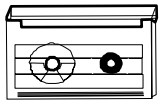
Additional cartridges (#2019) and cleaning cartridges (#2016) can be ordered by MES.

The 7208 Model 342 is available in black only.

Prerequisites

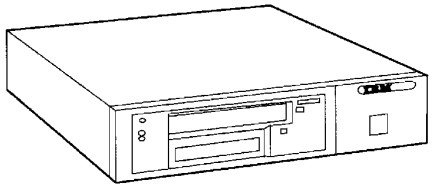
The minimum OS/400 release required is V4R1. At least V4R5 is required to attach via the #2749.

IBM 7208 Model 345 60 GB External 8mm Tape Drive



The 7208 Model 345 is a stand-alone SCSI 8mm streaming tape drive with the capacity of a 60 GB per cartridge. It uses the new IBM Mammoth-2 AME media data cartridge with SmartClean technology. The Model 345 also provides backward read compatibility with previous 20.0 GB 8mm AME tape cartridges.

Positioning



The 7208-345 External 8mm Tape Drive is an excellent solution for users of 8mm tape. Some features are:

- Read compatible with 20 GB 8mm AME tape cartridges
- Fast single cartridge tape backup

The 7208 Model 345 can be used for save/restore or archiving. It can provide a media capacity of up to 150 GB of data storage per cartridge using the ALDC algorithm for compression. It has a sustained data rate of 12 M per second (20 M per second with a 2.5:1 compression ratio). This gives three times the capacity and four times the date rate of the 7208 Model 342.

The 7208 Model 345 has the ability to read (but not write) the 20 GB 8mm AME format.

The 7208 Model 345 attaches to the AS/400e and iSeries servers in these ways:

- #2718 PCI Magnetic Media Controller (*withdrawn from marketing* on 02 July 2002)
- #2768 PCI Magnetic Media Controller

For a description of the #2718 and #2768, see Chapter 18, “I/O adapters and controllers” on page 325.

Features

The IBM 7208 Model 345 60 GB External Tape Drive is shipped with one 8mm AME SmartClean data cartridge, a cleaning cartridge, a test tape, an LVD terminator, a SCSI jumper, a #9224 2.4m/7.8-ft. SCSI cable, a country (region)-specific power cord, and an installation and user's guide.

If an additional SCSI cable is required, feature #5224 may be ordered.

The 7208 Model 345 is available in black only.

Prerequisites

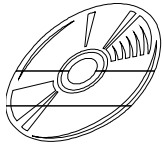
The minimum OS/400 release required is V4R5.

External storage DVD-RAM device

This section describes external storage DVD-RAM devices supported by the current iSeries and AS/400e product line.

IBM 7210 Model 025 External DVD-RAM Drive

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 can be used as an alternate IPL device. It is not supported by Boot Manager.

The 7210 Model 025 attaches to the AS/400e and iSeries servers in these ways:

- #2718 PCI Magnetic Media Controller (*withdrawn from marketing* on 02 July 2002)
- #2768 PCI Magnetic Media Controller

For a description of the #2718 and #2768, see Chapter 18, "I/O adapters and controllers" on page 325.

Features

A SCSI cable must be specified with any order to attach the 7210-025 to the controller card. Options are the #9751 (.7m/2.2 ft.) and the #9212 (2.5m/8.1 ft.). Additional #5301 (.7m/2.2 ft.), #5302 (2.5m/8.1 ft.), or #5303 (.5m/1.6 ft.) 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

The #8723 Rack Mounting Kit provides an 18-inch by 26-inch metal platform and mounting hardware for installing the 7210 in a rack.

Prerequisites

The minimum OS/400 release required to support the 7210 Model 025 is V4R5.

External storage automated tape library devices

External tape storage automated library specifications

This table helps to distinguish the technical characteristics of the external storage automated tape library devices supported by the iSeries and AS/400e servers marketed today.

Machine model	**Desktop** **3490E-F10** **Rack** **3490E-F11** **Library** **3490-F1A**	**3494-L12** **3494-D12** **3494-L10** **3494-D10** **3494-HA1**	**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** **3590-E11** **3590-H1A** **3590-H11**	**7329-308**
Description	½-inch tape	Library for 3490-x1A and 3590-x1A	C-XL format 0.31"	C-XL format 0.31"	LTO	½-inch tape Magstar	QIC ¼-inch AutoLoader
Technology	Longitudinal Serpentine	N/A	Longitudinal Serpentine	Longitudinal Serpentine	Longitudinal Serpentine	Longitudinal Serpentine	Longitudinal Serpentine
Native/ compressed[1]	800 MB 2.4 GB	Depends on installed drives	7 GB 21 GB	7 GB 21 GB	100 GB 200 GB	B and E: 40 GB 120 GB H: 60 GB 180 GB	50 GB 100 GB
Maximum number of cartridges/ library	10	6240	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 H1A: 1 H11: 10	8
Maximum total capacity	24 GB	748 TB	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 to 441.4 TB	B1A: 120 GB B11: 1.2 TB E1A: 120 GB E11: 1.2 TB H1A: 180 GB H11: 1.8 TB	800 GB
Maximum data rate/sec[2]	3 MB/s 9 MB/s	Depends on installed drives	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 H11 fibre: 70 MB/s H11 SCSI: 34 MB/s	5 MB/s 10 MB/s
Time to load	81 sec	30 sec	19 sec	20 sec	3494/3590 30 sec	56 sec	
Interface	SCSI-2 Fast/wide differential	RS232 Async or LAN for robotics	SCSI-2 Fast/wide differential	SCSI-2 Fast/wide differential	SCSI-2 HVD	SCSI-2 Fibre	Ultra SCSI-2 SE interface
Compression/ compaction method[6]	HDC IDRC	Depends on installed drives	LZ1	LZ1		IDRC LZ1	

Machine model	**Desktop** **3490E-F10** **Rack** **3490E-F11** **Library** **3490-F1A**	**3494-L12** **3494-D12** **3494-L10** **3494-D10** **3494-HA1**	**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** **3590-E11** **3590-H1A** **3590-H11**	**7329-308**
Controllers supported	#2729 #2749[3] #6501 #6534	Depends on installed drives	#2729 #2749[3] #6501 #6534	#2729 #2749[3] #6501 #6534	#2729 #2749[3] #6501 #6534 #2765[4, 5]	#2729 #2749[3] #6501 (not H1x) #6534 #2765[4, 6]	#2718 #2768
Minimum OS/400 release	V4R1	V2R3	V3R1	V4R1	V4R4	B1A/B11: V3R1 E1A/E11: V4R1 H1x: V4R5	V4R5
Alternate IPL device specify	#5504	Depends on Tape Devices Installed	#5515	#5515	#5537	#5519	#5536

Notes:

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 *iSeries Performance Capabilities Reference*, SC41-0607, which is available on the Web 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:

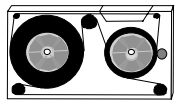
- **Random mode**: A mode where the library can retrieve and load cartridges at random based on user demand.
- **Auto mode**: A mode where the library sequentially loads cartridges to save or retrieve data and automatically advances to the next cartridge after a cartridge is filled or restored sequentially.
- **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 *iSeries Performance Capabilities Reference*, SC41-0607, which is available on the Web 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 barcode 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 (*withdrawn from marketing* on 02 July 2002)
- #2768 PCI Magnetic Media Controller

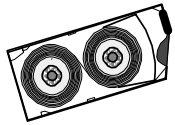
The minimum OS/400 supported software release is V4R5.

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.

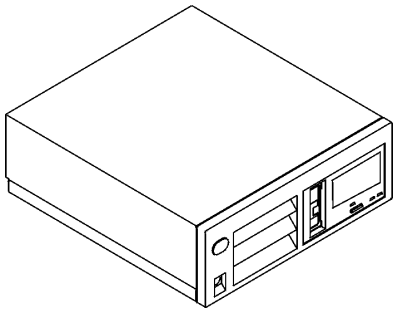
IBM Magstar MP 3570 Tape Cassette Subsystem

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).

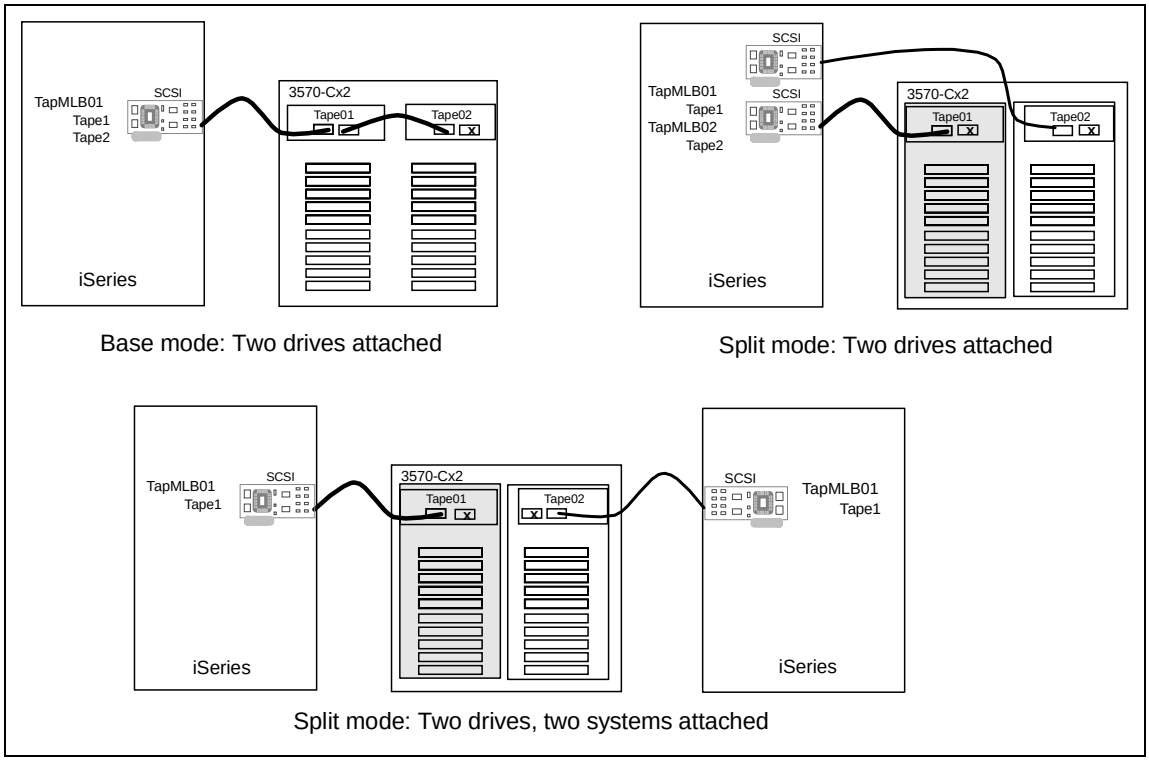


Positioning

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) (*withdrawn from marketing* on 31 July 2001)
- #2729 PCI Magnetic Media Controller
- #2749 PCI Ultra Magnetic Media Controller

See Chapter 18, “I/O adapters and controllers” on page 325, 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 Chapter 18, “I/O adapters and controllers” on page 325, 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 379 for the C00 models.

Model	Description	Number 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.

The minimum OS/400 release required is V3R1. PTFs may also be required. OS/400 V4R5 is the minimum required to attach via a #2749 PCI Ultra Magnetic Media Controller.

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/1.6 ft.), the #5212 (12m/39 ft.), the #5218 (18m/59 ft.), the #5225 (25m/81 ft.), and the #5245 (4.5m/15 ft.). 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.

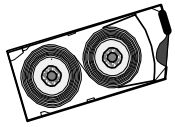
A media feature may also be ordered. The options are:

- #8705 10 C-format Data Cartridges
- #8708 10 Fast Access Linear Tape C-Format XL Data Cartridges

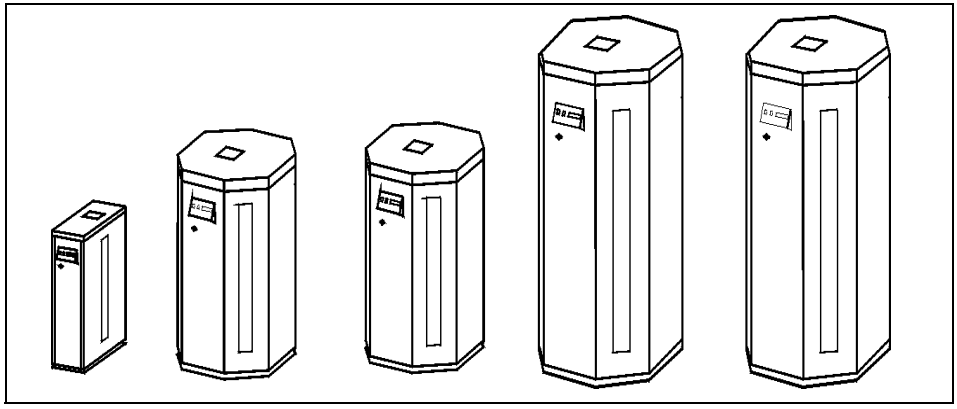
Cartridge magazines (#8753) and cleaning cartridges (#8750) can also ordered.

The 3579-C00 is available in black only.

IBM Magstar MP 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	Number of drives	Cassette slots	Capacity uncompressed	Capacity at 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) (*withdrawn from marketing* on 31 July 2001)
- #2729 PCI Magnetic Media Controller
- #2749 PCI Ultra Magnetic Media Controller

Two drives can be connected on a Single SCSI bus. See Chapter 18, “I/O adapters and controllers” on page 325, for a description of these controllers.

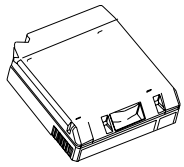
The Magstar MP 3575 tape library uses Magstar MP Fast Access Linear Tape Cartridges, which are designed to provide several enhancements over previous tape technologies. The cartridges are specially designed for repeated handling and used in automated libraries. The tape media is contained in a self-enclosed 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

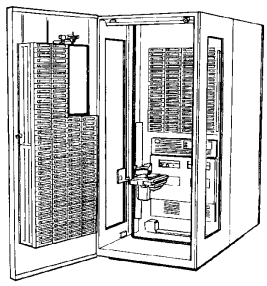
The minimum OS/400 release required for CISC systems is OS/400 V3R2 and V4R1 for RISC-bases iSeries and AS/400e servers and systems. Device drivers are available from IBM for AIX, HP-UX, NT, and Sun. Supported software for the Magstar MP 3575 tape library includes Tivoli Storage Manager (TSM) Version

3.7, BRMS/400, and NetTAPE, as well as products from Cheyenne, Legato, Spectra Logic, SCH Technologies, and Veritas.

IBM 358x Ultrium ATL Solutions with Linear Tape-Open 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 at 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 a 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 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 PCI Ultra Magnetic Media Controller IOA HVD, HD68 OS/400 V4R5	Up to 38 MB/s Aggregate sustained data rates up to 108 GB/hour
#2765 PCI Fibre Channel Tape Controller (3584/3584 only)	Up to 100 MB/s

You can find additional information about performance in the *iSeries Performance Capabilities Reference*, SC41-0607. You can download this book from the Web 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)

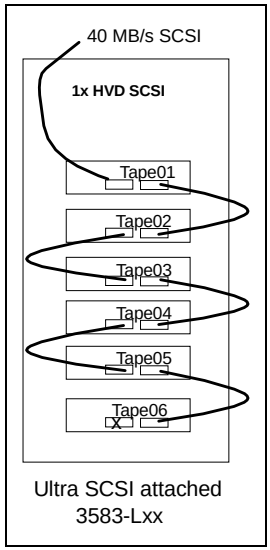
capacity and up to 200 GB with 2:1 hardware controlled data compression. For more information, see “External storage DVD-RAM device” on page 383.

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.



The diagram on the right illustrates that with the iSeries server, 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 PCI Fibre Channel Tape Controller.

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 iSeries 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:

- Completely saves the move operations
- Improves the overall library performance
- 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 Fibre Channel Attach

Features

- Model L32 (base frame)

  The base library, the Model L32, has 141 to 281 cartridge slots. It supports up to 12 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 12 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 72 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 3584 attachment to iSeries 270, 8xx, and SBx servers through the #2765 PCI 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 supported only with the QuickLoop function in V5R1. The 2109 SAN Fibre Channel Switch Models S08 and S16 can be used in QuickLoop mode to attach iSeries to the 3584. Full switch support is available with OS/400 V5R2.

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

These IBM and ISV product manufacturers support the 3584 UltraScalable Tape Library:

- 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

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.

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

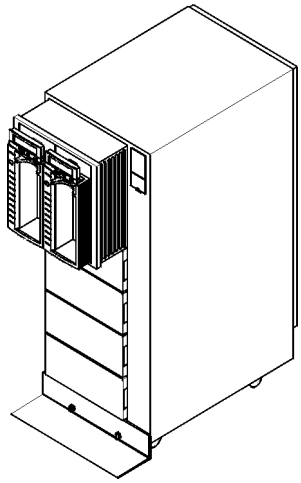
Future features and capabilities of the IBM 3584 UltraScalable Tape Library that provide additional attachment and expansion capabilities will include:

- Expanded Input/Output Station
- Support for Digital Linear Tape technology

Refer to this Web site for more details 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 right 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) (*withdrawn from marketing* on 31 July 2001)
- #2729 PCI 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 Chapter 18, "I/O adapters and controllers" on page 325.

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 10-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 Magnetic Media Controller (*withdrawn from marketing* on 31 July 2001)
- #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 that can attach to the AS/400 and iSeries servers using the #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 *IBM TotalStorage Enterprise Tape System 3590 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 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

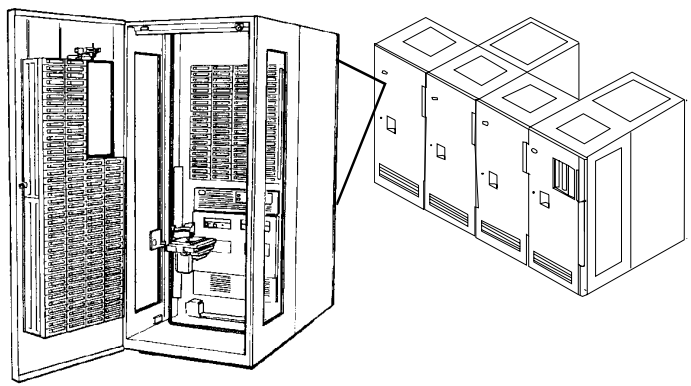
As you can see in the following table, the 3590 Ultra SCSI data rates, when attached to the iSeries 8xx, are unleashed and provide up to double the tape operation performance than was possible on the AS/400e Models 6xx and 7xx. In addition, the system maximum throughput (concurrent tape device operations) is increased by up to 700% (as measured, not the limit). Also, there is no longer any limitation on bus placement in regard to 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



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.

Number 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 allows 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 Chapter 18, “I/O adapters and controllers” on page 325, for descriptions of these controllers.

The Backup Recovery and Media Services for AS/400 (5769-BR1 or 5716-BR1) program 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.

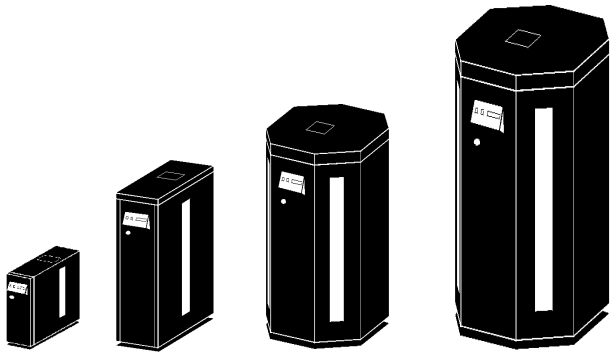
The cartridges on the 3494 must have human- and machine-readable external labels. These are read by the accessor, which travels on a linear rail (extended when additional units are added). The accessor uses a barcode reader. Its movement is horizontal, vertical, and 180 degree pivot.

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.

External optical storage device

This section describes the external storage optical devices supported by the current iSeries and AS/400e product line.

IBM 3995 Optical Library Cxx 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 ¼-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: The #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 Chapter 18, “I/O adapters and controllers” on page 325, for a description of these controllers.

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 and are available in rewritable, WORM, and CCW technology.

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 (5722-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 Chapter 5, “iSeries and AS/400e servers” on page 77, for these numbers.

External disk storage devices

The Enterprise and Versatile Storage Servers are external disk storage options supported for iSeries servers. This section describes each solution.

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

In V5R1, the ESS supports fiber-channel attachment and storage capacity ranging from 400 GB to over 11 TB. The recent introduction of the 73 GB disk drive has increased the maximum storage to 22 TB thereby providing excellent scalability.

A large number of standard configurations are offered to meet your capacity and performance needs. Performance may 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.

Two adapters are available to attach the ESS to an iSeries server, SCSI and fibre:

- 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.

- Model F20 attaches to the 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 73 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 Redbok Draft *IBM @server 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/`

A number of feature conversions are available for the ESS. These conversions allow the user to move from a given disk eight-pack to one of larger capacity. The conversions address the concern of users who require additional capacity but who also have floor space constraints that prohibit the addition of an ESS Expansion Enclosure.

Peripherals

Peripherals

21

Peripherals

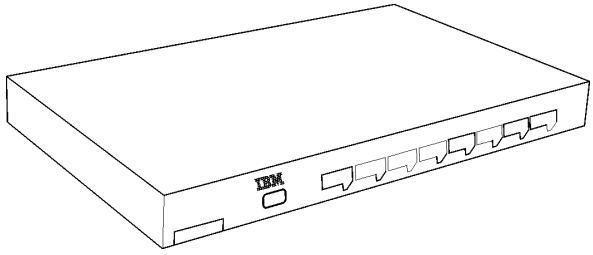
This chapter describes Storage Area Network components. It also covers the displays and printers that are supported by the iSeries servers.

Storage Area Network (SAN) components

Storage Area Networks 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 Fibre Channel. The iSeries supports connection of disk and tape using Fibre 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 Fibre Channel adapters #2765 and #2766 are the Enterprise Storage Server, Magstar 3590 and the Ultrium 3584 Tape library. For further flexibility the IBM SAN Fibre Channel Managed Hub (3534-1R2) is supported and can be used to interconnect systems and components. Switches are not supported. However, the IBM SAN Fibre 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 single mode fiber can be up to 10 kilometers.

Positioning

The Managed Hub enables customers who are 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 host servers and storage systems in a homogeneous server environment.

Features

The IBM SAN Fibre Channel Managed Hub offers:

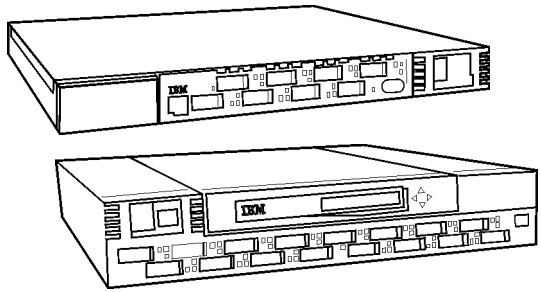
- Industry standard Fibre Channel attachment
- High-speed performance using nonblocking switch-based technology
- Simultaneous 100 MB/second full duplex data transfers across all ports
- Eight ports, one that is configured with either a short-wave or long-wave optical GBIC (see the details in the following paragraph)
- 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 (region)-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 single mode, 9.0/125 micron cable for distances up to 10 kilometers.

IBM SAN Fibre 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. This helps to meet the increasing demands by users for highly available, heterogeneous access to expanding storage pools.

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 that 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 short-wave or long-wave 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. This topology 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. This allows 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 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.

iSeries printers

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 1400 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.printers.ibm.com/R5PSC.NSF/Web/iSeries`

iSeries workgroup printers

IBM Infoprint workgroup printers are a family of high-performance laser printers designed for iSeries and network printing environments. The new IBM Infoprint 1000 Workgroup Printer Family – a family of five new cost-effective business printers – has just been added. 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.

Key features shared by IBM Infoprint printers 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 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 printers
- One-stop support from IBM Service, 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)
4516	Infoprint 1116	16	15,000
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
4920	Infoprint Color 1220	20	60,000
4928	Infoprint Color 1228	28	100,000

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 of e-business. 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.

Eight models comprise this line, ranging from 20 pages per minute to 45 pages per minute (ppm).

IBM Infoprint 1116 Workgroup Laser Printer

The Infoprint 1116 is the entry model of the Infoprint 1000 family. It is a reliable, economical printer with high resolution and versatile networking capabilities. It offers:

- Up to 16 pages per minute print speed
- Impressive 200 dpi image quality
- Multiple datastream support

IBM Infoprint 1120 Workgroup Laser Printer

This is a reliable, economical printer with excellent resolution and print speeds up to 20 ppm. It supports:

- Up to 20 pages per minute throughput with fast time to first page
- 1200 x 1200 dpi resolution
- iSeries integration and support
- Rich print data stream support includes IBM AFP/IPDS (option), PCL, and PostScript
- IBM Multifunction Printer (MFP) option adds copy, fax and scan capabilities
- Onsite Support from IBM Service, the experts in iSeries printing

IBM Infoprint 1125 Workgroup Laser Printer

The IBM Infoprint 1125 is a powerful, Internet-enabled laster printer that delivers exceptional performance and value. It includes:

- Up to 25 pages per minute throughput with fast time to first page
- 1200 x 1200 dpi resolution
- iSeries 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 MFP option adds copy, fax, and scan capabilities
- Onsite support from IBM Service, the experts in iSeries printing

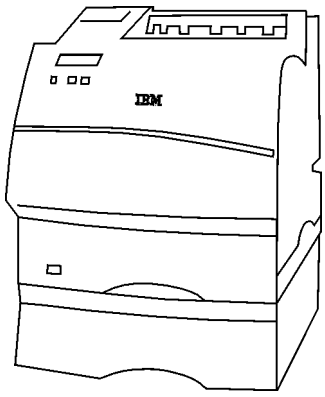
IBM Infoprint 1130 Workgroup Laser Printer

This is a small footprint 30 page per minute workgroup laser printer with multiple finishing capabilities. It supports:

- Up to 30 pages per minute throughput with fast time to first page
- 1200 x 1200 dpi resolution
- iSeries 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 MFP option adds copy, fax, and scan capabilities
- Onsite support from IBM Service, the experts in iSeries printing

IBM Infoprint 1140 Workgroup Laser Printer

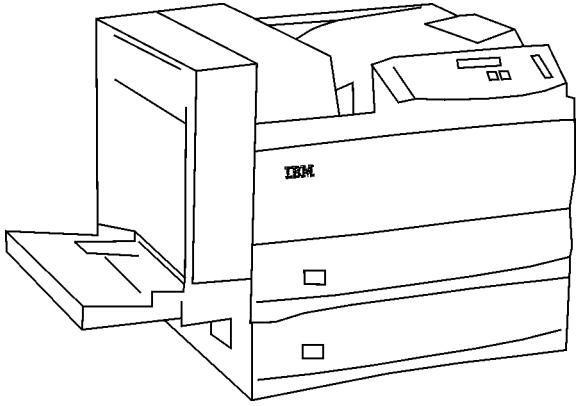
This printer is very fast, highly reliable, and geared to increase your productivity, not your total cost of printing. It supports:



- Up to 40 pages per minute throughput with fast time to first page
- 1200 x 1200 dpi resolution
- iSeries 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 MFP option adds copy, fax, and scan capabilities
- Onsite support from IBM Service, the experts in iSeries printing

IBM Infoprint 1145 Workgroup Laser Printer

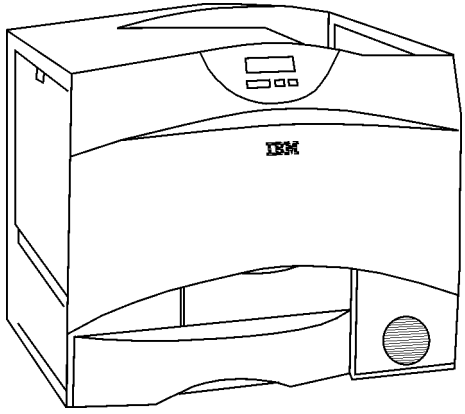
This is IBM's fastest workgroup printer. It offers robust finishing and connectivity functions, including:



- Up to 45 pages per minute throughput with fast time to first page
- Optional finisher provides stacking, stapling, and hole punching
- iSeries 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 MFP option adds copy, fax, and scan capabilities
- Onsite support from IBM Service, the experts in iSeries printing

IBM Infoprint Color 1220 Workgroup Laser Printer

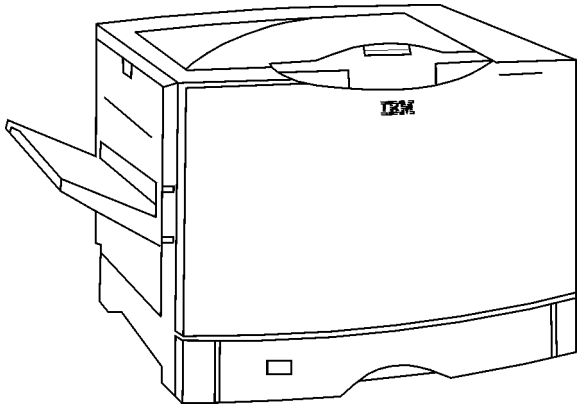
The IBM Infoprint Color 1220 provides high-speed, high quality color printing. It offers:



- Up to 20 pages per minute
- Excellent color quality at high speed
- Optional IPDS for robust monochrome printing for iSeries
- Excellent onsite support from IBM service
- IBM MFP option adds copy, fax, and scan capabilities

IBM Infoprint Color 1228 Workgroup Laser Printer

The IBM Infoprint Color 1228 provides high-speed, high quality color printing. It offers:



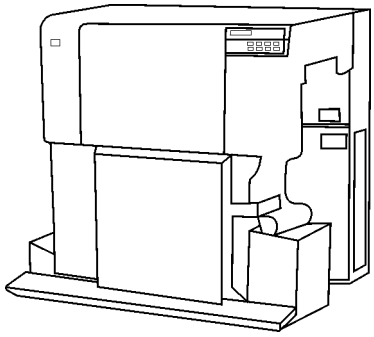
- Up to 28 pages per minute
- Excellent color quality at a high speed
- Optional IPDS for robust monochrome printing for iSeries
- Excellent onsite support from IBM Service
- IBM MFP option adds copy, fax, and scan capabilities

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 1,400 impressions per minute (with IBM Infoprint 4100). 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 are listed in the following table.

Printer	Type	Form	Speed (impressions per minute)
Infoprint 62	Monochrome	Continuos Form	62
Infoprint 70	Monochrome	Cutsheet	70
Infoprint 2085	Monochrome	Cutsheet	85
Infoprint 2105	Monochrome	Cutsheet	105
Infoprint 2000	Monochrome	Cutsheet	110
Infoprint 3000	Monochrome	Cutsheet	344
Infoprint 4000	Monochrome	Continuos Form	1002
Infoprint 4005	Monochrome	Continuos Form	944
Infoprint 4100	Monochrome	Continuos Form	1400
Infocolor 70	Color	Continuos Form	70
Infoprint Color 100	Color	Continuos Form	100
Infoprint Color 130	Color	Continuos Form	130

IBM Infoprint 62

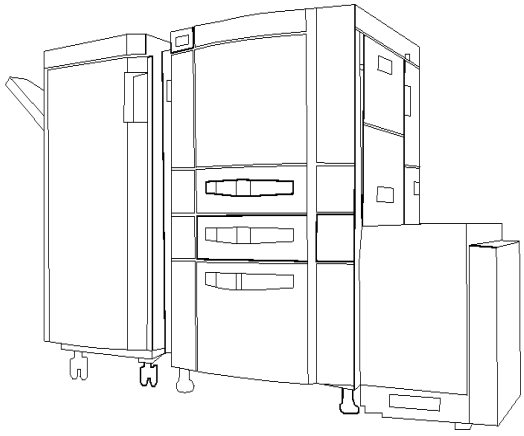


The IBM Infoprint 62 helps to streamline supply chain management by ensuring that your products have accurate, legible labels that can be easily scanned. The Infoprint 62 cost-effectively prints documents at the point-of-need. Print jobs can be submitted to the Infoprint 62 using a corporate intranet, providing easy access from all parts of your enterprise. Software support is provided with PSF/400 and AFP Utilities for AS/400.

By supporting a wide range of paper, one IBM Infoprint 62 can replace several specialty printers:

- Direct attachment to network and iSeries via Ethernet or Token Ring
- The straight paper path minimizes operator intervention and allows the use of difficult-to-print, heavy stock, and labels.
- The printer uses non-contact, flash-fusing technology, which makes it ideal for both production printing and special forms printing, such as heavy stock, labels, and ID cards.
- The printer's auto load and auto unload features simplify paper management. The operator simply inserts the paper into the input tractors and it loads automatically when a job starts. At the end of a job, the printer cuts the paper and repositions the leading edge at the input tractors. This procedure simplifies paper handling and minimizes paper waste.
- Available in 240 dpi and 300 dpi models

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
- Direct attachment to network and iSeries via Ethernet or Token Ring
- Standard duplex
- Built-in AFP/IPDS and optional PCL, PostScript, and PDF support flexible finishing capabilities
- Standard 2000 sheet output stacker can staple up to 50 sheets
- Input capacity up to 6,150 sheets
- New IBM Homerun RISC controller, with 400 MHz, 128 MB of memory, and 3.2 GB of disk, built to provide the kind of performance and functionality normally reserved for IBM's high-end production printers

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.

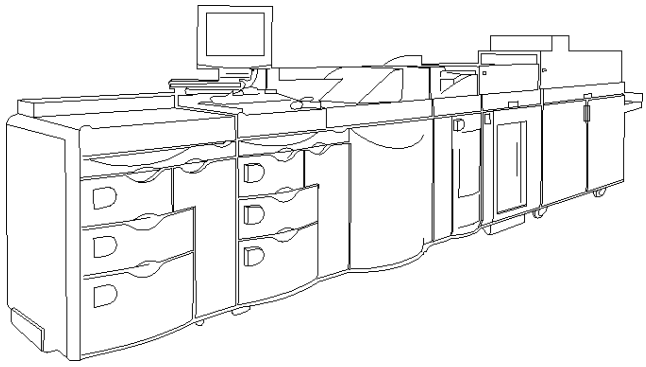
IBM Infoprint 2085 and 2105

The IBM Infoprint 2085 and 2105 cut-sheet production models are full-function, high-speed printer and duplication systems. These are the first products that effectively combine high-speed iSeries production printer with copier capabilities.

The 2085 and 2105 have speeds of 85 and 105 pages per minute respectively. They include:

- IPDS and duplication facilities standard
- Cutsheet production at an affordable price
- 600 dots-per-inch resolution with automatic conversion of lower-resolution applications
- Fully integrated (with IPDS) for reliable, high-speed iSeries printing
- Full support for ASCII (PostScript, PCL and PDF) available

IBM Infoprint 2000



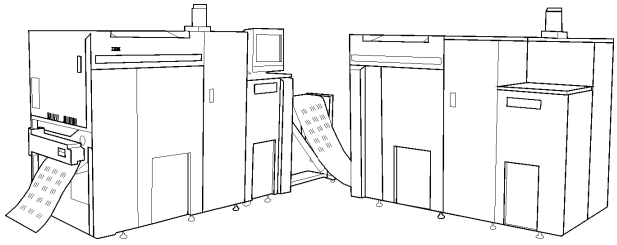
Infoprint 2000 printers bring cut-sheet printer capabilities to address the output needs of an e-business. This high-speed cut-sheet printer combines advanced hardware and software technologies to provide exceptional performance, flexibility, and control. The integration with Infoprint Manager brings 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:

- Up to 110 impressions per minute at 600 dpi
- Up to 2,000,000 impressions per month
- Superb image quality with Grayscale Resolution Enhancement Technology (GRET) producing crisper, clearer halftones, and more accurate reproduction of finer fonts
- Automatic enhancement of existing 240 dpi and 300 dpi applications
- Simple, direct attachment with Ethernet or Token Ring
- Supports paper sizes ranging from 8 by 10.5 to 11 by 17 and paper weights in the range of 16 lb bond to 110 lb index
- Input and output paper capabilities of up to 8,000 sheets (4,000 sheets are standard)
- Trayless duplexing and a shorter, straighter paper path means benchmark levels of reliability
- Software support provided by PSF/400
- IBM world class service and support

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 62 and Infoprint 70) 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.

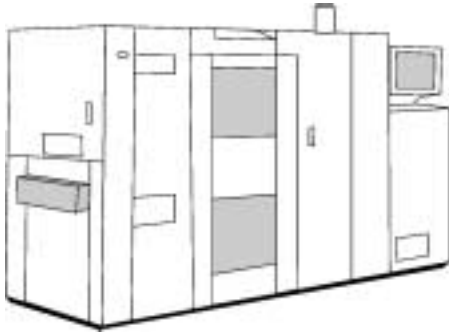
With high-volume applications such as reports, statements, documents, and direct mail, continuous-forms printing ensures high reliability. They also ensure the attachment of a wide variety of pre- and post-processing devices (paper roll input, cutters, inserters, and so on) for a smooth end-to-end process. 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 Systems

Infoprint 4000 is the top-of-the-line high-speed, continuous-form production printer family for iSeries. Speeds range up to 1002 impressions (on 8.5- by 11-inch sheets) 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 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 4100 Advanced Function Printing Systems

The Infoprint 4100 offers continuous forms printing with 19-inch wide print line for digital publishing and statements printing. Speeds up to 762 two-up, duplex letter or 718 two-up, duplex A4 impressions per minute with 480/600 dpi resolution. simplex and duplex models are available in this printer family.

Infoprint architecture provides higher resolutions and support for PostScript data streams. This helps to meet far more wide-ranging organizational document requirements, including replacement of applications that traditionally went to offset printing. The Infoprint 4100 attaches to the iSeries server over an Ethernet or Token-Ring network.

The key features include:

- Industry leading 600 dpi image quality
- Prints true 3-up 6-inch by 9-inch pages at up to 1400 impressions per minute
- Extra-wide format (19-inch print width)
- Reduced total cost of printing

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 Chapter 34, “IBM licensed

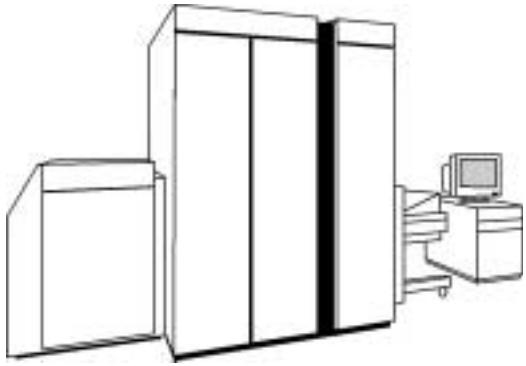
programs: Printing and document handling products” on page 799, for supporting software.

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. If offers an efficient way to print short runs and customize the text, images, and customer data on each document. It is designed as a stand-alone 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

This printer offers 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-inch image area on a 20-inch 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 for the 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

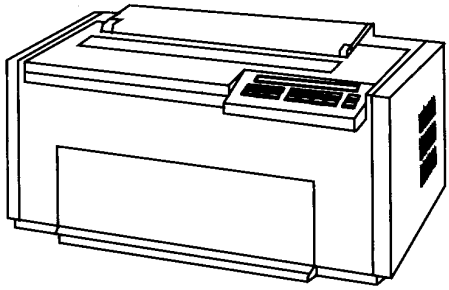
Features for the Color 130 Plus

- 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

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



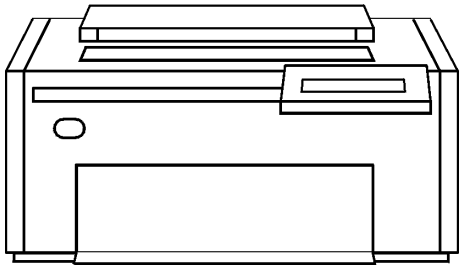
The 4230 range of printers provides heavy-duty, impact matrix printing. The six models of 4230, the 101, 1S2, 4S3, 1I1, 102, and 4I3, can all be twinaxial attached to an iSeries server using the twinax workstation controller. The Model 4S3 and 4I3 also offer serial and parallel attach.

All 4230s have an LCD display that provides 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

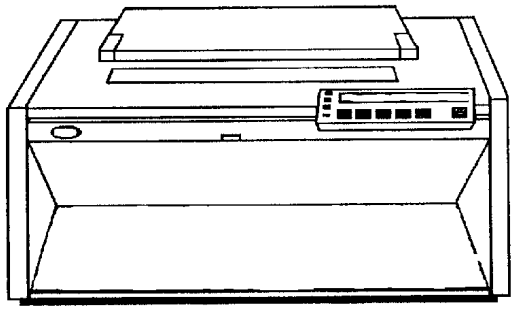


The 4232 is a heavy-duty, unattended impact dot matrix printer, capable of printing 600 characters per second (cps). It is designed for workstation printing or shared printer applications using an ASCII datastream.

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



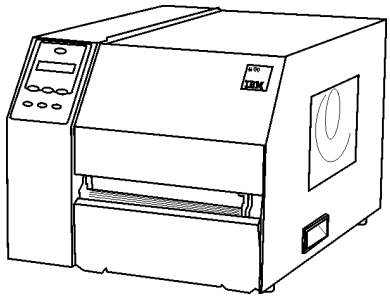
The 4247 printers are desktop model impact printers. They are capable of printing up to 700 cps in its fastest data processing (DP) mode. They include two continuous paper paths and a standard manual cut-sheet input.

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), and full printing error recovery

IBM 4400 Thermal Label Printers



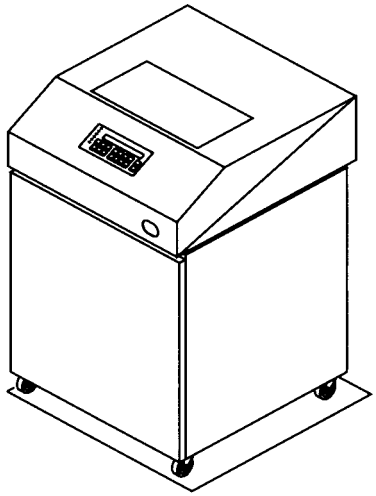
The IBM 4400 Thermal Label printers provide high-performance, high-quality thermal printing geared to the iSeries, network, and Supply Chain industrial environments in which they must operate. This is an environment where iSeries application integration, reliable output management, and network deployment 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 means that any Advanced Function Presentation 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 2,000 lines per minute. 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.

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
6400-020	2,000	Cabinet

An optional feature for Intelligent Printer Data Stream support enables full graphical applications with electronic forms, barcodes, graphics, scalable fonts, and optical character recognition.

Web access to operator panel enables remote control of network-connected 6400 models.

Customer Install Features

Customer Install Features

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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 of the features, including those designated as CIF. On MES orders where all features are CIF, the customer can install all of 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.

Features supported with OS/400 V5R2 or V5R1

The following table lists commonly ordered OS/400 feature codes for iSeries servers running OS/400 V5R2 or V5R1. The table identifies which features are CIF features, in which iSeries model and expansion unit the feature is supported, and the minimum release of OS/400 required to support the feature.

The columns in the following table contain:

- The feature code
- The feature description as used in the IBM marketing configurator
- A Y if the feature is a “Customer Install Feature”, or an N if it is an “Installed by IBM” feature
- How the features are installed in each of the iSeries models currently marketed by IBM. The installation options are defined as follows:
  - **B**: Plant or MES installation
  - **M**: MES install only (available for field installation only)
  - **P**: Plant install only (available on new system orders only)
  - **PU**: Plant install only. For model upgrades, a MES install
  - **S**: Supported in the specified iSeries model configuration. The feature may be migrated to the specified iSeries model as part of a model upgrade, but individual orders are not available.
- Minimum OS/400 Release: The OS/400 version and release which supports the feature, either natively, or with PTFs.

FC	Description	CIF	Model or Tower																			Min. OS/400
			250	270	820	830	840	890	SB2	SB3	03X	065	074	075	078	079	079	093	074	079		
0041	Device Parity Protection-All	Y	-	B	B	B	B	B	B	B	-	-	-	-	-	-	-	-	-	-	-	V4R5
0087	7207-122 Attachment	Y	-	B	B	B	B	-	B	B	-	-	-	-	-	-	-	-	-	-	-	V4R4
0089	External Tape Attach	Y	-	B	B	B	B	-	B	B	-	-	-	-	-	-	-	-	-	-	-	V4R5
0092	External xSeries Attach	Y	-	B	B	B	B	B	-	-	-	-	-	-	-	-	-	-	-	-	-	V5R1
0120	7210-020 Attachment	Y	-	B	B	B	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V4R5
0121	270 Lower Unit in Rack	Y	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V4R5
0122	270 Upper Unit in Rack	Y	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V4R5

FC	Description	CIF	Model or Tower																			Min. OS/400
			250	270	820	830	840	890	SB2	SB3	503X	0565	0574	0575	0578	0579	0579	0593	0074	0079		
0123	#5074 Lower Unit in Rack	Y	-	-	B	B	B	S	-	-	-	-	-	-	-	-	-	-	-	-	-	V4R5
0125	#9079 Lower Unit in Rack	Y	-	-	-	-	P	S	-	-	-	-	-	-	-	-	-	-	-	-	-	V4R5
0126	CEC Reduction Option	N	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	V5R2
0127	Field Install in Rack	N	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V4R5
0140	Logical Partitioning Specify	Y	-	B	B	B	B	B	-	-	-	-	-	-	-	-	-	-	-	-	-	V4R4
0141	HSL Opticonnect Specify	Y	-	B	B	B	B	B	B	B	-	-	-	-	-	-	-	-	-	-	-	V5R1
0142	Linux Partition Specify	Y	-	B	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
0153	Model 830 8-Way Processor	N	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V5R2
0158	Model 840 12-Way Processor	N	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V5R2
0159	Model 840 24-Way Processor	N	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V5R2
0162	Extended Single Ended Attach	Y	-	B	B	B	B	B	B	B	-	-	-	-	-	-	-	-	-	-	-	V5R1
0163	Fibre Channel Attach	Y	-	B	B	B	B	B	B	B	-	-	-	-	-	-	-	-	-	-	-	V5R1
0164	Differential Attach	Y	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	V5R1
0197	Model 890 24 Way Processor	N	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	V5R2
0198	Model 890 32-Way Processor	N	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	V5R2
0208	No Alt Install Device Use	Y	-	P	P	P	P	-	P	P	-	-	-	-	-	-	-	-	-	-	-	V4R5
0223	100Mbps Token-Ring Specify	Y	-	B	B	B	B	B	B	B	-	-	-	-	-	-	-	-	-	-	-	V4R5
0224	100/10Mbps Ethernet Specify	Y	-	B	B	B	B	B	B	B	-	-	-	-	-	-	-	-	-	-	-	V4R5

FC	Description	CIF	Model or Tower																			Min. OS/400
			250	270	820	830	840	890	SB2	SB3	503X	5065	5074	5075	5078	5079	8079	8093	9074	9079		
0225	1Gbps Ethernet Specify	Y	-	B	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V5R1
0226	1Gbps Ethernet Specify	Y	-	B	B	B	B	B	B	B	-	-	-	-	-	-	-	-	-	-		V5R2
0297	Model 250 Package	Y	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V5R1
0298	Model 250 package	Y	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V5R1
0369	100m Optical SPCN Cable	Y	-	-	-	B	B	B	-	-	-	-	B	-	B	B	B	B	B	B		V5R1
0371	LC-SC Adapter Kit (50um)	Y	-	B	B	B	B	B	-	-	-	-	B	B	B	B	B	B	B	B		V5R1
0372	LC-SC Adapter Kit (62.5um)	Y	-	B	B	B	B	B	-	-	-	-	B	B	B	B	B	B	B	B		V5R1
0382	Remote Control Panel Cable	Y	-	S	S	S	S	S	S	S	-	-	-	-	-	-	-	-	-	-		V4R5
0426	512MB Server Memory	N	-	-	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V5R2
0427	1GB Server Memory	N	-	-	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V5R2
0446	512MB DDR Server Memory	Y	-	B	-	-	-	-	-	-	-	-	-	B	-	-	-	-	-	-		V5R2
0447	1GB DDR Server Memory	Y	-	B	-	-	-	-	-	-	-	-	-	B	-	-	-	-	-	-		V5R2
0550	830 Rack	N	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
0551	iSeries Rack	Y	-	B	B	B	B	B	B	B	-	-	-	-	-	-	-	-	-	-		V4R5
0565	#5065 Equivalent	Y	-	-	-	-	-	-	-	-	S	-	-	-	-	-	-	-	-	-		V4R4
0574	#5074 Equivalent	Y	-	-	B	B	B	B	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
0578	PCI Expansion Unit in Rack	N	-	-	B	B	B	B	-	-	-	-	-	-	-	-	-	-	-	-		V5R1
0601	Linux Dir Attach-2743	Y	-	B	B	B	B	B	-	-	-	-	B	B	B	B	B	B	B	B		V5R1
0602	Linux Dir Attach-2760	Y	-	B	B	B	B	B	-	-	-	-	B	B	B	B	B	B	B	B		V5R1
0603	Linux Dir Attach-2744	Y	-	B	B	B	B	B	-	-	-	-	B	B	B	B	B	B	B	B		V5R1
0604	Linux Dir Attach-2763	Y	-	-	B	-	-	-	-	-	-	-	-	B	-	-	-	-	-	-		V5R1
0605	Linux Dir Attach-4748	Y	-	-	S	S	S	S	-	-	-	-	S	S	-	S	S	S	S	S		V5R1
0606	Linux Dir Attach-4778	Y	-	-	B	B	B	B	-	-	-	-	B	B	-	B	B	B	B	B		V5R1

FC	Description	CIF	Model or Tower																			Min. OS/400
			250	270	820	830	840	890	SB2	SB3	503X	0565	5074	5075	5078	5079	8079	8093	9074	9079		
0607	Linux Dir Attach-4838	Y	-	B	B	B	B	B	-	-	-	-	B	B	B	B	B	B	B	B		V5R1
0608	Linux Dir Attach-4745	Y	-	B	B	B	B	M	-	-	-	-	B	B	B	B	B	B	B	B		V5R1
0609	Linux Dir Attach-2772	Y	-	B	B	B	B	B	-	-	-	-	B	B	B	B	B	B	B	B		V5R1
0610	Linux Dir Attach-2773	Y	-	B	B	B	B	B	-	-	-	-	B	B	B	B	B	B	B	B		V5R1
0611	Linux Dir Attach-2765	Y	-	B	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V5R1
0612	Linux Dir Attach-2766	Y	-	B	B	B	B	B	-	-	-	-	B	B	B	B	B	B	B	B		V5R1
0613	Linux Dir Attach-2742	Y	-	B	B	B	B	B	-	-	-	-	B	B	B	B	B	B	B	B		V5R2
0614	Linux Dir Attach-2793	Y	-	B	B	B	B	B	-	-	-	-	B	B	B	B	B	B	B	B		V5R2
0615	Linux Dir Attach-2794	Y	-	B	B	B	B	B	-	-	-	-	B	B	B	B	B	B	B	B		V5R2
0616	Linux Dir Attach-2805	Y	-	B	B	B	B	B	-	-	-	-	B	B	B	B	B	B	B	B		V5R1
0617	Linux Dir Attach-2806	Y	-	B	B	B	B	B	-	-	-	-	B	B	B	B	B	B	B	B		V5R1
0620	Linux Dir Attach-5700	Y	-	B	B	B	B	B	-	-	-	-	B	B	B	B	B	B	B	B		V5R2
0621	Linux Dir Attach-5701	Y	-	B	B	B	B	B	-	-	-	-	B	B	B	B	B	B	B	B		V5R2
0623	Linux Dir Attach-2849	Y	-	B	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V5R2
0705	Forced #2749 Placement	Y	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-		V5R1
0707	Forced #2768 Placement	Y	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-		V5R1
0826	#4314 Load Source Specify	Y	-	M	M	M	M	M	M	M	-	-	-	-	-	-	-	-	-	-		V4R5
0827	#4324 Load Source Specify	Y	-	M	M	M	M	M	M	M	-	-	-	-	-	-	-	-	-	-		V4R5
0828	#4317 Load Source Specify	Y	-	B	B	B	B	M	B	B	-	-	-	-	-	-	-	-	-	-		V4R5
0829	#4318 Load Source Specify	Y	-	B	B	B	B	B	B	B	-	-	-	-	-	-	-	-	-	-		V4R5
0830	#4319 Load Source Specify	Y	-	B	B	B	B	B	-	-	-	-	-	-	-	-	-	-	-	-		V5R1
1460	3m Copper HSL Cable	Y	-	B	B	B	B	-	B	B	B	-	B	B	B	B	B	B	B	B		V4R5
1461	6m Copper HSL Cable	Y	-	B	B	B	B	-	B	B	B	-	B	B	B	B	B	B	B	B		V4R5

FC	Description	CIF	Model or Tower																			Min. OS/400
			250	270	820	830	840	890	SB2	SB3	503X	0565	5074	5075	5078	5079	8079	8093	9074	9079		
1462	15m Copper HSL Cable	Y	-	B	B	B	B	-	B	B	B	-	B	B	B	B	B	B	B	B		V4R5
1463	2m SPCN Cable	Y	-	B	B	B	B	B	B	B	B	-	B	B	B	B	B	B	B	B		V4R5
1464	6m SPCN Cable	Y	-	B	B	B	B	B	B	B	B	-	B	B	B	B	B	B	B	B		V4R5
1465	15m SPCN Cable	Y	-	B	B	B	B	B	B	B	B	-	B	B	B	B	B	B	B	B		V4R5
1466	30m SPCN Cable	Y	-	B	B	B	B	B	B	B	B	-	B	B	B	B	B	B	B	B		V4R5
1468	250m Optical SPCN Cable	Y	-	-	-	B	B	B	-	-	-	-	B	-	B	B	B	B	B	B		V5R1
1470	6m HSL Optical Cable	Y	-	-	-	B	B	B	-	-	-	-	B	-	B	B	B	B	B	B		V5R1
1471	30m HSL Optical Cable	Y	-	-	-	B	B	B	-	-	-	-	B	-	B	B	B	B	B	B		V5R1
1472	100m HSL Optical Cable	Y	-	-	-	B	B	B	-	-	-	-	B	-	B	B	B	B	B	B		V5R1
1473	250m HSL Optical Cable	Y	-	-	-	B	B	B	-	-	-	-	B	-	B	B	B	B	B	B		V5R1
1474	6m HSL to HSL-2 Cable	Y	-	B	B	B	B	B	-	-	-	-	B	B	B	B	B	B	B	B		V5R2
1475	10m HSL to HSL-2 Cable	Y	-	B	B	B	B	B	-	-	-	-	B	B	B	B	B	B	B	B		V5R2
1482	3.5m HSL-2 Cable	Y	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-		V5R2
1483	10m HSL-2 Cable	Y	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-		V5R2
1485	15m HSL-2 Cable	Y	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-		V5R2
1516	Interactive Capacity Card	N	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
1517	Interactive Capacity Card	N	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
1518	Interactive Capacity Card	N	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
1519	Interactive Capacity Card	N	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
1520	Interactive Capacity Card	N	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
1521	Interactive Capacity Card	N	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
1522	Interactive Capacity Card	N	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
1523	Interactive Capacity Card	N	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
1524	Interactive Capacity Card	N	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
1525	Interactive Capacity Card	N	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
1526	Interactive Capacity Card	N	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5

FC	Description	CIF	Model or Tower																			Min. OS/400
			250	270	820	830	840	890	SB2	SB3	503X	5065	5074	5075	5078	5079	8079	8093	9074	9079		
1527	Interactive Capacity Card	N	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
1531	Interactive Capacity Card	N	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
1532	Interactive Capacity Card	N	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
1533	Interactive Capacity Card	N	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
1534	Interactive Capacity Card	N	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
1535	Interactive Capacity Card	N	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
1536	Interactive Capacity Card	N	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
1537	Interactive Capacity Card	N	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
1540	Interactive Capacity Card	N	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
1541	Interactive Capacity Card	N	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
1542	Interactive Capacity Card	N	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
1543	Interactive Capacity Card	N	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
1544	Interactive Capacity Card	N	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
1545	Interactive Capacity Card	N	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
1546	Interactive Capacity Card	N	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
1547	Interactive Capacity Card	N	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
1548	Interactive Capacity Card	N	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-		V5R1
1576	Interactive Capacity Card	N	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-		V5R2
1577	Interactive Capacity Card	N	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-		V5R2
1578	Interactive Capacity Card	N	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-		V5R2
1579	Interactive Capacity Card	N	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-		V5R2
1581	Interactive Capacity Card	N	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-		V5R2
1583	Interactive Capacity Card	N	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-		V5R2
1585	Interactive Capacity Card	N	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-		V5R2
1587	Interactive Capacity Card	N	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-		V5R2
1588	Interactive Capacity Card	N	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-		V5R2

FC	Description	CIF	Model or Tower																			Min. OS/400
			250	270	820	830	840	890	SB2	SB3	503X	0565	0574	0575	0578	0579	0579	0593	0074	0079		
1591	Interactive Capacity Card	N	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	V5R2
1604	POD Activation	Y	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V4R5
1605	POD Activation	Y	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V5R1
1610	890 POD Activation	Y	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	V5R2
2248	Model 270 Processor	N	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V4R5
2250	Model 270 Processor	N	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V4R5
2252	Model 270 Processor	N	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V4R5
2253	Model 270 2-Way Processor	N	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V4R5
2301	Model 270 Processor	N	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V5R1
2302	Model 270 Processor	N	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V5R1
2303	Model 820 Processor	N	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V5R1
2315	Model SB2 8-Way Processor	N	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	V4R5
2316	Model SB3 12-Way Processor	N	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	V4R5
2318	Model SB3 24-Way Processor	N	-	-	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	V4R5
2349	Model 830 4/8-Way Proc	N	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V5R1
2351	Model 830 1/8-Way POD	N	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V5R1
2352	Model 840 8/12-Way POD	N	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V5R1
2353	Model 840 12/18-Way POD	N	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V5R1
2354	Model 840 18/24-Way POD	N	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V5R1
2395	Model 820 Processor	N	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V4R5
2396	Model 820 Processor	N	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V4R5
2397	Model 820 2-Way Processor	N	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V4R5

FC	Description	CIF	Model or Tower																			Min. OS/400
			250	270	820	830	840	890	SB2	SB3	503X	5065	5074	5075	5078	5079	8079	8093	9074	9079		
2398	Model 820 4-Way Processor	N	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V4R5
2400	Model 830 2-Way Processor	N	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V4R5
2402	Model 830 4-Way Processor	N	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V4R5
2403	Model 830 8-Way Processor	N	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V4R5
2416	Model 840 8/12-Way POD	N	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V4R5
2417	Model 840 12/18-Way POD	N	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V4R5
2418	Model 840 12-Way Processor	N	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V4R5
2419	Model 840 18/24-Way POD	N	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V4R5
2420	Model 840 24-Way Processor	N	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V4R5
2422	Dedicated Domino Processor	N	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V4R5
2423	Dedicated Domino Processor	N	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V4R5
2424	Dedicated Domino 2-Way Proc	N	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V4R5
2425	Dedicated Domino Processor	N	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V4R5
2426	Dedicated Domino 2-Way Proc	N	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V4R5
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

FC	Description	CIF	Model or Tower																			Min. OS/400
			250	270	820	830	840	890	SB2	SB3	503X	5065	5074	5075	5078	5079	8079	8093	9074	9079		
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	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V5R1
2457	Dedicated Domino 2-Way Proc	N	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V5R1
2458	Dedicated Domino 4-Way Proc	N	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V5R1
2460	Model 840 12-Way Processor	N	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V5R1
2461	Model 840 24-Way Processor	N	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V5R1
2487	Model 890 16/24-Way Proc	N	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	V5R2
2488	Model 890 24/32-Way Proc	N	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	V5R2
2723	PCI Ethernet IOA (CIF=Y in 5033 and 250)	N	S	-	-	-	-	-	-	-	S	S	-	-	-	-	-	-	-	-	-	V4R1
2724	PCI 16/4Mbps Token-Ring IOA (CIF=Y in 5033 and 250)	N	S	-	-	-	-	-	-	-	S	S	-	-	-	-	-	-	-	-	-	V4R1
2729	PCI Mag Media Controller (CIF=Y in 5033 and 250)	N	S	-	-	-	-	-	-	-	S	S	-	-	-	-	-	-	-	-	-	V4R1
2738	HSL Ports - 8 Copper	N	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	V5R2
2739	Optical Bus Adapter	N	-	-	-	-	-	-	-	-	-	-	M	-	M	M	M	M	M	M	M	V5R1

FC	Description	CIF	Model or Tower																			Min. OS/400
			250	270	820	830	840	890	SB2	SB3	503X	5065	5074	5075	5078	5079	8079	8093	9074	9079		
2742	PCI Two-Line WAN IOA	Y	-	B	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V5R2
2743	PCI 1Gbps Ethernet IOA	Y	-	B	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V4R5
2744	PCI 100Mbps Token-Ring IOA	Y	-	B	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V4R5
2745	PCI Two-line WAN IOA (CIF=Y in 5033 and 250)	N	M	-	-	-	-	-	-	-	M	M	-	-	-	-	-	-	-	-		V4R4
2746	PCI Twinaxial Workstn IOA (CIF=Y in 5033 and 250)	N	M	-	-	-	-	-	-	-	M	M	-	-	-	-	-	-	-	-		V4R4
2748	PCI RAID Disk Unit Ctlr (CIF=Y in 5033 and 250)	N	S	-	-	-	-	-	-	-	S	S	-	-	-	-	-	-	-	-		V4R4
2749	PCI Ultra Mag Media Ctlr	Y	-	B	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V4R5
2750	PCI ISDN BRI U IOA (CIF=Y in 5033 and 250)	N	S	-	-	-	-	-	-	-	S	S	-	-	-	-	-	-	-	-		V4R4
2751	PCI ISDN BRI S/T IOA (CIF=Y in 5033 and 250)	N	S	-	-	-	-	-	-	-	S	S	-	-	-	-	-	-	-	-		V4R4
2754	HSL Ports - 8 Copper	N	-	-	-	M	-	-	M	-	-	-	-	-	-	-	-	-	-	-		V5R1
2755	HSL Ports -16 Copper	N	-	-	-	-	M	-	-	M	-	-	-	-	-	-	-	-	-	-		V5R1
2758	HSL Ports - 2 Opt/ 6 Copper	N	-	-	-	M	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V5R1
2759	HSL Ports - 4 Opt/12 Copper	N	-	-	-	-	M	-	-	-	-	-	-	-	-	-	-	-	-	-		V5R1
2760	PCI 1Gbps Ethernet UTP IOA	Y	-	B	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V5R1
2761	PCI Integrated Analog Modem (CIF=Y in 5033)	N	S	-	-	-	-	-	-	-	S	S	-	-	-	-	-	-	-	-		V4R4
2763	PCI RAID Disk Unit Ctlr (CIF=N in 250)	Y	M	B	B	-	-	-	-	-	-	-	-	B	-	-	-	-	-	-		V4R5
2765	PCI Fibre Channel Tape Ctlr	Y	-	B	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V5R1
2766	PCI Fibre Channel Disk Ctlr	Y	-	B	B	B	B	B	-	-	-	-	B	B	B	B	B	B	B	B		V5R1

FC	Description	CIF	Model or Tower																			Min. OS/400
			250	270	820	830	840	890	SB2	SB3	503X	5065	5074	5075	5078	5079	8079	8093	9074	9079		
2768	PCI Magnetic Media Ctlr	Y	-	B	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V4R5
2772	PCI Dual WAN/Modem IOA	Y	-	B	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V5R1
2773	PCI Dual WAN/Modem IOA(ANSI)	Y	-	B	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V5R1
2774	HSL Ports - 2 Opt/ 6 Copper	N	-	-	-	M	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V5R1
2776	HSL-2 Ports - 8 Copper	N	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-		V5R2
2777	HSL Ports - 8 Copper	N	-	-	-	M	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V5R1
2778	PCI RAID Disk Unit Ctlr	N	-	-	-	-	-	-	-	-	-	M	-	-	-	-	-	-	-	-		V5R1
2788	HSL Ports - 8 Optical	N	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-		V5R2
2790	PCI Integ Netfinity Server	N	-	-	S	S	S	S	S	S	-	-	S	S	S	S	S	S	S	S		V4R5
2791	PCI Integ xSeries Server	N	-	-	S	S	S	S	S	S	-	-	S	S	S	S	S	S	S	S		V4R5
2792	PCI Integ xSeries Server	N	-	-	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V5R2
2793	PCI 2-Line WAN w/Modem	Y	-	B	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V5R2
2794	PCI 2-Line WAN w/Modem (CIM)	Y	-	B	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V5R2
2795	128MB Server Memory	N	-	-	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V4R5
2796	256MB Server Memory	N	-	-	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V4R5
2797	1GB Server Memory	N	-	-	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V4R5
2799	PCI Integ xSeries Server	N	-	-	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V5R1
2805	PCI Quad Modem IOA	Y	-	B	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V5R1
2806	PCI Quad Modem IOA (CIM)	Y	-	B	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V5R1
2817	PCI 155Mbps MMF ATM	Y	-	B	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V5R1
2824	PCI LAN/WAN/Workstation IOP (CIF=Y in 5033 and 250)	N	M	-	-	-	-	-	-	-	M	M	-	-	-	-	-	-	-	-		V4R4

FC	Description	CIF	Model or Tower																			Min. OS/400
			250	270	820	830	840	890	SB2	SB3	503X	5065	5074	5075	5078	5079	8079	8093	9074	9079		
2838	PCI 100/10Mbps Ethernet IOA (CIF=Y in 5033 and 250)	N	M	-	-	-	-	-	-	-	M	M	-	-	-	-	-	-	-	-		V4R1
2842	PCI IOP	Y	-	B	-	-	-	-	-	-	-	-	-	B	-	-	-	-	-	-		V4R5
2843	PCI IOP	Y	-	-	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V4R5
2849	PCI 100/10Mbps Ethernet IOA	Y	-	B	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V5R2
2881	Main Storage Expansion	N	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
2884	Main Storage Expansion	Y	-	B	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
2890	PCI Integ Netfinity Server	Y	-	S	-	-	-	-	-	-	-	-	-	S	-	-	-	-	-	-		V4R5
2891	PCI Integ xSeries Server	Y	-	S	-	-	-	-	-	-	-	-	-	S	-	-	-	-	-	-		V4R5
2892	PCI Integ xSeries Server	Y	-	B	-	-	-	-	-	-	-	-	-	B	-	-	-	-	-	-		V5R2
2895	128MB Server Memory	Y	-	B	-	-	-	-	-	-	-	-	-	B	-	-	-	-	-	-		V4R5
2896	256MB Server Memory	Y	-	B	-	-	-	-	-	-	-	-	-	B	-	-	-	-	-	-		V4R5
2897	1GB Server Memory	Y	-	B	-	-	-	-	-	-	-	-	-	B	-	-	-	-	-	-		V4R5
2899	PCI Integ xSeries Server	Y	-	B	-	-	-	-	-	-	-	-	-	B	-	-	-	-	-	-		V5R1
3000	Migrated 128MB Main Storage	N	-	-	M	M	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
3005	512MB Main Store	Y	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
3006	512MB Main Storage	Y	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
3007	1GB Main Storage	Y	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V5R1
3009	128MB Main Storage	Y	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V5R1
3015	8GB Main Storage	N	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-		V5R2
3016	8GB Main Storage	N	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-		V5R2
3017	32GB Main Storage	N	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-		V5R2
3018	32GB Main Storage	N	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-		V5R2
3020	4GB Main Storage	N	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-		V5R2

FC	Description	CIF	Model or Tower																			Min. OS/400
			250	270	820	830	840	890	SB2	SB3	503X	0565	0574	0575	0578	0579	0579	0593	0074	0079		
3021	4GB Main Storage	N	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-		V5R2
3022	128MB Main Storage	Y	M	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
3024	256MB Main Storage	Y	M	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
3025	512MB Main Storage	Y	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
3026	512MB Main Storage	Y	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
3027	1GB Main Storage	Y	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V5R1
3029	128MB Main Storage	Y	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V5R1
3032	256MB Main Storage	Y	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V5R1
3033	512MB Main Storage	Y	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V5R1
3034	1GB Main Storage	Y	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V5R1
3035	16GB Main Storage	N	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-		V5R2
3036	16GB Main Storage	N	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-		V5R2
3062	128MB Main Storage	N	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
3064	256MB Main Storage	N	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
3065	512MB Main Storage	N	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
3066	512MB Main Storage	N	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
3067	1GB Main Storage	Y	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V5R1
3195	4096MB Main Storage	N	-	-	-	-	S	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
3196	8192MB Main Storage	N	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
3197	1024MB Main Storage	N	-	-	-	-	S	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
3198	2048MB Main Storage	N	-	-	-	-	S	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
3612	1024MB Main Storage	N	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
3613	2048MB Main Storage	N	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
3614	4096MB Main Storage	N	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
4308	4.19GB Disk Unit	Y	-	-	-	-	-	-	-	-	-	S	S	-	-	S	S	S	S	S		V4R4
4314	8.58GB Disk Unit	Y	-	S	S	S	S	S	S	S	-	S	S	S	-	S	S	S	S	S		V4R4

FC	Description	CIF	Model or Tower																			Min. OS/400
			250	270	820	830	840	890	SB2	SB3	503X	5065	5074	5075	5078	5079	8079	8093	9074	9079		
4317	8.58GB 10k rpm Disk Unit	Y	-	B	B	B	B	S	B	B	-	M	B	B	-	B	B	B	B	B		V4R4
4318	17.54GB 10k rpm Disk Unit	Y	-	B	B	B	B	B	B	B	-	M	B	B	-	B	B	B	B	B		V4R4
4319	35.16GB 10k rpm Disk Unit	Y	-	B	B	B	B	B	-	-	-	-	B	B	-	B	B	B	B	B		V5R1
4324	17.54GB Disk Unit	Y	-	S	S	S	S	S	S	S	-	S	S	S	-	S	S	S	S	S		V4R4
4331	1.6GB Read Cache Device	Y	-	S	S	S	S	-	S	S	-	S	S	S	-	S	S	S	S	S		V4R4
4425	CD-ROM	Y	-	-	-	B	B	S	B	B	-	M	B	-	-	B	B	B	B	B		V4R4
4430	DVD-RAM	Y	-	-	-	B	B	B	B	B	-	-	B	-	-	B	B	B	B	B		V4R5
4482	4GB 1/4-Inch Cartridge Tape	Y	-	-	-	B	B	B	B	B	-	M	B	-	-	B	B	B	B	B		V4R4
4483	16GB 1/4-Inch Cartridge Tape	Y	-	-	-	B	B	S	B	B	-	M	B	-	-	B	B	B	B	B		V4R4
4486	25GB 1/4-Inch Cartridge Tape	Y	-	-	-	B	B	S	B	B	-	M	B	-	-	B	B	B	B	B		V4R4
4487	50GB 1/4-Inch Cartridge Tape	Y	-	-	-	B	B	B	B	B	-	M	B	-	-	B	B	B	B	B		V5R1
4525	CD-ROM	Y	-	B	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
4530	DVD-RAM	Y	-	B	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
4582	4GB 1/4-Inch Cartridge Tape	Y	-	B	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
4583	16GB 1/4-Inch Cartridge Tape	Y	-	B	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
4584	30GB 1/4-Inch Cartridge Tape	Y	-	B	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
4586	25GB 1/4-Inch Cartridge Tape	Y	-	B	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
4587	50GB 1/4-Inch Cartridge Tape	Y	-	B	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V5R1
4684	30GB 1/4-Inch Cartridge Tape	Y	-	-	-	B	B	B	B	B	-	M	B	-	-	B	B	B	B	B		V4R5
4723	PCI 10Mbps Ethernet IOA	Y	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	S	S		V4R5

FC	Description	CIF	Model or Tower																			Min. OS/400
			250	270	820	830	840	890	SB2	SB3	503X	5065	5074	5075	5078	5079	8079	8093	9074	9079		
4745	PCI Two-Line WAN IOA	Y	-	B	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V4R5
4746	PCI Twinaxial Workstn IOA	Y	-	B	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V4R5
4748	PCI RAID Disk Unit Ctlr	Y	-	S	S	S	S	S	-	-	-	-	S	S	-	S	S	S	S	S		V4R5
4750	PCI ISDN BRI U IOA	Y	-	S	S	S	S	-	S	S	-	-	S	S	S	S	S	S	S	S		V4R5
4751	PCI ISDN BRI S/T IOA	Y	-	S	S	S	S	-	S	S	-	-	S	S	S	S	S	S	S	S		V4R5
4761	PCI Integrated Analog Modem	Y	-	S	S	S	S	-	S	S	-	-	S	S	S	S	S	S	S	S		V4R5
4778	PCI RAID Disk Unit Ctlr	Y	-	B	B	B	B	B	-	-	-	-	B	B	-	B	B	B	B	B		V5R1
4801	PCI Crypto Coprocessor	Y	M	B	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V4R5
4802	PCI Crypto Coprocessor (CIF=Y in 5033)	N	-	-	-	-	-	-	-	-	S	S	-	-	-	-	-	-	-	-		V4R5
4805	PCI Crypto Accelerator	Y	-	B	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V5R2
4815	PCI 155Mbps UTP OC3 ATM	Y	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	S	S		V4R5
4816	PCI 155Mbps MMF ATM	Y	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	S	S		V4R5
4818	PCI 155Mbps SMF OC3 ATM	Y	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	S	S		V4R5
4838	PCI 100/10Mbps Ethernet IOA	Y	-	B	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V4R5
5029	Software Version V5R2	Y	M	B	B	B	B	B	B	B	-	-	-	-	-	-	-	-	-	-		V5R2
5033	Migration Tower I	N	-	-	M	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
5034	Migration Tower I	N	-	-	M	M	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
5035	Migration Tower I	N	-	-	M	M	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
5065	Storage/PCI Expansion Tower	Y	-	-	-	-	-	-	-	-	S	-	-	-	-	-	-	-	-	-		V4R4
5066	1.8m I/O Tower	Y	-	-	-	-	-	-	-	-	S	-	-	-	-	-	-	-	-	-		V4R4
5074	PCI Expansion Tower	Y	-	-	B	B	B	B	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
5075	PCI Expansion Tower	Y	-	B	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5

FC	Description	CIF	Model or Tower																			Min. OS/400
			250	270	820	830	840	890	SB2	SB3	503X	5065	5074	5075	5078	5079	8079	8093	9074	9079		
5077	Migration Tower II	N	-	-	-	B	B	-	B	B	-	-	-	-	-	-	-	-	-	-		V4R5
5078	PCI Expansion Unit	N	-	-	-	-	B	-	-	-	-	-	B	-	-	B	B	B	B	B		V5R1
5079	1.8m I/O Tower	Y	-	-	B	B	B	B	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
5101	30-Disk Expansion Feature	N	-	-	-	B	B	-	-	-	-	M	B	-	-	B	B	B	B	B		V4R4
5102	Dual Line Cords - 820 CEC	N	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V5R1
5103	Dual Line Cords - 830 CEC	N	-	-	-	B	-	-	B	-	-	-	-	-	-	-	-	-	-	-		V5R1
5104	Dual Line Cords - 840 CEC	N	-	-	-	-	B	-	-	B	-	-	-	-	-	-	-	-	-	-		V5R1
5105	Dual Line Cords - I/O Tower	N	-	-	-	-	-	-	-	-	-	-	B	-	-	B	B	B	B	B		V5R1
5106	Dual Line Cords - 5079 Tower	N	-	-	-	-	-	-	-	-	-	-	B	-	-	B	B	B	B	B		V5R1
5107	30-Disk Expansion Feature	N	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-		V5R2
5111	30-Disk Exp w/Dual Line Cord	N	-	-	-	B	B	B	-	-	-	-	B	-	-	B	B	B	B	B		V5R1
5114	Dual Line Cords - Tower	Y	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-		V5R2
5117	30-Disk Exp w/Dual Line Cord	N	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-		V5R2
5155	Redundant Power and Cooling	Y	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
5156	Redundant Power and Cooling	Y	-	-	-	-	-	-	-	-	-	-	-	B	-	-	-	-	-	-		V4R5
5157	Feature Power Supply	Y	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
5160	Power Dist Unit 1 Phase NEMA	N	-	B	B	B	B	B	B	B	-	-	-	-	-	-	-	-	-	-		V5R1
5161	Power Dist Unit 1 Phase IEC	N	-	B	B	B	B	B	B	B	-	-	-	-	-	-	-	-	-	-		V5R1
5162	Power Dist Unit 2 of 3 Phase	N	-	B	B	B	B	B	B	B	-	-	-	-	-	-	-	-	-	-		V5R1
5284	1.8m I/O Tower	Y	-	-	-	-	-	M	-	-	-	-	-	-	-	-	-	-	-	-		V5R2
5537	Alt-IPL Spec for 3580	Y	-	B	B	B	B	-	B	B	-	-	-	-	-	-	-	-	-	-		V4R5

FC	Description	CIF	Model or Tower																			Min. OS/400
			250	270	820	830	840	890	SB2	SB3	503X	5065	5074	5075	5078	5079	8079	8093	9074	9079		
5538	Alt IPL spec for DVD-RAM	Y	-	B	B	B	B	-	B	B	-	-	-	-	-	-	-	-	-	-		V4R5
5546	Sys Console 100Mbps Tkn-Rng	Y	-	B	B	B	B	B	B	B	-	-	-	-	-	-	-	-	-	-		V5R1
5548	Sys Console 100Mbps Ethernet	Y	-	B	B	B	B	B	B	B	-	-	-	-	-	-	-	-	-	-		V5R1
5599	No Save/Restore Device	-	-	B	B	B	B	-	B	B	-	-	-	-	-	-	-	-	-	-		V4R5
5700	PCI 1Gbps Ethernet IOA	Y	-	B	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V5R2
5701	PCI 1Gbps Ethernet UTP IOA	Y	-	B	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V5R2
5704	PCI Fibre Channel Tape Ctlr	Y	-	B	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B		V5R2
6384	30GB 1/4-Inch Cartridge Tape	Y	M	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
6425	CD-ROM (CIF=Y in 5033)	N	-	-	-	-	-	-	-	-	S	-	-	-	-	-	-	-	-	-		V4R4
6484	30GB 1/4-Inch Cartridge Tape (CIF=Y in 5033)	N	-	-	-	-	-	-	-	-	M	-	-	-	-	-	-	-	-	-		V4R5
6818	17.54GB 10k rpm Disk Unit (CIF=Y in 5033 and 250)	N	M	-	-	-	-	-	-	-	M	-	-	-	-	-	-	-	-	-		V4R4
6831	1.6GB Read Cache Device (CIF=Y in 5033 and 250)	N	S	-	-	-	-	-	-	-	S	-	-	-	-	-	-	-	-	-		V4R4
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	-	-	S	S	S	S	-	-	-	S	S	-	-	S	S	S	S	S		V4R5
7501	Quantity 150 of #4317	Y	-	-	B	B	B	S	-	-	-	M	B	-	-	B	B	B	B	B		V4R5
7502	Quantity 150 of #4318	Y	-	-	B	B	B	B	-	-	-	M	B	-	-	B	B	B	B	B		V4R5

FC	Description	CIF	Model or Tower																			Min. OS/400
			250	270	820	830	840	890	SB2	SB3	503X	0565	0574	0575	0578	0579	0579	0593	0974	0979		
7503	Quantity 150 of #4324	Y	-	-	S	S	S	S	-	-	-	S	S	-	-	S	S	S	S	S		V4R5
7504	Quantity 150 of #4319	Y	-	-	B	B	B	B	-	-	-	-	B	-	-	B	B	B	B	B		V5R1
8079	Opt Base 1.8m I/O Rack	Y	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
8093	Opt Base 1.8m I/O Rack	Y	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-		V5R2
9002	Dual Line Cord Enabler	N	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V5R1
9057	Storage Exp Unit	N	-	-	-	B	B	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
9074	Base I/O Enclosure	Y	-	-	-	B	-	-	P	-	-	-	-	-	-	-	-	-	-	-		V4R5
9079	Base I/O Tower	Y	-	-	-	-	B	-	-	P	-	-	-	-	-	-	-	-	-	-		V4R5
9094	Base PCI-X I/O Enclosure	Y	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-		V5R2
9301	Upgraded 30-Disk Expansion	N	-	-	-	-	M	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
9330	Base PCI Integrated Exp Unit	N	-	-	-	-	-	-	-	-	S	-	-	-	-	-	-	-	-	-		V4R4
9691	Base Bus Adapter	Y	-	-	-	-	-	-	-	-	-	-	B	-	B	B	B	B	B	B		V4R5
9730	Base HSL-2 Ports - 4 Copper	Y	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-		V5R2
9732	Base HSL Ports - 8 Copper	Y	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V4R5
9733	Base HSL Ports - 8 Copper	Y	-	-	-	B	-	-	P	-	-	-	-	-	-	-	-	-	-	-		V4R5
9737	Base HSL Ports - 16 Copper	Y	-	-	-	-	B	-	-	P	-	-	-	-	-	-	-	-	-	-		V4R5
9739	Base Optical Bus Adapter	Y	-	-	-	-	-	-	-	-	-	-	B	-	B	B	B	B	B	B		V5R1
9748	Base PCI Disk Unit Ctlr	Y	-	-	-	S	S	-	S	S	-	-	-	-	-	-	-	-	-	-		V4R5
9752	Base HSL Ports - 8 Copper	Y	-	-	-	P	-	-	P	-	-	-	-	-	-	-	-	-	-	-		V5R1
9755	Base HSL Ports -16 Copper	Y	-	-	-	-	P	-	-	P	-	-	-	-	-	-	-	-	-	-		V5R1
9758	Base HSL Ports - 2 Opt/6 Cop	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V5R1
9759	Base HSL Ports-4 Opt/12 Cop	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-		V5R1

FC	Description	CIF	Model or Tower																			Min. OS/400
			250	270	820	830	840	890	SB2	SB3	503X	5065	5074	5075	5078	5079	8079	8093	9074	9079		
9767	Base PCI Disk Unit Ctlr	Y	-	P	P	-	-	-	-	-	-	-	-	S	-	-	-	-	-	-		V4R5
9771	Base PCI 2-Line WAN w/Modem	Y	S	P	P	P	P	P	P	P	-	-	-	-	-	-	-	-	-	-		V4R5
9774	Base HSL Ports - 2 Opt/6 Cop	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V5R1
9777	Base HSL Ports - 8 Copper	N	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-		V5R1
9778	Base PCI RAID Disk Unit Ctlr	Y	-	-	-	B	B	-	P	P	-	-	-	-	-	-	-	-	-	-		V5R1
9789	Base HSL Ports - 4 Optical	Y	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-		V5R2
9793	Base PCI 2-Line WAN w/Modem	Y	-	P	P	P	P	P	P	P	-	-	-	-	-	-	-	-	-	-		V5R2
9794	Base PCI 2-Line WAN w/Modem	Y	-	P	P	P	P	P	P	P	-	-	-	-	-	-	-	-	-	-		V5R2
9887	Base HSL-2 Bus Adapter	Y	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-		V5R2
9943	Base PCI IOP	Y	-	-	-	B	B	B	B	B	-	-	B	-	B	B	B	B	B	B		V4R5

OS/400

OS/400

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Operating System/400 (5722-SS1)

The iSeries operating system, OS/400, is architected as a single entity. This means that such facilities 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.

Intuitive graphical management using iSeries Navigator

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.

Universal Database

For iSeries servers with OS/400 Version 4 or later, the system price includes OS/400 at no additional charge. The full function robust commercial database, Universal Database for iSeries, is also included at no additional cost. The operating system and the database do not have user-based charges. This provides for an effective return-on investment with no surprise fees for additional users.

Logical partitioning (LPAR) and server consolidation

A server consolidation focus allows multiple copies of OS/400, plus Linux, on a single system. Reduced or eliminated IPL requirements when changing LPAR configurations and resources.

With dynamic and granular logical partitioning, OS/400 makes it easier than ever to manage multiple applications in a single server. LPAR supports multiple OS/400 releases and Linux. The iSeries can now provide a Storage Area Network for directly attached Windows 2000 servers.

Linux

Linux offers an added application environment that provides the leading open source operating system. Look for e-business applications coming to this environment that complement iSeries integration and reliability.

Clustering and high availability

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.

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 integrated file system (IFS) files. V5R2 supports operating system objects.

Operations Navigator

Operations Navigator offers two times the growth in advanced graphical user interface functionality and many setup wizards. In V5R2, the Operations Navigator name changed to *iSeries Navigator*.

Management Central-Pervasive

Management Central-Pervasive offers a 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.

OS/400 PASE (Portable Application Solutions Environment)

OS/400 PASE offers improved enablement for porting UNIX applications to iSeries; provides 64-bit support for AIX Version 4.3.3.

TCP/IP

e-business runs on TCP/IP. iSeries TCP/IP is rich in function and is designed for high performance and ease of use. Dynamic Domain Name System and Network Quality of Service are among the features supported.

OS/400 Directory Services

OS/400 Directory Services supports IBM SecureWay Directory Version 3.2. It provides distributed functions support for products such as WebSphere, Policy Director, MQSeries, Meta-Directory, and HTTP Server.

Internet Printing Protocol (IPP)

IPP provides Web-enabled worldwide print support.

IBM eServer Technical Support Advantage for iSeries

Is the part of IBM Technical Support Advantage that covers iSeries customers, providing additional options for connecting to IBM, easier access to other IBM @server support information and more.

New with V5R2

OS/400 V5R2 should be considered for either a new installation or as an upgrade from previous versions of OS/400 to take advantage of many V5R2 software enhancements, including:

- **Performance management improvements**: Dynamic logical partitioning for award-winning 64-bit Linux is added. New intuitive iSeries Navigator (formerly known as Operations Navigator) workload management tools.
- **Adaptive storage virtualization for high availability**: Mainframe-class availability with switched disk cluster management. Self-optimizing, multiple IBM DB2 UDB images for business unit consolidation.
- **Microsoft cluster support:** Extensive Windows server management now supports Microsoft Cluster Server.
- **IASP switched disk**: Supports OS/400 library objects.
- **Secure management of e-business infrastructure**: Industry's first eLiza Enterprise Identity Mapping enables true single signon.
- **High performance Apache Web serving:** With secure sockets and caching accelerators.
- **Wireless-optimized Web-ready micro-drivers:** For simple and pervasive operations.
- **Capacity Upgrade on Demand (CUoD):** Available with new 830 models.
- **Database function:** Continuous availability, with independent auxiliary storage pools (IASPs), clustering, and journaling enhancements.
- **PASE:** AIX V5L support 32 and 64-bit applications and Linux library extensions.
- **LPAR:** Virtual Gigabit Ethernet connection between OS/400, Linux partitions, and Integrated xSeries Servers. Dynamic processor movement for Linux partitions.
- **ODBC**: Driver for Linux provides access to DB2 UDB for iSeries.

V5R2 is supported through 30 September 2004.

OS/400 overview

OS/400 contains the base operating system, additional optional feature components, and separate licensed programs that bundled with the operating system at no extra charge. The customer can purchase advanced features and functions not included in the base group of products shipped with the operating system.

Program number	**5722-SS1**
Version Release Modification	V5R2
Announced	29 April 2002
Usage	Processor Based
Software Subscription	Yes
IPLA/Keyed	Yes/Yes
HIPO	1000

Version 5 Release 2 of IBM Operating System/400 licensed program provides system support for all RISC models listed:

- 150
- 170
- 250
- 270
- 6xx
- Sxx
- 7xx
- SBx
- 820
- 830
- 840
- 890
- Dedicated Server for Domino processors (all)

Version 5 Release 1 of IBM Operating System/400 licensed program provides system support for the RISC models supported by V5R2 plus:

- 4xx
- 5xx

Version 5 of OS/400 does not run on models of the AS/400 system based on IMPI processors (CISC models). CISC systems include these models:

- Bxx
- Cxx
- Dxx
- Exx
- Fxx
- 100
- 135
- 140
- 2xx
- 3xx

Be aware that some functions of the operating system are available on newer hardware only.

The following table lists the features and products available with OS/400 Version 5 Release 1 or 2.

Product name	Product number	Option number	Version 5		Base/ separate	Charge/ no charge
			R1	R2		
OS/400	5722-SS1		x	x	B	N/C
Universal DB2 for iSeries			x		B	N/C
System Openness Includes		13	x	x	S	N/C
Media & Storage Extension	1500	18	x	x	S	C
Object Connect/400		22	x	x	B	N/C
OptiConnect/400	1515	23	x	x	S	C
NetWare Enhanced Integration	5769-SA3	25	x	x	B	N/C
DB2 Symmetric	1517	26	x	x	S	C
DB2 Multisystem	1518	27	x	x	S	C
PASE		33	x	x	S	N/C[1]
iSeries Print Service Facilities	1501 1502 1503	36, 37, 38	x x x	x x x	S	C
HA Switchable Resources	1505	41	x	x	S	C

Product name	Product number	Option number	Version 5		Base/ separate	Charge/ no charge
HA Journal Performance	1545	42		x	S	C
Licensed programs within OS/400						
Integration FSIOP	5769-SA2		x		S	N/C
iSeries Integration for Windows Server	5722-WSV		x	x	B	N/C
TCP/IP Connectivity Utilities for iSeries	5722-TC1		x	x	B	N/C
WebSphere Application Server for iSeries	5733-AS3		x		S	N/C
HTTP Server for iSeries	5722-DG1		x	x	B	N/C
HTTP Server Powered by Apache for iSeries	5722-DG1		x	x	S	N/C
IBM Toolbox for Java	5722-JC1		x	x	B	N/C
iSeries Developer Kit for Java	5722-JV1		x	x	B	N/C
Performance Manager/400	5722-PM1		x		B	C
iSeries Access for Windows iSeries Navigator[2]	5722-XE1		x	x	B	N/C

Notes:

B: Base feature included with OS/400.

S: Separate feature must be specified on order.

N/C: No charge feature

C: Charge feature

1 No charge with V5R2 only

2 Formerly known as Client Access Express and Operations Navigator

The following sections in this chapter briefly describe the components listed in the previous table. You can learn more about the components from the table in the remainder of this Handbook.

OS/400 Version 5 is delivered on CD-ROM to speed loading of software and to reduce the risk of media errors. All manuals are also delivered in softcopy form on CD-ROM.

Base OS/400

OS/400 is a 64-bit operating system running on all models of the iSeries. OS/400 with its base function provides ease of implementation, management, and operation in one totally integrated object-oriented operating system. The following are integrated features:

- Advanced GUI support to provide for:
  - Easy setup and management of the system, including the TCP/IP function
  - Database functions
  - User and printer job administration
  - System management
  - Software distribution
  - Performance monitoring
  - Centralized management of multiple systems
  - Plug-in support for Domino, BRMS, and others
- Network computing
- Integrated file system (IFS) with industry standards
- Multiple operating environments and logical partitions
  - Different versions and releases of OS/400
  - Linux
  - PASE
  - Resource sharing
- Clustering and shared resources
- High system availability
- Client/server connectivity
- DB2 Universal Database for iSeries
- Transaction processing
- Batch processing
- Extensive run-time applications
- Openness standards
- Performance Management/400
- Electronic Customer Support
- Comprehensive security for system resources
- Interfaces to system functions
- Connectivity to remote devices, systems, and networks
- Office services
- National language versions and multilingual support

Each function of OS/400 follows 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 cornerstone functions 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 IFS and iSeries printers into the Microsoft Network

Neighborhood. User benefits include better control of user visibility to resources, for example. The only directories or printers that can be seen by end users are those set up as “shared” by an administrator or resource owner.

Desktop users can fully satisfy their file and print serving needs through the iSeries NetServer function. Therefore, the file and print serving functions once facilitated with other iSeries Client Access clients is 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 iSeries 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 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.

Features

- iSeries NetServer can operate as the *Logon Server* for Windows clients. OS/400 can be used to authenticate logging onto Windows, provide the home directory, and logon scripts to the Windows user. In addition, Windows user profiles, including Desktop, Start Menu, Favorites, and policies, can be stored and retrieved from an iSeries server. A separate networked Windows NT or Windows 2000 server is no longer needed.
- The iSeries Navigator provides an enhanced management of users, including managing disabled user profiles with menus. (Application programming interfaces (APIs) are also available.)

- A Windows-compatible 128-character and NTLMV2 password hash is now supported.
- User IDs longer than 10 characters are truncated (to 10 characters) instead of being rejected when checking for an iSeries user ID.
- An iSeries NetServer Setup wizard within iSeries Navigator guides you through setting up your iSeries NetServer. This Setup wizard is also used to configure logon support.
- Access of files larger than 2 GB in the IFS
- Using iSeries 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. 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 access the iSeries NetServer without user intervention.
- Printer Shares can be published in Directory Services (LDAP) for use by Windows 2000 systems using *Active Directory* to find printers.

New with V5R2

- Performance and scalability features are enhanced to help customers consolidate file and print serving on an iSeries server.
- AS/400 NetServer support of Linux clients provides the same file and print sharing function as prior releases of 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.
- Takes advantage of the native file sharing protocol using TCP/IP

  It is delivered with Windows 95, Windows 98, Windows NT, or Windows for Workgroups. No additional software is required on the iSeries server.

iSeries Support for Windows Network Neighborhood program complies with the “Common Internet File System” (CIFS) standard currently proposed by Microsoft.

For additional information, refer to:

`http://www.ibm.com/servers/eserver/iseries/netserver`

Note: NetServer at V5R1 supports Windows 3.1 and Windows NT 3.51 and Windows 95. Windows 95 is no longer supported with NetServer V5R2.

Network printing support

Distributed print support provides a connection to LAN-attached ASCII printers and support for Advanced Function printers. 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 spooled file and its attributes to the remote system.

This integrated OS/400 function supports printing of text, images, graphics, barcodes, electronic forms, multiple fonts, logos, signatures, and more. These formats provide 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. 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 automatically transforms 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 greatest flexibility possible in network design.

For a list of supported networks, communication facilities, and protocols, see Appendix A, “Referenced lists” on page 885.

Other communication facilities are available as licensed programs, such as IBM Communications Utilities for iSeries (5722-CM1). See Chapter 31, “IBM licensed programs: Networking products” on page 729, for further information.

TCP/IP Utilities (5722-TC1) is included with OS/400 (although not part of OS/400) from V3R1 onward and automatically ships with each order of OS/400. TCP/IP Utilities include applications such as Telnet, FTP, support for Domain Name system, and many others. See Chapter 27, “TCP/IP Connectivity Utilities (5722-TC1)” on page 597, for further information on TCP.

Network management facilities

Several communications and systems management functions are available to manage iSeries servers. Some are integrated into OS/400, and some are separately-priced features. These functions help manage and control local systems and distributed systems that operate within a network controlled by a host system or by another iSeries server.

Network management functions available for the iSeries server include:

- Systems management in TCP/IP networks
- Alerts support to NetView, System/36, System/38, iSeries
- 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 base 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*	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.

***** 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.

OS/400 is distributed with the security level set to 40.

See *Tips and Tools for Securing Your iSeries*, SC41-5300, for information on iSeries security implementation.

Features

- **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 and 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 used by OS/400 to protect itself from unauthorized changes.

- **Digital Certificate Manager (DCM)**

  The user interface for DCM includes support for:

  – Certificate extensions

  – Storing the certificate private keys using an IBM Cryptographic Coprocessor

  – 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**

  Case-sensitive user profile passwords of up to 128 characters in length with a larger character set.

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 its 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 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.

New with V5R2

- **Enterprise Identity Mapping (EIM**)

  EIM provides technology that maps a user identity on one system to the user's identity on another system. The operating system and applications can now equate the term *jsmith* on iSeries to *janesmith* on the zSeries server.

DB2 Universal Database for iSeries

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 is the trademark of the iSeries server. It is not a separate product. DB2 Universal Database (UDB) for iSeries is fully integrated into OS/400 software.

DB2 UDB for iSeries can be used for both transaction processing and *complex* decision support applications. Advanced parallel processing and advanced query optimization techniques support queries of large decision support databases for applications such as Business-to-Business, Business-Intelligence, customer relationship management (CRM), and other e-business applications.

An integrated iSeries database offers many advantages. As an integrated part of OS/400, the database commands and user interfaces have a look and feel that are consistent with the rest of the system. For example, database objects are automatically included as part of the system-wide cross-reference facilities. OS/400 base system administration commands and GUIs can be used for save, restore, security, and object management. This allows the database to exploit new system functions and hardware for improved availability, recovery, security, concurrency, and performance as they are introduced. DB2 UDB for iSeries is installed with the system providing automatic bring up and recovery functions when the an IPL is run on the system.

DB2 UDB takes advantage of the unique capabilities of the iSeries server such as single-level storage and the object-based design. This means administrators do not need to review table space allocations and extents, rebind applications for database changes update statistics, or balance indexes. Such tasks are automatically performed by DB2 UDB for iSeries.

Conformance to industry database standards, advanced functions, and distributed data capabilities with supporting performance allow DB2 UDB for iSeries to operate equally well with centralized database applications, or as the database server in complex heterogeneous client/server networks. The reliability and unique combination of functions of DB2 UDB for iSeries make the iSeries the ideal database server for many customers' needs.

The iSeries consistently achieves top positions in several major standard benchmarks such as TPC-C due in part to the design of DB2 UDB. DB2 UDB for iSeries provides excellent performance in a non-parallel, symmetric parallel, and massive parallel configurations.

Features

- **Object-relational technology**

  Object-relational technology with Large Object (LOB) and Data Link Support enables you to store and manage non-traditional data elements as a normal part of the database.

  DB2 UDB for iSeries can store and manipulate LOB data fields. An iSeries record with LOB fields can hold up to 2 GB of data. This improves DB2 UDB for iSeries ability to support applications that hold data such as very large text, image, and audio.

- **DATALINK data type**

  For the DATALINK data type, 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. You can store a uniform resource locator (URL) to resolve to the object.

- **DB2 UDB Extenders for iSeries**

  DB2 UDB Extenders provide enablers to link and exchange data in XML and Text Extender documents with DB2 UDB and provide sophisticated text search capabilities.

  The DB2 XML Extender allows you to convert your existing relational data into an XML document and vice-versa. DB2 Text Extender enables high-speed rich text and multimedia search and manipulation capabilities such as fuzzy searches and synonym searches.

- **Advanced query optimization technologies**

  Query optimization, including the IBM patented encoded vector indexing technology, enhances the performance of query and SQL processes.

- **DB2 UDB family compatibility**

  There is compatibility across the DB2 UDB family with such cross family utilities as Data Propagator, DB2 OLAP, QMF, and more.

- **Database SQL portability**

  DB2 UDB for iSeries adds Java to the list of languages in which stored procedures can be written. Additional languages supported are C, C++, Cobol, Rexx, Fortran, and PL1.

- **National language support (NLS)**

  Data in multiple national languages can reside in the same table and be accessed across 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.

- **User-defined types**

  User-defined types are derived from existing predefined types such as integer and character. You can create your own data types for strong typing and for 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 data type.

- **User-defined functions**

  SQL lets you define your own functions to use within SQL itself. This saves you time by reusing common building blocks that you develop yourself. User-defined functions are necessary building blocks to support the database extenders.

- **Declarative referential integrity**

  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.

- **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.

Open standards-based interoperability

Support for client/server environments is greatly enhanced in DB2 UDB for iSeries by incorporating popular database standards and transmission protocols, such as support for:

- ANSI X3.135.1999, ISO 9075-1999, and FIPS 127-2 Structured Query Language (SQL)
- The Open Group's Distributed Relational Database Architecture (DRDA) Distributed Unit of Work - Application Directed
- Microsoft's Open Database Connection (ODBC)
- Apple's Data Access Language (DAL)
- XML
- JDBC
- OLE DB and ADO
- U.S. Government C2 security

- UCS-2 (Unicode or ISO 10646)
- Euro Character support

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)
- Advanced Peer-to-Peer Networking (APPN)

The integrated database is a full-function database with features competitive to other widely used databases, reducing the need for a dedicated Database Administrator. The fact that the database is integrated allows the operating system to control some of its management functions and makes it easier to maintain than a competitive database. With security built-into OS/400, DB2 UDB allows a better security model than other database where additional tools are purchased to provide the security 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.

Distributed database support

OS/400 supports distributed relational databases using SQL. Distributed database support allows read and write access from an iSeries server to another iSeries server or to any other database supporting the Open Group DRDA architecture, including DB2 UDB for OS/390 and z/OS, DB2 UDB for Windows, and DB2 UDB for AIX.

DB2 Relational Connect, a feature of DB2 UDB for Windows and UNIX servers, allows access to additional databases such as Oracle, Microsoft SQL Server, and others. An iSeries server can connect to a system running DB2 Relational Connect to access data in the databases accessible by DB2 Relational Connect.

The CPI for database is Structured Query Language (SQL). The customer's investment in data is protected by distributed support with data connectivity across platforms. Interactive access to distributed database is possible using the prompted facilities of interactive SQL (ISQL). This is available in DB2 Query Manager and SQL Development Kit for iSeries (5722-ST1), a separately licensed program.

New with V5R2

- **Server consolidation**

  Multiple DB2 UDB database images within a single instance of the operating system allows for application flexibility and server consolidation. It provides an ability for a single application to access multiple database instances with common database names.

- **Performance**

  Performance improvements are made in several areas. e-business oriented applications benefit from the new Adaptive e-Transaction Services support in V5R2, designed specifically for applications using the Open Group XA transaction interface or Java Transaction APIs (JTA). New journaling and EVI maintenance enhancements improve performance for batch-oriented processing and query workloads respectively.

- **SQL enhancements**

  A major SQL enhancement is *Identity columns*, which can be used to generate artificial or surrogate key values by telling DB2 to auto-increment the column value as new rows are inserted into the table.

  Support for unions in a view allows the user to shift some programming effort into DB2. Instead of forcing the user to remember to combine (union) all of the required tables, a single SQL view can be created to simplify this process.

  The SQL procedural language used in the creation of SQL user-defined table functions (UDTF), user-defined functions (UDF), triggers and stored procedures is also enhanced in V5R2 to improve DB2 UDB compatibility. Most significant is support for nested compound statements, which enable the user to bundle related statements together into their own execution block within an SQL procedure, trigger, or function.

  Removal of the *Order By* restriction that required any column used to order/sort query results to be included in the results. Statement 3 is not allowed in V5R1, but is supported with V5R2.

  SQL procedures, functions, and triggers no longer require licensed program product 5722-ST1 to be installed on the iSeries. Interactive SQL and embedded SQL do require 5722-ST1 to function on iSeries.

For more information on SQL enhancements and general DB2 UDB enhancements, see:

`http://www.ibm.com/servers/eserver/iseries/db2/`

Standards

DB2 UDB for iSeries provides a large number of functions and features comparable to other leading commercial databases that are available on the market.

Some standard features are:

- Stored procedures
- Triggers
- Join operators
- Enhanced SQL query support
- X/Open Call Level Interface to SQL
- SQL Repeatable Read: A standard compliant isolation level, Repeatable Read support is included in MQSeries for iSeries, a separately-licensed program, 5722-MQ1.
- Two-phase commit transaction management
- Data replication
- ODBC driver for DB2 UDB for iSeries is enhanced with ODBC 3.5 support and support for Microsoft Transaction Server (MTS). MTS support enables DB2 UDB for iSeries to participate in transactions involving two-phase commit coordinated through MTS. ODBC 3.5 support also delivers support for Unicode.
- Journaling and SQL DDL operation journaling (V5R1)
- System-wide database catalog
- 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.

For a more complete list and comparison with other databases, see the Web site:

`http://www.iseries.ibm.com/db2`

When you reach this Web site, select **common DB2 UDB features** link.

High performance database server (centralized and distributed server)

The high performance iSeries 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. The optimizer detects changes in the number of processors on each query. So when processors are moved to an LPAR or when Capacity Upgrade on Demand adds additional processors, the query plan is automatically reoptimized if necessary.

- **SQL encoded-vector indexes (EVI)**

  An encoded-vector index can be created through SQL and can improve query performance – especially for long-running queries that run against large files using many selection criteria. An EVI has several advantages over a traditional index with the same keys, for example:

  – Precise statistics about the distribution of key values are automatically maintained and can be accessed quicker 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 bitmaps quicker than from traditional indexes.

- **Explain function**

  The 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 or database changes.

- **Block INSERT and FETCH**

  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**

  An automatic recording blocking function 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 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 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, so that a single query can consume an unusually large amount of resources, which negatively affects the performance of other users.

  The governor facility allows a time limit to be set for a query. Before the query is started, its run time is estimated. If the estimate exceeds the specified time limit, the query is not started. This is advantageous over similar functions on other databases that let the query run for a portion of time and then stop it since no unnecessary processing of the query occurs.

- **Query tuning**

  DB2 UDB for iSeries provides both iSeries Navigator graphical and programmatical CL command interfaces to help tune SQL queries. Users can dynamically control how DB2 UDB for iSeries is to optimize queries by changing a set of query attributes (such as the parallel degree characteristic). Both summary and detailed database performance monitors can be used to track and analyze SQL statement performance. A Visual Explain capability can be used to graphically show how a specific query has been optimized and can suggest indexes that might help performance.

- **Scalability**

  DB2 UDB for iSeries supports very large database environments. A single table can be up to one TB and 4.2 billion rows. Distributed tables can be up to 32 TB.

  DB2 SMP for iSeries and DB2 Multisystem support enable both horizontal and vertical growth.

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:

- **iSeries Navigator database (Database Navigator)**

  The iSeries Navigator database is a graphical interface that you can use to perform many common administrative database options. From iSeries Navigator you can create, change, delete, move, and copy database objects. You can enter data into tables, view table contents, run SQL scripts, graphically display the relationships of your database objects, graphically display your query optimization with Visual Explain, monitor database performance, and perform other database management tasks.

  The iSeries Navigator is enhanced with a Database Navigator interface that displays the relationship among relational objects such as tables, views, and indexes. Another enhancement to the iSeries Navigator interface is the ability to generate the SQL statements used to create a database object regardless of whether it was created with SQL.

- **Online backup and restore**

  Online database maintenance can be performed, including the ability to backup and restore, while users are accessing and changing the database. This provides for around-the-clock operation.

- **Object level recovery**

  Recovery can be at an object level. This allows you to restore a single file when necessary. It is not necessary to restore the entire database to “fix” a single file.

- **Roll forward and backward recovery**

  The ability to roll forward and backward to recover records allows database changes made after the last backup to be reapplied after a restore, or for 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**

  An audit trail maintains a record of database changes such as the user, program, and job making the change.

- **Performance tuning and trace**

  The performance tuning and trace function analyzes processor and disk workloads for improved performance. The integrated nature of the database allows the entire system to be tuned, not just the database.

Integrated file system

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 can 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 can be thought of as a separate 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. The IFS 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.

Supported file systems within the IFS are:

- **Network File System (NFS)**. 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**: The QFileSvr.400 file system provides access to other file systems that reside on remote iSeries servers.
- **QLANSrv**: QLANSrv 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 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**: QNTC is the 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 (IPCS).

The QNTC file system lets you share data with servers that can communicate using the Windows NT LM 0.12 dialect.

The QNTC file system can communicate with Windows NT servers. This includes a stand-alone server and any Windows NT Application Processors (NTAP) servers running in the domain. See *IBM AS/400 Integration for Windows Server - Setup*, 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**: QOpenSys is the open systems file system. QOpenSys is compatible with UNIX-based open system standards, such as POSIX and XPG. Like the root file system, QOpenSys takes advantage of the stream file and directory support that is provided by the IFS. It also supports case-sensitive object names.
- **QOPT**: QOPT is the optical file system. QOPT provides access to stream data that is stored on optical media.
- **QSYS.LIB**: QSYS.LIB is the library file system. QSYS.LIB supports the iSeries library structure and provides access to database files and all of the iSeries object types that the library support manages.
- **“root” (/)**: “root” is the / file system. The root file system takes full advantage of the stream file support and hierarchical directory structure of the IFS. The root file system has the characteristics of a Disk Operating System (DOS) and OS/2 file systems.
- **UDFS**: UDFS is the user-defined file system. The UDFS file system resides on an auxiliary storage pool (ASP). The user creates and manages the UDFS file system. Independent ASPs in V5R1 use the UDFS structure.

You can interact with any of the file systems through a common interface that includes commands, menus, displays, and APIs. The interface is optimized for the input/output of stream data, in contrast to the record input/output provided through the data management interfaces.

Features

- Is a hierarchical directory structure.
- Provides support for storing info.rmation in stream files that can contain long continuous strings of data

- Is 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.
- Provides 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 are provided.
- Threadsafe IFS API interfaces to access objects in a multi-threaded job are provided.
- Text file I/O can convert between CCSIDs with characters of differing lengths.
- PC created files (even read only files) can be managed through a command and API interfaces.
- You can 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. A *dev/null* character is useful for applications to discard output from sub-applications without changing the subapplication. The dev/null character special file can be written to forever, but is always empty when read.
- Stream I/O supports save files. This allows you to extract the contents of a save file, transport the save file through the network using stream file protocols, and place the contents back into another save file.
- File system APIs support parameters and buffers in teraspace for large I/O operations
- Deadlock detection helps diagnose applications with a conflict in locking order.

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

Ease of installation, use, and maintenance with OS/400

Operations Console

iSeries servers support a directly-attached or LAN-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 server. 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, and mode changes, 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 six meters.

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 the graphical control panel application. In general, both applications make it possible to perform the majority of system operations tasks, for example backup and recovery, with the iSeries servers and managing staff in physically separate locations.

The connection between the remote and direct-attach Operations Consoles uses Windows dial-up networking (PPP). Direct-attach Operations Console uses Windows NT Remote Access Service (RAS) for access.

See “iSeries Operations Console: Direct Attach, LAN, and Remote” on page 762 for further details on Operations Console and cabling requirements.

Software requisites

The Operations Console applications are included on the iSeries Client Access for Windows 95/NT CD-ROM shipped with OS/400 V4R3 and later releases. The applications are installed and used on PCs using the Windows NT Workstation 4.0, 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 a later release is required for direct and remote 5250 console attachment. However, the control panel application functions as a stand-alone application with any IMPI or RISC “black-box” system.

The LAN-attached Operations Console is supported with OS/400 V5R1 onward.

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 OS/400. The menus use an object-oriented approach by providing a 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 can 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 can be specific to a field or line on the screen, or to extended help on the use of the display.

Programming temporary fixes (PTFs)

Programming temporary fixes can be shipped to a central site, either on media or electronically, and then packaged and distributed to remote license sites, either on media or electronically. Customers can download PTFs over the Internet. The client hardware needed is a PC with Windows 95/NT, a TCP connection to the iSeries over a LAN, and access to the Internet. Configuration and setup information is documented on the Web at:

`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.

PTFs (including Licensed Internal Code changes) are loaded and applied using a command.

System detected software problems

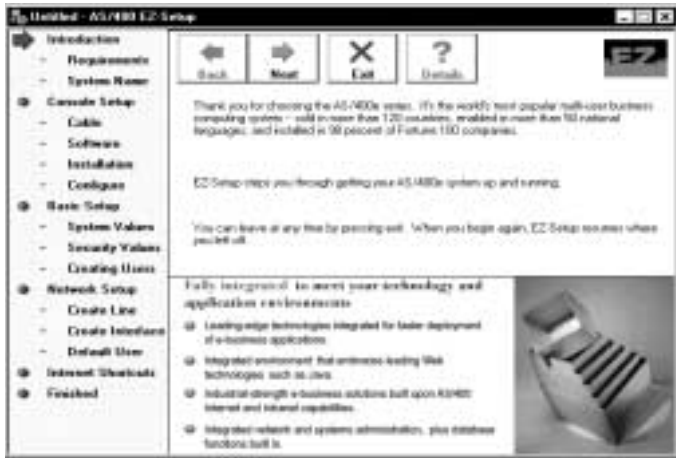
Symptom strings are automatically created by the OS/400 licensed program at the time an error occurs. Symptom strings make the management of problems in the system easier and recovery quicker by improving the rate at which customers can find appropriate fixes for problems. Problem resolution time is decreased when failure data is collected at the time of occurrence and reduces the need to recreate failures.

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. An Operations Console cable connected to the host iSeries is required.

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

Operations Navigator provides an industry leading integrated systems management offering with an easy-to-use graphical interface. Numerous GUI extensions enhance iSeries Navigator functions with configuration and administration wizards and iSeries Information Center online documentation that is available on the Web, CD, or from iSeries Navigator Help panels.

The EZ-Setup wizard is designed to easily:

- Install iSeries Access and the components of iSeries Navigator needed by EZ-Setup.
- Set the system name, date, time, and security values.
- Create security officer and system operator profiles.
- Define LAN connection for token-ring, Ethernet, or Integrated xSeries Server for iSeries adapter.
- Start TCP/IP and selected servers.
- Create Internet shortcuts on the desktop for the iSeries Information Center, iSeries Home Page, iSeries Access, and iSeries Technical Support.
- Install the Netscape Navigator browser, if needed.
- Configure Operations Console to be ready to use when EZ-Setup completes.
- Perform the initial NetServer configuration for iSeries Access, including the start of TCP/IP and setting the system and domain names for NetServer.
- Give the user the option to launch iSeries Navigator by using a radio button.
- Upgrade the path from twinaxial to Operations Console.

EZ-Setup includes the ability to:

- Install and configure Lotus Domino for iSeries
- Configure LDAP service
- Configure HTTP (using the Internet Connection Setup wizard)
- Install the Information Center
- Configure the Extreme Support Connection

EZ-Setup provides a complete setup path for many users and allows an "out-of-box" experience to serve a business in one quick and easy path. EZ-Setup is part of iSeries Access 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 iSeries 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

The Internet Setup wizard simplifies the steps required to connect your iSeries server to the Internet and to use application and Web serving. The wizard allows you to connect your iSeries server to an Internet Service Provider (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, to:

- 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.

Availability and recovery

Many functions are available to help maintain the availability of an iSeries server. They include:

- **System Managed Access Path Protection (SMAPP)**

  SMAPP supports and automates the process of selecting which access paths should be protected. This can improve IPL performance.

- **Uninterruptable power supply (UPS)**

  UPS maintains power to the iSeries server during a site power loss.

- **RAID**

  The iSeries provides disk protection and availability. RAID-0, RAID-1 (disk, controller, and bus level protection), and RAID-5 are supported. Concurrent maintenance of disks is also supported.

- **Journaling**

  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. Byte stream file and directories can also be journaled.

- **Commitment control**

  Commitment control ensures that if a transaction requires multiple database changes, all of them (or none of them) are made.

- **Batch journal caching**

  The caching of journals in batch provides a significant performance improvement for batch environments which use journaling. Applications that perform large numbers of database add, update, or delete operations typically see the greatest improvement. Although directed primarily toward batch jobs, some interactive applications may also benefit from this feature.

- **Save-while-active (SWA)**

  Save-while-active allows one or more libraries to be saved while operations, including changes, continue against the libraries. During a short period of acquiesced operation, a checkpoint is taken of all libraries being saved before the first save operation begins, so that all libraries are synchronized.

- **Save/restore to multiple tapes concurrently**

  Otherwise known as parallel save and restore, V5R1 supports the capability to use multiple tape devices (from 2 to 32), or multiple resources in a tape library, in parallel. In particular, parallel tape support reduces the amount of time required to save and restore very large objects.

- **Auxiliary storage pools**

  Auxiliary storage pools (ASPs) are individual disks reserved for particular objects (like individual libraries). ASPs can be used to isolate those objects to assist in their recovery. Up to 31 user ASPs and 67 independent ASPs are supported offered with V5R1 and later. All systems ship with one system ASP configured.

- **Independent auxiliary storage pool (IASP)**

  Independent ASPs can be defined as stand-alone or switched. User Defined File Systems (UDFS) or database and program, journals, or OS objects can be created in these IASPs. When the IASP is moved from one system to another, 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.

- **Large capacity disk load balancing**

  The ability to balance data across disk arms in an ASP, based on performance, capacity, average utilization, and hot/cold data is provided. These functions are controlled with CL commands.

- **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 POSIX shared memory APIs.

- **Expert Cache**

  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.

- **Integrated hardware disk compression**

  The 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. 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**

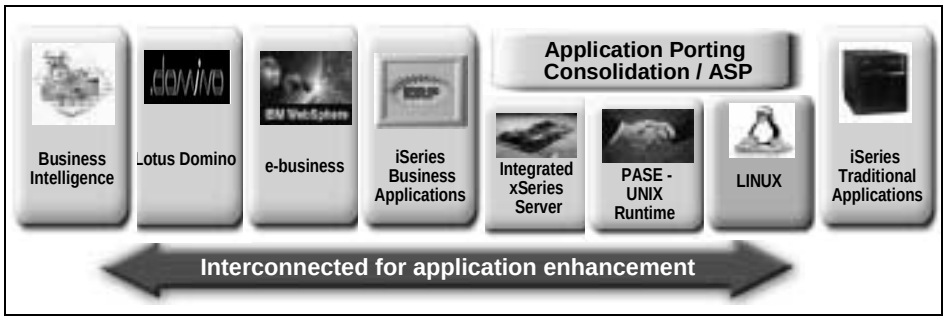
  OS/400 includes Hierarchical Storage Management (HSM) APIs used by Backup and Recovery Media Services for iSeries (BRMS), 5722-BR1, to provide HSM functions. Use these APIs to develop custom HSM applications.

- **Concurrent maintenance**

  Concurrent maintenance can be done 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. Select models of 270, 250, and 8xx hardware support a hot swap capability to 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)

Advanced parallel logical partitioning enhances 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 to achieve server consolidation, business unit consolidation, a mix of production and test environments, and integrated clusters.



Logical partitions are ideal for companies that want to run both 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. Licenses can be managed across partitions.

Each partition's system name is distinct and the system values can be set independently. Each partition can have a different primary and secondary national language and can 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 system processor or (with V5R1 onward) with part of a processor. Memory and disk can be shared within a single iSeries server.

The iSeries capabilities are enriched with the functionality included with LPAR. The advantages of an LPAR implementation include:

- Software Licensed Management (SLM) APIs allow customers and business partners to monitor usage counts across the system rather than for each partition.
- A dynamic movement of processor, memory, and interactive performance between partitions spreads the system workload to where resources are needed, and potentially reduces the total amount of resource required on a system.
- With the OS/400 V5R1 capability to support partial (fractional) processors, the maximum number of partitions supported (on iSeries 270, 820, 830, 840, and 890 models) is 32. V4R5 supports a maximum of one partition per processor, in whole number increments so that the maximum number of partitions is equal to the number of processors on a given system.

- With OS/400 V5R1, up to four partitions per processor are supported on iSeries 270, 820, 830, 840, and 890 hardware. With V4R5, processors are assigned to partitions in whole number increments.
- Creating and managing secondary partitions is performed from the primary partition.

LPAR capabilities applicable to 820, 830, 840, 890, 720, 730, 740, 620, 640, 650, and S10, S20, S30, and S40 models include:

- The dynamic movement of processor, memory, and interactive performance between partitions running OS/400 Version 5.
- Linux running in a secondary partition.
- Virtual OptiConnect emulates external OptiConnect hardware by providing a virtual bus between logical partitions. To use virtual OptiConnect, you only need to purchase OptiConnect for OS/400. Additional hardware is not required. If multiple paths between partitions are available, OptiConnect software selects the virtual OptiConnect path over either a high-speed link (HSL) or SPD OptiConnect external path. An IPL of the affected partitions is not required.

  Virtual OptiConnect is supported with V4R4 onward.
- Virtual LAN provides 16 independent high-speed virtual 1Gb Ethernet internal bus-to-bus communication paths between logical partitions. Virtual LAN allows connections in any combination of high-speed bus-to-bus communication links between multiple partitions. Additional communication hardware is not required.

  With V5R2, partitions support:

  – OS/400
  – Linux
  – Windows Integrated xSeries Server or Integrated xSeries Adapter instances

  The enablement and setup of Virtual LAN is easy and does not require an IPL. Virtual LAN supports the TCP/IP protocol.
- Multiple OS/400 versions within a partitioned environment on appropriate systems. See the table that follows for supported partitions.
- Linux support in a secondary logical partition and (with V5R2) dynamic processor movement.

LPAR capabilities applicable to 270, 820, 830, 840 V5R1 (or later), and the Model 890 include:

- Granular processor movement with a reduction of 1% of each processor
- Select uniprocessor 270 and 820 models support partitioning

- iSeries Navigator support to create and manage partitions including a scheduled movement of resources.
- iSeries Navigator GUI functions are enhanced with V5R2 to improve LPAR management, including these capabilities:
  - Configuration support of Linux with the *Create Partition wizard*
  - Ability to save partition configuration data
  - Ability to export configuration data to HTML format for hardcopy prints
  - Partition numbers are visible with names
  - Ability to change virtual processors when moving processing units
  - Updates to property sheets for shared and dedicated processors
  - Ability to select views by selecting columns to display

Releases supported in secondary and primary logical partitions are shown in the following table.

Suggested reading

For additional information on logical partitioning, see:

`http://www.ibm.com/servers/eserver/iseries/lpar`
`http://www-1.ibm.com/servers/eserver/iseries/service/itc`

Supported processors	Primary partition	Shared processor	Secondary partition				
			V4R4	V4R5	V5R1	V5R2	Linux
N-way 6xx, 7xx, Sxx	V4R4	No	Yes	Yes	Yes		No
	V4R5	No	Yes	Yes	Yes		No
	V5R1	No		Yes	Yes	Yes	No
	V5R2	No			Yes	Yes	No
270 Processors (SStar Uni) #2431, #2432, and #2452	V5R1	Yes			Yes	Yes	Yes
	V5R2	Yes			Yes	Yes	Yes
270 Processors (SStar 2-way) #2434 and #2454	V5R1	Yes		Yes[1]	Yes	Yes	Yes
	V5R2	Yes			Yes	Yes	Yes
820 Processors (Pulsar Uni) #2395, #2396, #2425	V5R1	Yes			Yes	Yes	No
	V5R2	Yes			Yes	Yes	No
830 Processor (IStar n-way) #0153,#2349	V5R1	Yes			Yes	Yes	Ded
	V5R2	Yes			Yes	Yes	Ded

Supported processors	Primary partition	Shared processor	Secondary partition				
			V4R4	V4R5	V5R1	V5R2	Linux
840 Processor (SStar n-way) #0158, #0159 820 Processors (SStar Uni) #0150, #2435, #2436, and #2456	V5R1	Yes			Yes	Yes	Yes
	V5R2	Yes			Yes	Yes	Yes
820 Processors (IStar n-way) #2397, #2398, #2426, #2427	V4R5	No		Yes[1]	Yes		No
	V5R1	Yes[2]		Yes[1]	Yes	Yes	Ded
	V5R2	Yes[2]			Yes	Yes	Ded
830 Processors (IStar n-way) #2400, #2402, #2403 840 Processors (IStar n-way) #2416, #2417,#2418, #2419, #2420	V4R5	No		Yes	Yes		No
	V5R1	Yes[2]		Yes[1]	Yes	Yes	Ded
	V5R2	Yes[2]			Yes	Yes	Ded
820 Processors (SStar n-way) #0151, #0152, #2437, #2438, #2457, and #2458 840 Processors (SStar n-way) #2461, #2460,#2352, #2353, #2354	V5R1	Yes		Yes[1]	Yes	Yes	Yes
	V5R2	Yes			Yes	Yes	Yes
890 Processor (POWER4 n-way) #0197, #0198, #2487, #2488	V5R2	Yes				Yes	Yes

Notes:
1. All partitions must be at V5R1 to support processor sharing and dynamic movement of processor resources.
2. Linux supported on Dedicated Processors only, other partitions support processor sharing.

Linux for iSeries

Linux enables a 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 or later. Up to 31 Linux partitions are supported, depending on the iSeries model.

Processor features for iSeries Model 270, 820, and 840 servers using SStar, and Model 890 POWER4 processors, allow Linux to run in a shared processor pool, where one processor can be shared between four OS/400 and Linux partitions. On n-way processor features for iSeries Model 820, 830, and 840 servers with IStar processors, Linux requires a minimum of one processor per Linux environment.

New with V5R2

- Dynamic allocation of virtual processor units
- Shared read-only virtual disk
- Library support for 64-bit applications
- ODBC connectivity to DB2 UDB for iSeries downloadable from the Web at:

  `http://www.ibm.com/eserver/iseries/linux/odbc`
- Linux Samba can access iSeries NetServer (Windows Network Neighborhood) and output queues
- Native Fibre Channel and multiport serial device support
- IBM Java 1.3.1

V5R2 iSeries logical partition capability gives you the flexibility to dynamically move processor resources between Linux partitions. In V5R1, this requires a reboot of the partition.

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.

With virtual I/O, the I/O resources (disk, tape, and 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 is enhanced to support Linux in a similar way. For example, Linux is started with a vary on command of the Network Server Description (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, devices are owned by Linux. OS/400 does not see the devices and cannot directly use them.

Specific iSeries I/O adapters are supported in a 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 IBM marketing configurator supports ordering IOAs without IOPs when a Linux partition is defined using the following feature codes:

- #0601 Linux Direct Attach - #2743 PCI 1Gbps Ethernet IOA
- #0602 Linux Direct Attach - #2760 PCI 1Gbps Ethernet UTP IOA
- #0603 Linux Direct Attach - #2744 PCI 100Mbps Token-Ring IOA
- #0604 Linux Direct Attach - #2763 PCI RAID Disk Unit Controller
- #0605 Linux Direct Attach - #4748 PCI RAID Disk Unit Controller
- #0606 Linux Direct Attach - #4778 PCI RAID Disk Unit Controller
- #0607 Linux Direct Attach - #4838 PCI 100/10Mbps Ethernet IOA
- #0608 Linux Direct Attach - #4745 PCI WAN IOA
- #0609 Linux Direct Attach - #2772 PCI Dual WAN/Modem IOA
- #0611 Linux Direct Attach - #2765 PCI Fibre Channel Tape Controller
- #0612 Linux Direct Attach - #2766 PCI Fibre Channel Disk Controller
- #0613 Linux Direct Attach - #2742 PCI 2-Line WAN IOA
- #0614 Linux Direct Attach - #2793 PCI 2-Line WAN w/Modem
- #0616 Linux Direct Attach - #2805 PCI Quad Modem IOA
- #0623 Linux Direct Attach - #2849 PCI 100/10Mbps Ethernet IOA

The Linux console is a PC connected to the iSeries primary or hosting partition via a TCP/IP LAN. Operations Console with LAN Connectivity, a function of Client Access Express, is required to establish a secure connection to OS/400. 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 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.

iSeries ODBC Driver for Linux

Linux programs written to the ODBC interface can access iSeries database data via an 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 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.
- Supporting code is to be supplied as downloads on the Web.

Suggested reading

For additional information about Linux, refer to the following Web sites:

```
http://www.ibm.com/eserver/iseries/linux
http://www-1.ibm.com/servers/eserver/iseries/linux/odbc
http://www-1.ibm.com/servers/eserver/iseries/service/itc
```

iSeries clustering

Prior to V5R1, 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.

With OS/400 V5R1 and onward, iSeries clusters enable you to set up an environment to provide availability beyond 99.94% for critical applications and 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.

IASPs offer significant functions that allow even more flexibility and improved availability. With V5R1, IFS data can be switched between IASPs. using HSL OptiConnect loop. IASPs allow you to take data offline and bring data online independent of the System ASP and other User ASPs. IASPs also support:

- Journaling of IFS objects, data areas and data queues, and options to reduce the amount of data journaled.
- The system services support of HA Switchable Resources allows the use of resilient device cluster resource groups containing IASPs.
- HSL OptiConnect is supported as a cluster communications fabric.
- Options to adjust the tuning and configuration parameters of your cluster to better match your communications environment.

- IBM Cluster Management Utility allows you to create and manage a simple two-node, switched disk cluster.

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 that represents the application server to a backup node and restart the application in the event of a primary node failure.

Cluster Resource Services includes 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 that 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 works closely with the cluster middleware business partners to provide easy-to-use cluster management applications, including Lakeview Technology and Vision Solutions.

iSeries clusters support up to 128 nodes. Use any of the existing OptiConnect, WAN, and LAN connectivity options can be used to build a cluster. These options include:

- Either SPD fiber or HSL copper and fiber bus connections are fully supported system features. When used with OptiConnect software, they are attractive connectivity methods for high-end and mid-range models existing in the same location. Independent ASPs and switched disk work in this environment as of V5R1.
- 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 that contains the high-availability business partner cluster management application. Install OS/400 V4R4 or later on each node in the cluster.

High Availability Switchable Resources installs as Option 41 of OS/400/ A chargeable option of OS/400, HA Switchable Resources provides the capability to achieve a highly available environment using switchable resources (IASPs). The resources are physically switched between systems so that only one copy of the resource is required.

New with V5R2

OS/400 V5R2 enhances iSeries clustering with additional capabilities including:

- IASPs can now contain OS/400 DB2 library-based objects.
- Groups of IASPs can be linked together.
- Thread relative naming for controlling job attributes.
- Multiple library name spaces allow multiple databases and duplicate library names across name spaces.
- Clustered Hash Table Server enables sharing and replicating of non-persistent data between cluster nodes.
- Clustered Hash Table APIs provide connection control, storage, and retrieval table of entries, and generate keys and information about stored entries.
- Cluster GUI enhancements
- On rejoin, cluster node can start itself.
- Fully supported cluster commands
- User control of automatic failover
- Fully supported cluster commands

Suggested reading

For additional information about clustering, refer to the following Web sites:

`http://www-1.ibm.com/servers/eserver/iseries/ha`
`http://www-1.ibm.com/servers/eserver/iseries/service/itc`

iSeries Windows integration and Microsoft cluster support

iSeries Windows Integration

iSeries Integrated xSeries Server and Integrated xSeries Adapter offerings support Virtual Ethernet LAN, Microsoft Cluster Services, and Automatic Cartridge Loader support. With V5R2, new xSeries models are now supported using the Integrated xSeries Adapter.

Virtual Ethernet LAN

The Virtual LAN introduced in V5R1 to enable high-speed communications between OS/400 and Linux partitions within the iSeries server is extended to support Integrated xSeries Servers and xSeries servers attached with Integrated xSeries Adapters. With this support, Windows servers can communicate with each other and with OS/400 and Linux partitions over the fast, more secure, and reliable Virtual Ethernet LANs.

Microsoft Cluster Services

With the clustering support provided in Windows 2000 Advanced Server, two Integrated xSeries Servers or two xSeries servers attached with Integrated xSeries Adapters can form a cluster and use the 16 new shared storage spaces available with V5R2. In the cluster environment, if there is an outage on one of the Windows servers, the storage spaces can be switched to the second Windows' server and the applications can be automatically restarted to reduce the length of the system outage.

For planning information regarding Windows.NET Standard and Enterprise servers, refer to Product Preview information in Hardware Announcement 102-157, dated 4 June 2002.

Auto Cartridge Loader

Customers who have systems with large amounts of data often have Auto Cartridge Loader (ACL) tape devices (3570, 3580, and 3590) with the ability to automatically load another tape cartridge. Support is now added in the Windows integration support to handle commands for ACLs. Multiple tape cartridges can be accessed during backup/restore operations initiated from the Windows server.

Suggested reading

For additional information about Windows Integration, refer to the following Web site:

`http://www-1.ibm.com/servers/eserver/iseries/windowsintegration`

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 and 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).

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.

For more information, see the High Availability and Clusters Web site at:

`http://www-1.ibm.com/servers/eserver/iseries/ha`

Graphical (GUI) management of a system

iSeries 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.

IBM eServer Technical Support Advantage

An important aspect of technology is its need of effective technical support to help make that technology work for us as people. That is what IBM Technical Support Advantage delivers in this increasingly Web-based world, an easier access to total solutions.

As the part of Technical Support Advantage that covers the iSeries product line, IBM has enhanced 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 @server Technical Support Web sites
- IBM Electronic Services for iSeries
- Universal Connection: ECS over TCP/IP
- PM/400e Integrated with Workload Estimator
- Physical Device Placement Assistant (PDPA)
- Software Inventory Utility (SIU)
- iSeries University
- Web interface to manage software keys
- Enhanced software knowledge base
- Streamlined fix downloads

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 the iSeries servers. Management Central-Pervasive also runs from a Web browser running on PCs or Network Stations.

For more information about Management Central-Pervasive, see “Management Central-Pervasive” on page 768.

Network 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. This makes 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 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 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 system required is a PC with Windows 9x/NT/2000, a TCP connection to the iSeries server over a LAN, and access to the Internet. Selected configurations and setup information are 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 Electronic Customer Support 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

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.

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.

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 Access for Windows

iSeries Access for Windows (5722-XE1 - previously known as Client Access Express) is a component of the iSeries Access Family (5722-XW1). It offers a powerful set of capabilities for connecting PCs to iSeries servers. It also enables end users and application programmers to leverage business information, applications, and resources across an enterprise by extending the iSeries resources to the PC desktop. iSeries Access for Windows 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
- All functions of iSeries Navigator for working with iSeries resources and administering and operating iSeries servers, plus graphical interfaces to work with these iSeries

iSeries Access for Windows is compatible with Windows 98, Windows Me, Windows 2000, Windows XP, and Windows NT 4.0 operating systems.

iSeries Access for Windows is included with OS/400. A license is required to run the PC5250 Display and Printer Emulation and Data Transfer components, a license is not required to install these components. When you acquire the iSeries Access product (5722-XW1), these functions are also available.

Besides PC5250 Display and Printer Emulation and Data Transfer components, all other functions require only an OS/400 license before you can use them.

To receive all the products in the iSeries Access Family order 5722-XW1. If you have not ordered 5722-XW1, you may evaluate the product from the Keyed Stamped Media for 70 days. At the end of the 70-day evaluation period, the

product is disabled if you do not order the product and receive a software license key.

National language versions and multilingual support

The iSeries server with OS/400 is a worldwide product that addresses many country (region)-unique requirements. For different countries (regions)/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 national language versions can be installed on a single iSeries server. Regardless of the national language version, all system commands are in U.S. 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 than 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 a 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 euro currency sign support for those countries (regions) currently supported in the iSeries national language structure who are inside and outside the European Monetary Units (EMU) and whose national standards authorities have approved the appropriate standards.

IBM considers an IBM product to be EuroReady 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 EuroReady.

IBM considers a solution to be EuroReady when solution providers have analyzed the euro requirements, including the need to comply with relevant European Community rules, and built-in appropriate function accordingly.

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`

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. 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 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.

Programs within OS/400

The programs in the following table are part of OS/400. Each program 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 Appendix A, “Referenced lists” on page 885, for a list of all OS/400 options available at V5R2 and V5R1.

Product name	Product number	For further information
Universal DB2 for iSeries	N/A	Chapter 26, “IBM licensed programs: Database accessories” on page 561
Integration with Windows Server	5722-WSV	“iSeries Integration with Windows Server (Base 5722-SS1 as 5722-WSV)” on page 532
TCP/IP Connectivity Utilities for iSeries	5722-TC1	Chapter 27, “TCP/IP Connectivity Utilities (5722-TC1)” on page 597
Client Access Express for iSeries	5722-XE1	Chapter 32, “iSeries Access products” on page 743
IBM Toolbox for Java	5722-JC1	Chapter 29, “IBM licensed programs: Application development products” on page 649
iSeries Developer Kit for Java	5722-JV1	Chapter 29, “IBM licensed programs: Application development products” on page 649
HTTP Server for iSeries	5722-DG1	“HTTP Server for iSeries (5722-DG1)” on page 536
HTTP Server Powered by Apache for iSeries	5722-DG1	“HTTP Server for iSeries (5722-DG1)” on page 536
Performance Manager/400	5722-PM1	“IBM Performance Tools for iSeries (5722-PT1)” on page 788

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 summarizes whether the product is included with the operating system automatically or if it must be ordered separately. The status states whether the product is a chargeable or a no charge feature.

System Openness Includes (5722-SS1 Option 13)

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 IBM Business Partners or iSeries application developers to take advantage of 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.

System Openness Includes (5722-SS1 Option 13)	
Included in base	No
Status	No charge
Related products	CPA toolkit

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 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.

These APIs previously shipped as PRPQ 5799-XTH.

Media and Storage Extension (5722-SS1 Option 18)

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 offline 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.

Media and Storage Extension (5722-SS1 Option 18)	
Status	Charged feature
Included in base	No
Related products	BRMS (5722-BR1) Tivoli Storage Manager (5697-TSM)

Object Connect for iSeries (5722-SS1 Option 22)

Object Connect for iSeries provides support to simply and efficiently move individual objects, entire libraries, or entire integrated file system directories from one iSeries server to another over a standard communications connection. Systems can be connected via standard APPC (using APPN), TCP/IP communications lines (using AnyNet), LAN or an HSL OptiConnect loop (fiber or copper). 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.

Object Connect for iSeries (5722-SS1 Option 22)	
Included in base	Yes
Status	No Charge

OptiConnect for iSeries (5722-SS1 Option 23)

OptiConnect for iSeries provides high-speed transparent access to data through SPD fiber optic bus connections or HSL fiber optic and copper bus connections. It also includes 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.

Using OptiConnect for iSeries among systems sharing the same bus (connected with SPD fiber or HSL fiber/copper cables only) can achieve transport efficiencies not possible with more general purpose, wide-area communications protocols.

With HSL OptiConnect for iSeries, customers can off load the database application CPU cycles of up to 28 iSeries servers given three CECs per loop. However when three CECs are on a loop, no I/O towers can exist on that loop.

The major advantages of OptiConnect for iSeries are realized by customers who are rapidly approaching system capacity limits, and who intend to implement distributed database application servers within a data center or short-distance campus environment. OptiConnect for iSeries is also an integral part of high availability configurations.

When used with the Object Connect for iSeries facility, OptiConnect for iSeries provides a high-efficiency migration aid for the iSeries Advanced Series.

OptiConnect for iSeries (5722-SS1 Option 23)	
Included in base	No
Status	Charged feature

DB2 Symmetric Multiprocessing for OS/400 (5722-SS1 Option 26)

DB2 Symmetric Multiprocessing for OS/400 expands on the parallel capabilities of DB2 UDB for iSeries. This separately priced feature of OS/400 improves 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 provided by this feature help to allow for better and more effective 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. SMP capabilities have existed since the introduction 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.

With the introduction of DB2 Symmetric Multiprocessing, a single database operation can run on multiple processors at the same time or in parallel. These database operations are typically queries. However, parallel processing is also supported for import and export between DB2 UDB for iSeries and other databases.

Parallel index build capability is included in DB2 Symmetric Multiprocessing for iSeries. An index build can use multiple processors at the same time. That is, it works on multiple parts of the index in parallel. This allows significant performance increases in cases where an index is created or rebuilt. It also allows 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 subtasks. Each subtask runs independently on a separate processor. Once the subtasks complete, the results of each subtask are combined to form the complete query result. Because of the advanced, single-level store architecture of OS/400, these subtasks 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.

This process of splitting queries to run in parallel allows for significant performance increases. These performance increases become more pronounced with the addition of more processors. For example, if a query is running in 20 seconds on an iSeries with a dedicated processor, adding a second dedicated processor along with the DB2 Symmetric Multiprocessing feature may

allow this query to run in approximately 10 seconds. Adding two additional processors may allow this query to run in approximately 5 seconds.

This example illustrates how scalable the technology is, which is very important with database parallelism. Scalability governs how much benefit is gained from adding additional processors. Perfect scalability allows for four processors to run a query in one-fourth of the time that a single processor could, as explained in the previous example. The advanced architecture of the iSeries and of OS/400 have enabled DB2 Symmetric Multiprocessing to show industry-leading scalability across all iSeries n-way systems.

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 therefore, 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 subtasks are used for each query. Using fewer subtasks than processors available allows a greater amount of the total system resources to be used by other users. Using more subtasks than available processors 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 Symmetric Multiprocessing for OS/400 (5722-SS1 Option 26)	
Included in base	Nos
Status	Charged feature
Related products	DB2 Multisystem for iSeries

DB2 Multisystem for iSeries (5722-SS1 Option 27)

The iSeries server and DB2 Multisystem provide a scalable solution for data warehousing that spans from the smallest datamart to the largest enterprise data warehouse. DB2 Multisystem allows multiple iSeries servers to be connected to allow the processing power and storage capacity of all the servers to 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.

DB2 Multisystem for iSeries (5722-SS1 Option 27)	
Included in base	No
Status	Charged feature
Related products	DB2 Symmetric Multiprocessing

OS/400 PASE (Portable Application Solutions Environment) (5722-SS1 Option 33)

OS/400 PASE is an integrated runtime that provides simplified porting of selected solution provider UNIX applications. OS/400 PASE complements and expands the iSeries solution portfolio by focusing on rapidly porting UNIX applications to the iSeries platform.

PASE is a library of APIs and system services that enable AIX programs to run in OS/400. It provides a subset of AIX V4.3.3 functionality to support running 32-bit UNIX applications directly on iSeries hardware. PASE includes full support for X-Windows.

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:

- AIX 4.2.1 with 32-bit support
- AIX 4.3 with 64-bit application model
- AIX 5.1 with 32 and 64 bit application model (new with V5R2)

OS/400 PASE exploits the iSeries processor's ability 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 server 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.

OS/400 PASE (5722-SS1 Option 33)	
Included in base	Yes, header and export files extensions are packaged with OS/400 Option 33
Status	No charge feature

New with V5R2

- AIX 5L support
- Linux library support through AIX 5L
- Compile C, C++ programs on V5R2 for PASE (ID)
- PTY, TTY support
- Support for launching JVM from PASE

OS/400 PASE now supports an expanded application development environment. OS/400 PASE has additional installation support and use of the IBM Visualage C++ Professional for AIX V6 (5765-F56) and IBM C for AIX V6 (5765-F57) compiler programs. hese compilers can be installed and used in OS/400 PASE, eliminating the need to compile OS/400 PASE applications on a separate AIX system.

OS/400 PASE programs can now also launch the iSeries integrated JVM. Conversely, the iSeries integrated JVM supports native methods implemented as procedures in an OS/400 PASE executable. It's easier to port AIX applications that use a combination of Java and C/C++ code to OS/400 PASE.

Suggested reading

You can find more information about OS/400 PASE on the Web at:

`http://www.redbooks.ibm.com`
`http://www.iseries.ibm.com/developer/factory/pase`

IBM Print Service Facilities Option (5722-SS1 Options 36, 37, 38)

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 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 therefore, managed by PSF/400 to IPDS printers. V5R1 includes 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 bidirectional 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

The net effect of this level of print management is to ensure each 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 iSeries print management. The Send Network Spooled Files (SNDNETSPLF) command (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.

Applying IPDS to a TCP/IP network restores the same level of print support (as described above) as twinaxial-connected printers. This includes sending standard SCS spooled files across the network.

To create an Intelligent Printer Data Stream (IPDS) printer on the system, you must (after specifying the device type as IPDS) specify AFP(*YES) in the printer device description. Any printer defined as Type(*IPDS) and AFP(*YES) needs 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. All IP-connected IPDS printers must be configured with AFP(*YES) and therefore require PSF/400.

The PSF feature of OS/400 required is based on the speed of the fastest printer measured in Impressions per minute (IPM), not by your CPU size. The number of printers does not matter. The speed of the fastest printer does.

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

New with V5R2

PSF/400 V5R2 includes the following enhancements:

- Printing of two-dimensional (2D) barcodes: PDF417, UPS Maxicode, and Datamatrix. 2D barcodes provide far higher data density (up to 4000 characters) than standard barcodes. 2D barcodes are enabled with DDS keywords and with the iSeries page definition. The target IPDS printer must support IPDS 2D barcoding.
- Support for finishing by group. Operations such as stapling can now be selected within a spooled file, on a group of pages (subdocument) within the spooled file. The finishing operation can be specified dynamically via DDS. In addition, group finishing can be defined using page definition and form definition objects.
- Support for dynamic font selection. The font DDS keyword can now be a variable, enabling fonts to be selected by the application program.
- Support for AFP/IPDS printing of XML data. XML data can be formatted into AFP pages using iSeries page definition objects.
- Support for iSeries IPDS printers, including the IBM Infoprint 2085 and 2105.

The OS/400 option number associated with each tier is represented in this table.

Option number	Feature description
36	1 to 28 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 for Lotus Notes (5722-SS1 Base)

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.

Integration for Lotus Notes (5722-SS1 Base)	
Included in base	No
Status	Not orderable

Integration for Lotus Notes (5722-SS1 Base)	
Included in base	No
Related products	5722-SS1 Integration Services with FSIOP (#2644)

Enhanced Integration with Novell NetWare (5722-SS1 Option 25 and 5722-SA3)

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 regardless of whether there is an IPCS installed on the system. 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 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. An iSeries user's 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 is 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.

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

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 (5722-SS1 Option 41)

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 Simple Cluster Management GUI**: 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 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.

High Availability Switchable Resources, OS/400 (5722-SS1 Option 41)	
Included in base	No
Status	Charged feature
Keyed	yes

High Availability Journal Performance (5722-SS1 Option 42)

For V5R2, there are a number of improvements and additions to journal management. For the most demanding high-availability clustering environments supported by our high availability Business Partners, Journal Standby Mode and Asynchronous Journaling capabilities enable faster failover and reduce performance bottlenecks. Both the Journal Caching feature and the Journal Standby feature are provided by installing OS/400 option 42.

High Availability Journal Performance, OS/400 (5722-SS1 Option 42)	
Included in base	No
Status	Charged feature
Keyed	yes

Journal Caching feature

The Journal Caching feature was available as PRPQ 84486 before V5R2 and is now a standard orderable feature in V5R2.

The Journal Caching feature allows batch applications to substantially reduce the number of synchronous disk write operations performed, thereby reducing overall elapsed batch execution time. Journal caching provides significant performance improvement for batch applications that perform large numbers of add, update, or delete operations against journaled objects. Applications using commitment control will see less improvement (commitment control already performs some journal caching). Journal caching is especially useful for situations where journaling is being used to enable replication to a second system.

Important: We recommend that you do not use journal caching if it is unacceptable to lose even one recent change in the event of a system failure where the contents of main memory are not preserved. This type of journaling is directed primarily toward batch jobs and may not be suitable for interactive applications where single system recovery is the primary reason for using journaling.

Journal Standby feature

You may want to put a journal in standby state if the journal is on a backup system. By having the journal in standby state, a switchover to the target system can be accomplished more quickly because all objects on the backup system can be journaled, therefore allowing the switchover processing to skip the costly step of starting journaling for all objects. At the same time though, the backup system does not incur the overhead of journaling because most journal entries are not deposited when the journal is in standby state.

Using commitment control is not allowed while in *STANDBY state.

Suggested reading

You can find more information on backup and recovery and to learn which journal entries are allowed to be deposited in these states in the iSeries Information Center at:

`http://www.iseries.ibm.com/infocenter`

iSeries Integration with Windows Server (Base 5722-SS1 as 5722-WSV)

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

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

V5R2, V5R1, and V4R5

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 license for the Windows operating system has to be purchased. The software installs as separately licensed program 5722-WSV. The software is included in OS/400 Option 29, Integration with Windows NT Server.

All of the following information is also true for xSeries servers attached to iSeries servers via the Integrated xSeries Adapter.

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 server

  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.

- iSeries Navigator Support for Windows Server Management

  iSeries 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 Integrated xSeries Server includes an Intel 1 GHz 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 integrated server 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

The iSeries servers offer integration with Windows to support larger and more complex Windows applications and additional tools to help reduce the cost of managing a Windows server environment.

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

iSeries Navigator support for Windows disk and user management

Additional facilities are added to iSeries 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, iSeries Navigator now supports disk and user management for these Windows servers. Enhancements include the ability 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.

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)

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.

HTTP Server for iSeries (5722-DG1)	
Included in base	Yes
Status	Shipped with OS/400/no charge feature

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.
- LDAP is used to store configuration information and user authentication information.
- A Domino plug-in allows the HTTP server to access documents stored in Notes.
- Platform for Internet Content Selection (PICS) support enables labels (meta data) 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 WWW activity through the server helps to identify the audiences accessing the customer server.
- Direct WWW access to existing DB2 UDB for iSeries data is provided via an 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.
- 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
- Domino runs “on top of” the IBM HTTP Server.
- A built-in search capability is provided for SBCS and DBCS data.

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)

  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 IBM Business Partners and Customers who are interested in learning about or piloting Java Servlet applications.

Refer to the IBM HTTP Server for iSeries Web page 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.
- These services support SSL:
  - HTTP Server
  - LDAP Server
  - Telnet Server
  - Management Central
  - DDM and DRDA
  - Client Access Servers

– iSeries Navigator

With SSL support, these services can establish secure communication sessions with their corresponding clients. Data exchanged between the clients and servers is encrypted, and, therefore, not subject to eavesdropping.

Net.Currency

- 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 can have built-in Web Registry and Flat File support. Web Registry support allows storage and retrieval of macro variables, giving them persistence across macro boundaries. 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 for iSeries (powered by Apache) (5722-DG1)

iSeries HTTP support includes the Apache HTTP server. Support for Apache is added so that server instances built using the HTTP Server for iSeries (original) 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 configurable

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 enhancements, including the Apache Portable Run-Time and the multiprocessing modules.

HTTP Server for iSeries (powered by Apache) (5722-DG1)	
Included in base	Yes
Status	Supported/freeware

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:
  - 5722-AC3 Cryptographic Access Provider 128-bit for iSeries
  - 5722-CE3 Client Encryption 128-bit
- TCP/IP support
  - Point-to-Point Protocol (PPP) synchronous and asynchronous communication connections span low to high bandwidth connections to the World Wide Web.
  - Serial Line Internet Protocol (SLIP) asynchronous communication connections allow inexpensive, limited bandwidth access to the World Wide Web.

- 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.
- Popular graphical FTP clients and Web server development tools
- Direct database serving to Web browsers allows DB2 UDB for iSeries data to be queried and served (with graphics, if desired) to a Web browser using HTTP Server for iSeries.

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`

The HTTP Server (powered by Apache) now includes the popular ASF Tomcat Servlet Engine. With ASF Tomcat you can serve both servlets and JSPs using an "In Process" or "Out of Process" servlet engine. The following items are delivered as part of this enhancement:

- ASF Jakarta Tomcat 3.2.4
- Compliance with JavaServer Pages (JSP) 1.1
- Compliance with Java Servlet 2.2 specification
- In-process ASF Jakarta Tomcat
- Out-of-process ASF Jakarta Tomcat using mod_jk ajp12 protocol support
- Out-of-process ASF Jakarta Tomcat using mod_jk ajp13 protocol support
- Support of JDK 1.2 and 1.3

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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	V5R2
V3R2	X		
V4R1	X		
V4R2	X		
V4R3	X		
V4R4	X	X	
V4R5		X	X
V5R1			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

The following table indicates which target release can be specified when compiling or saving objects on a given OS/400 system.

Values for the TGTRLS parameter			
Current OS/400 release	***Current**	***PRV**	**Other valid values**
V5R2	V5R2	V5R1	V4R5
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

iSeries Extreme Support Tools

IBM Technical Support Advantage (formerly referred to as Extreme Support Personalized (ESP)) is the IBM comprehensive Technical Service and Support initiative exclusively for iSeries servers. ESP includes Internet support, voice and on-site support, and support that is integrated into the product. For iSeries servers, ESP Tools are organized by the following four categories.

System performance and capacity planning

- **Management Central - Pervasive:** Enables remote monitoring of system performance and status.
- **Online Disk Arms Calculator (ODAC):** Estimates the minimum number of disk arms needed to optimize processor performance.

- **Performance Analysis (iDoctor for iSeries):** Condenses trace data into summary reports and graphs to help isolate performance issues.
- **Performance Management/400 (PM/400e):** Capacity monitoring and reporting to identify resource constraints and plan future growth.
- **Performance Tools/400:** A set of tools for reporting and analyzing performance, with modeling functions for capacity planning.
- **Workload Estimator for iSeries:** Estimates computer resources required for a wide variety of workloads.

Planning and ordering a new system or upgrade

- **Electronic Service Agent Inventory:** This tool is shipped with the iSeries product, and collects machine inventory of hardware and installed software, performance data, and fix level, enabling simplified upgrades.
- **Find and Compare Tools (FACT):** Find models with specific characteristics, look at details, and explore supported hardware upgrade paths.
- **Query Order Status:** Real-Time Manufacturing Electronic Direct Information Access (R-Media) provides real-time manufacturing order status, missing parts and U.S. return parts information.
- **iSeries System Inventory Assistant:** Web-based functions for enabling accurate hardware and software upgrades.
- **View and Install Internet Software Keys:** The Internet Software Keys application allow you to view and install software keys for OS/400.
- **Software Inventory Utility:** Simplifies software upgrade planning by providing a report of installed software.
- **LPAR Validation Tool (LVT):** Assists in the design and validation of an LPAR (logical partitioning) system for supported iSeries servers.

Installing a new/upgrade system or new features

- **Capacity Upgrade on Demand:** A fast method of activating extra processor capacity without disrupting existing operations.
- **Personal Planning Assistant:** Takes the user through a checklist of tasks for physical planning, system planning, and support planning.
- **Physical Device Placement Assistant (PDPA):** Guidance on where components should be placed when added to an existing system.
- **Security Advisor:** Generates a list of recommendations for establishing a system security policy.
- **Site Preparation: Physical Planning:** The process of preparing your business site for the installation of a new server.

- **TCP/IP Setup:** Simplifies the process of connecting a server to the Internet.
- **LPAR API Toolkit:** A set of commands to allow you to more easily retrieve and manage resources on an LPAR system.

The following are invoked from the system, rather than from the Web:

- **EZ Setup:** A part of iSeries Access that guides the user through installation of a new system.
- **Universal Connection wizard:** A part of iSeries Navigator that is used to configure the connection to IBM Electronic Customer Support.

Problem management and fixes:

- **Fix Maintenance Advisor:** Provides assistance on a preventive maintenance strategy that is based on your iSeries or AS/400 environment and applications.
- **Internet PTF Downloads (iPTF):** Allows you to select, order, and download PTFs via the Internet.
- **Problem Reporting:** Allows you to report problems and ask technical questions about OS/400 software.
- **Electronic Service Agent:** Hardware problem reporting predicts and prevents hardware errors by early detection of potential problems and automatic calls to IBM Service when necessary.

Additional hardware and software support options

Contact your local IBM Support Center for additional hardware or software support. Refer to the following Web site for contact information for all IBM locations (worldwide):

`http://www.ibm.com/planetwide/`

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Software terms

This section discusses software migration, upgrade paths, previous release support, terms and conditions, and Software Subscription.

Software on all iSeries servers is processor or user based. Processor-based software is grouped into seven groups P05, P10, P20, P30, P40, P50, and P60. Each server is placed into a group based on its processor and interactive feature. Software pricing is then based on this group for that server. Each server in the hardware section has a software group indicated.

User based pricing depends on the number of actual active users using that software on a system. Keyed software where user pricing is required needs a software key for the “base” license and for the allowed number of users. In some cases after purchasing a certain amount of licences in a particular processor group, the user is then entitled to unlimited use of that software on that system. Where user pricing is applicable, the terms of use are stated in the respective chapters.

OS/400 Version 5 terms and conditions

OS/400 is included in iSeries Model 250, 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. OS/400 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 4 or higher requires a unique OS/400 License Authorization Code (LAC) supplied by IBM. This is an 18-character alpha-numeric code that allows a software product or feature to be used on a specific iSeries server. The OS/400 License Authorization Code, also known as a software key, 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 should be entered at the time of installation. However, the system and software will operate for 70 days without the License Authorization Code. During those 70 days, the system generates daily warning messages requesting that the customer obtain and enter 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 for use of the system.

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.

Many of the program products and optional features also require a software key to function. These are all included in the Keyed Stamped Media distribution.

Keyed Stamped Media distribution

Many OS/400 product features are available on Keyed Stamped Media 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, the software license must be ordered and a software key will be created. Contact your IBM Representative or IBM Business Partner for ordering information.

New Software License Keys are required when the version, release, or modification level of the software changes or the software is transferred to a different system. 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 Hardware Service Manager report.

If a keyed 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.

You can find the V5R1 Keyed Stamped Media product/feature list in “Keyed Stamped Media Distribution” on page 897. The V5R2 Keyed Stamped Media product/feature list is in “V5R2 keyed products” on page 898.

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 and Release upgrades are acquired for customers running in LPAR via Software Subscription just as they are for customers without LPAR.

For customers who perform both a processor group upgrade and a release upgrade at the same time, they must also perform the processor group upgrade for the current product Version and Release, and then upgrade the release to the desired level. The necessary keys are sent automatically with this method.

For customers performing a processor group upgrade following a software release upgrade, contact the key center to request necessary back-level keys at the higher processor group level. Be sure to inform the key center that it is an LPAR machine. Customers with an LPAR machine are entitled to keys for the latest Version and Release they own and for any earlier Version and Release.

When calling the Software Key Center, the customer should have their:

- IBM Customer Number
- Specific product and feature information for requested software keys
- If available, the incomplete Software Key Sheet shipped with their software order
- The Proof of Entitlement document (or IBM Invoice for the software product)
- HW Serial Number for the system they are calling about.

Temporary software keys (20 day usage) will be provided if a permanent software key cannot be provided due to entitlement or other problem areas requiring an IBM Business Partner or IBM Representative support to correct.

Key center contact information			
Site	**Hours**	**Telephone number**	**e-mail address**
U.S.A Boulder, Colorado	Monday through Friday 6 a.m. to 5 p.m., weekends from Friday 5 p.m. to Monday 6 a.m MST	1-800-446-8989	KEYREGS1@vnet.ibm.com
EMEA Copenhagen, Denmark	24 x 7 x 365	45-80-32-16-19	DKIBMK10@ibmmail.com
APS Asia Pacific Sydney, Australia		61-2-9951-9629 Fax 61-2-9951-9791	KEYS@au1.ibm.com
Asia Pacific Tokyo, Japan		81-462-73-6409 Fax:81-462-74-4714	JL04988@jp.ibm.com
Latin America Argentina, Para Argentina, Chile, Colombia, Ecuador, LCR, Peru, Venezuela, and Bolivia	9:00 a.m. to 6:00 p.m.	+54 11 4898 4984 Fax: +54 11 4898 4898 ext. 5287	SWkey@ar.ibm.com

Key center contact information			
Site	**Hours**	**Telephone number**	**e-mail address**
South America Brazil	8:30 a.m. to 6:00 p.m.	0800-787371 Fax: +55 11 885 2263	REGINAS@VNET.IBM.COM
North America Mexico	9:00 a.m. to 6:00 p.m.	+52 5 267 34 26 Fax: +52 5 267 27 09 or +52 5 267 27 01	RIVEROLL@VNET.IBM.COM
North America Toronto, Canada		1-800-426-2255	SWKEYS@ca.ibm.com

For further reference on key centers, see:

`http://www.ibm.com/servers/eserver/iseries/wwkms`

Software Subscription

As of Version 4, customers must purchase Software Subscription, which entitles the customer to all future Version and Release updates that are available during the contract period for any eligible software that the customer has licensed (see the table that follows). Additional product or optional feature licenses, user programs, and/or processor upgrades are chargeable and not included under Software Subscription. Software Subscription is available at prepaid options of one and three years (5733-SW1 and 5733-SW3 respectively). Version and Release updates are not automatically shipped to the customer. As updates are announced, customers have to contact their IBM Representative or IBM Business Partner to order the update.

The price of Software Subscription is based on the tier level of the hardware, regardless of the amount or tier level of software that has been licensed to a system. Most iSeries software is covered by Software Subscription. Customers who did not order Software Subscription when they installed Version 4 or Version 5, or who do not renew their contracts before the renewal date, must either re-license the software or acquire Subscription After License to upgrade to a new version or release. If the customer is at V3R7 or earlier, the upgrade to V4 or later is chargeable. Software Subscription only applies to V4 and higher and should be purchased when first acquiring V4 or later releases.

Suggested reading

For further information on Software Subscription, contact your IBM Sales Representative, refer to the appropriate announcement letter, or see:

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

Eligible products for Software Subscription

The products eligible for IBM Software Subscription for iSeries (5733-SW1 and 5733-SW3) are listed in the following table.

Product ID	Title
5697-G14	DB2 Forms for iSeries V2
5697-G23	DB2 Warehouse Manager for iSeries V7
5697-G24	QMF for Windows for iSeries V7.2
5697-G84	DB2 Table Editor for iSeries V4.2
5697-G85	DB2 Web Query Tool for iSeries V1.2
5722-AC2	Cryptographic Access Provider 56-bit for iSeries
5722-AC3	Cryptographic Access Provider 128-bit for iSeries
5722-AF1	AFP Utilities for AS/400
5722-AP1	Advanced DBCS Printer Support for AS/400
5722-BR1	Backup Recovery and Media Services for iSeries
5722-CE2	iSeries Client Encryption (56-bit)
5722-CE3	iSeries Client Encryption (128-bit)
5722-CM1	Communications Utilities for iSeries
5722-CR1	Cryptographic Support for AS/400
5722-DB1	System/38(TM) Utilities for AS/400
5722-DE1	DB2 UDB Extenders for iSeries V7.1
5722-DFH	CICS(R) Transaction Server for iSeries
5722-DS1	Business Graphics Utility for AS/400
5722-IP1	Infoprint Server for iSeries
5722-JS1	Advanced Job Scheduler for iSeries
5722-MG1	Managed System Services for iSeries
5722-PD1	Application Program Driver for AS/400
5722-PT1	Performance Tools for iSeries
5722-QU1	Query for iSeries
5722-SM1	System Manager for iSeries

5722-SS1	OS/400
5722-ST1	DB2 Query Manager and SQL Development Kit for iSeries
5722-WDS	WebSphere Development Studio for iSeries
5722-XW1	iSeries Client Access Family
5733-B2B	Connect for iSeries
5733-FXD	Integrated Domino Fax for iSeries
5733-ID1	Infoprint Designer for iSeries
5733-PY2	WebSphere Payment Manager for iSeries Version 2.2
5769-AC1	Cryptographic Access Provider 40-bit for AS/400
5769-AC2	Cryptographic Access Provider 56-bit for iSeries
5769-AC3	Cryptographic Access Provider 128-bit for iSeries
5769-AF1	AFP Utilities for AS/400
5769-AP1	Advanced DBCS Printer Support for AS/400
5769-BR1	Backup Recovery and Media Services for AS/400
5769-CB1	ILE COBOL for AS/400
5769-CE1	AS/400 Client Encryption (40-bit)
5769-CE2	AS/400 Client Encryption (56-bit)
5769-CE3	AS/400 Client Encryption (128-bit)
5769-CL3	Application Development ToolSet Client Server for AS/400
5769-CM1	Communications Utilities for AS/400
5769-CR1	Cryptographic Support for AS/400
5769-CX2	ILE C for AS/400
5769-CX5	VisualAge for C++ for AS/400
5769-DB1	System/38 Utilities for AS/400
5769-DC1	DCE Base Services for AS/400
5769-DC3	DCE DES Library Routines for AS/400
5769-DFH	CICS® for AS/400
5769-DP3	DB2 DataPropagator for iSeries V7.1
5769-DS1	Business Graphics Utility for AS/400
5769-FN1	Advanced Function Printing DBCS Fonts for AS/400

5769-FNT	Advanced Function Printing Fonts for AS/400
5769-JS1	Job Scheduler for AS/400
5769-MG1	Managed System Services for AS/400
5769-PD1	Application Program Driver for AS/400
5769-PT1	Performance Tools for AS/400
5769-PW1	Application Development ToolSet for AS/400
5769-QU1	Query for AS/400
5769-RG1	ILE RPG for AS/400
5769-SM1	System Manager for AS/400
5769-SS1	Operating System/400®
5769-ST1	DB2 Query Manager and SQL Development Kit for AS/400
5769-VG1	VisualAge Generator Server for AS/400
5769-WDS	WebSphere Development Studio for iSeries
5769-XW1	AS/400 Client Access Family for Windows®
5798-AF3	Advanced Function Printing PrintSuite for AS/400
5798-FAX	Facsimile Support for iSeries
5798-TBY	Facsimile Support for AS/400

Software Maintenance

Software Maintenance differs from Software Subscription. Software maintenance requires you to purchase maintenance for the individual product separately. Customers that have a prepaid Software Subscription are still eligible for upgrades under the old programs. New customers need to plan their Software Subscription and software maintenance plans.

Software maintenance is not automatically renewed after it expires. It is the customer's responsibility to renew maintenance for the products.

Eligible products for Software Maintenance

Software Maintenance is applicable to the programs listed in the following table. These programs were included in the previous version of Software Subscription but are now under software maintenance.

Product ID	Title	1 Year Maintenance Program ID	3 Year Maintenance Program ID
5639-E45	Personal Communications V5.0	5733-A67	5733-A68
5639-M76	WebSphere Commerce Studio Professional Developer Edition, V5.1	5733-A75	5733-A76
5648-C54	Host On-Demand V4.0	5733-A67	5733-A68
5648-D01	Screen Customizer for Host Integration V1.0	5733-A67	5733-A68
5648-E09	Host Access Client Package for Multiplatform V1.1	5733-A67	5733-A68
5648-E24	WebSphere Transcoding Publisher V3.5 for iSeries	5733-M19	5733-M20
5648-E27	WebSphere Collaborative Profiles, Commerce Suite Edition, V5.1	5733-A75	5733-A76
5648-E66	IBM Express Business Processes for Multiplatforms	5648-E70	5648-E71
5722-RD1	Content Manager On Demand for iSeries	5733-M91	5733-M92
5722-VI1	Content Manager for iSeries	5733-M81	5733-M82
5724-A18	WebSphere Commerce Suite, Pro Edition for iSeries, V5.1	5733-A75	5733-A76
5733-A38	MQSeries for iSeries, V5.2	5733-M27	5733-M28
5733-A47	WebSphere Personalization V3.5 for iSeries	5733-M29	5733-M30
5733-A52	WebSphere Extended Personalization Offering V1.0 AS/400	5733-M31	5733-M32
5733-A53	WebSphere Integration Offering V1.0 AS/400	5733-M33	5733-M34
5733-A56	WebSphere Commerce Studio Developer Edition, V5.1	5733-A75	5733-A76
5733-A61	Host Access Client Package for iSeries V2.0	5733-A67	5733-A68
5733-A63	ADRES eServer	5733-A62	5733-A74
5733-IM3	Intelligent Miner for Data for iSeries V6R1	5733-M87	5733-M88
5733-WA3	WebSphere Application Server V3.5, Advanced Edition for iSeries (128 bit)	5733-M37	5733-M38
5733-WA4	WebSphere Application Server V4.0, Advanced Edition for iSeries	5733-M37	5733-M38
5733-WS4	WebSphere Application Server V4.0, Adv Single Server Edition for iSeries	5733-MA1	5733-MA2
5769-DL1	Dictionaries and Linguistics Tools for iSeries	5733-M89	5733-M90
5769-LNP	Lotus Enterprise Integrator for iSeries	5733-M97	5733-M98

5769-LNT	Lotus Domino Server for iSeries	5733-MS6	5733-MS7
5769-MQ2	MQSeries for AS/400, V4.2	5733-M27	5733-M28
5769-RD1	Content Manager OnDemand for AS/400	5733-M91	5733-M92
5769-VI1	Content Manager for AS/400	5733-M81	5733-M82
5798-NC3	Net.Commerce for AS/400, V3.2	5733-A75	5733-A76
5798-WC4	WebSphere Commerce Suite, Pro Edition for AS/400, V4.1	5733-A75	5733-A76
5798-WC5	WebSphere Commerce Suite, Pro Edition for iSeries, V5.1	5733-A75	5733-A76

Database

Database

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IBM licensed programs: Database accessories

DB2 Universal Database (UDB) for iSeries is the relational database manager that is fully integrated on your iSeries server. Because it is integrated, DB2 UDB for iSeries is easy to use and manage. DB2 UDB for iSeries also provides functions such as triggers, stored procedures, and dynamic bitmapped indexing that serve a wide variety of application types. These applications range from traditional host-based applications to client/server solutions to Business Intelligence applications.

Multiple databases are now supported on an iSeries server through the use of independent disk pools, and you can manage all of the databases on the server using iSeries Navigator.

This chapter describes the accessories available from IBM to complement OS/400's integrated database.

Product name	Product number	Refer to
IBM DB2 OLAP Server for AS/400 Version 7.1	5686-OLP	on page 562
IBM DB2 DataPropagator Version 8.1 for AS/400	5722-DP4	on page 565
IBM DB2 Intelligent Miner for Data for AS/400 V6R1	5733-IM3	on page 567

Product name	Product number	Refer to
IBM Query for AS/400	5722-QU1	on page 571
IBM DB2 Query Manager and SQL Development Kit for AS/400	5722-ST1	on page 572
Query Management Facility (QMF) for Windows for AS/400 Version 7.02	5697-G24	on page 575
IBM DB2 Warehouse Manager for AS/400 Version 7.2	5724-B08	on page 579
IBM System/38 Utilities for AS/400	5722-DB1	on page 581
IBM DB2 DataJoiner Version 2.1.1	5801-AAR Feature #3049	on page 583
DB2 Spatial Extender Version 2.1.1	5803-AAR	on page 586
DB2 Table Editor for iSeries, Version 4.3	5697-G84	on page 587
DB2 Web Query Tool for iSeries V1.3	5697-G85	on page 590
DB2 Universal Database Extenders for iSeries, Version 7.1	5722-DE1	on page 592

IBM DB2 OLAP Server for AS/400 Version 7.1 (5641-OLP)

The DB2 OLAP Server for AS/400, Version 7.1 program comes with a Set of Servers and Optional Application Tools that help you provide a flexible, comprehensive OLAP solution. DB2 OLAP Server is an enterprise-scale, online analytical processing system. It is designed for a wide-range of multidimensional reporting, analysis, modeling, and planning applications.

DB2 OLAP Server uses the Hyperion Essbase engine for:

- Data access
- Navigation
- Application program interfaces (APIs)
- Application design and management
- Application partitioning
- Data calculation

You can choose one of two storage systems:

- Standard relational database management system (RDBMS) using a star schema data structure
- Essbase integrated multidimensional data store

With a *relational data store*, DB2 OLAP Server uses DB2, the industry-leading relational database. It stores fact and dimension tables, which comprise the star schema, to meet your business requirement.

Parallel relational technology can be exploited to deliver improved access performance. The DB2 OLAP Server can be managed by familiar RDBMS system management, backup, and recovery tools, allowing businesses to leverage their investment in existing skill and technology.

Data in the DB2 OLAP Server can be leveraged by Essbase-ready applications and the vast variety of generic Structured Query Language (SQL) access tools. SQL tools can easily join the star schema with existing relational tables in the warehouse for additional reporting and analysis.

With the *Essbase integrated data store*, DB2 OLAP Server provides a high-performance multidimensional data store that is simple to implement.

Regardless of the type of data store used, DB2 OLAP Server can be used with 50-plus Essbase-ready tools provided by independent software vendors (ISVs).

IBM DB2 OLAP Server for AS/400 Version 7.1		
Product number	5686-OLP	
Minimum OS/400 level	V4R4	
Availability	15 December 2000	
Software type	Passport Advantage and Software Maintenance	
Installation prerequisites	Refer to the announcement letter for prerequisites required for the client.	
Related products	Features the same functional capabilities and interfaces as ShowCase Essbase/400 Version 3.0 IBM DB2 OLAP Server Analyzer Version 7.1 (20P4095)	
Replaces product	DB2 OLAP Server for AS/400, Version 1.1 (P/N 11K6742)	
Web link	`http://www.ibm.com/software/data/db2/db2olap/`	

Solutions and benefits

DB2 OLAP Server can be used for management, reporting, analysis, modeling, planning and data warehousing applications. Typical applications include Sales, Profitability, Market share, Supplier Analysis, Executive Information System

(EIS), Financial consolidations, Budgeting, Forecasting, and Enterprise performance measurement.

Features

DB2 OLAP Server includes a comprehensive set of graphical tools for database management, security, and administration for deploying industrial-strength OLAP applications.

Add-on programs

- **Currency Conversion**: Converts financial data using any currency exchange rate scenario.
- **APIs**: Let you use standard tools to create custom DB2 OLAP Server applications that take advantage of the powerful data storage, retrieval, and analytical capabilities of DB2 OLAP Server.
- **Extended Spreadsheet Toolkit**: Includes more than 20 macros and Visual Basic (VB) functions, letting you build custom Lotus 1-2-3 or Microsoft Excel applications that tightly integrate clients with DB2 OLAP Server.
- **DB2 OLAP Server for AS/400 Partitioning Option Version 7.1**: Provides a collection of powerful features that makes it easy to design and administer multidimensional databases (cubes or star schemas) that span OLAP applications or servers.
- **DB2 OLAP Server for AS/400 Builder Version 7.1**: Integrates with the Application Manager and lets you easily build, modify, and maintain analytical models, calculations, data access security, data loading rules, dimension building, and system management functions.

New with Version 7.1

- Bigger cubes can be created within a given batch window.
- You can choose multidimensional or relational storage at the application level.
- Attributes bring your analysis into the next level of details.

Ordering

The DB2 OLAP Server for AS/400, Version 7.1 program has two priced units consisting of the number of installations and the number of concurrent users.

DB2 OLAP Server for AS/400, Version 7.1 Program Package, English 20P4078. The Program Package includes entitlements for one installation and one user.

- Entitlement for 1 Additional Install 20P4079
- Entitlement for 1 Additional User 20P4080

References

Search for “DB2 OLAP Server - Theory and Practices” on the following Web sites:

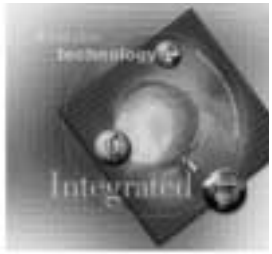
```
http://publib.boulder.ibm.com/html/as400/infocenter.html
http://www.redbooks.ibm.com
http://www-1.ibm.com/servers/solutions/bi/iseries/
http://www-3.ibm.com/software/data/db2/db2olap/index.html
```

IBM DB2 DataPropagator Version 8.1 for iSeries (5722-DP4)

DB2 DataPropagator for iSeries V8.1 provides read-only, update anywhere, and on-demand replication between relational sources and targets. DB2 DataPropagator for iSeries consists of the following autonomous components and programs:

- **Administration**: New Replication Center (included with the DB2 Control Center in DB2 Connect Personal Edition)
- **Capture**: Captures changes made to data on replication sources
- **Apply**: Reads previously captured changed data and applies it to target tables

Note: IBM DB2 DataPropagator Version 7.1 for AS/400 (5769-DP3) is still available for earlier releases of the operating system.

IBM DB2 DataPropagator Version 8.1 for iSeries		
Product number	5722-DP4	
Minimum OS/400 level	V5R2	
Program size	15 MB	
HIPO	1035	
Availability	30 August 2002	
Software type	Software Subscription	
Prerequisites	OS/400 V5R2 The Replication Center requires Windows	

IBM DB2 DataPropagator Version 8.1 for iSeries	
Replaces products	IBM DB2 DataPropagator Version 7.1 for AS/400 (5769-DP3) IBM DB2 DataPropagator Relational for AS/400 V5.1 (5769-DP2) IBM DB2 DataPropagator Relational Capture and Apply OS/400 (5769-DP1)
Web link	http://www.ibm.com/software/data/dpropr/

Solutions and benefits

Companies need sophisticated information integration capabilities to view and analyze multiple aspects of their business. Replication provides the ability to share the same data among multiple locations or multiple business functions. Data replication can consistently deliver the right data, to the right people, at the right time allowing them to improve decision making, increase online throughput, improve data availability, and reduce application costs.

Data replication has proven value in these key application areas:

- Information integration
- Business Intelligence
- e-business
- Enterprise Application Integration (EAI)
- Mobile computing

These areas are all characterized by the need to share access to data in a distributed computing environment. In addition to one-for-one copying of data from source to target, replication allows customers to combine data from multiple sources into a single target location for easy access or analysis.

New with Version 8.1

- Usability improvements
  - A new powerful GUI tool, the Replication Center
  - Greater control over what is captured for each registration
  - Greater control over recapturing data from replicas
  - Reorganization of change data tables and unit of work table upon controlled-end of capture
- Performance improvements
  - Fewer joins between replication tables
  - Optimal memory allocation: Capture keeps historical information for smarter decisions on memory allocation
  - Fewer updates for subscription sets with multiple members
  - Apply program optimizes processing if it has only one subscription set

- New functions
  - Allows multiple sets of Capture Control tables
  - Automated monitoring
  - On-demand monitoring
  - Additional historical data in control tables
  - Long table names and column names
  - More frequent commits by the Apply program
  - Referential integrity for more types of target tables
  - New option for replicating changes to target-key columns
  - New signals to control the Capture program
  - More ways to set operational parameters for the Capture program
  - Rule enforcement
  - Migration utility
- Serviceability improvements
  - New trace facility for Apply program
  - Improved Replication Analyzer program

Ordering

IBM DB2 DataPropagator Version 8.1 for AS/400 uses the IBM processor-based pricing model.

Reference

Search for “propagator” on the following Web sites:

```
http://publib.boulder.ibm.com/html/as400/infocenter
http://www.redbooks.ibm.com
http://www.ibm.com/software/data/dpropr/cmd/as400cmd.html
http://www.ibm.com/software/data/dpropr/
```

IBM DB2 Intelligent Miner for Data for AS/400 V6R1 (5733-IM3)

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. 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.

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 facilitates the iterative analysis process, integrated into the product or for the customer to integrate into their application. 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 “IBM DB2 DataJoiner Version 2.1.1 (5801-AAR)” on page 583).

IBM DB2 Intelligent Miner for Data for AS/400 V6R1		
Product number	5733-IM3	
Minimum OS/400 level	V4R2 V4R3 to support DBCS	
HIPO	N/A	
Availability	25 May 2001	
Software type	Software maintenance One Year 5733-M87 Three Year 5733-M88	
Prerequisites	5733-IM3 is a Client Server Tool. It requires a Windows 95 or higher, or AIX client.	
Related products	IBM DB2 OLAP Server for AS/400 Version 7.1	
Replaces product	IBM DB2 Intelligent Miner for Data V2 (5733-IM2) IBM DB2 Intelligent Miner for Data V1 (5733-IM1)	
Web link	http://www-3.ibm.com/software/data/iminer/	

Solutions and benefits

DB2 Intelligent Miner for Data products provide a wide range of industrial-strength mining technologies within an integrated tool suite. It supports sophisticated data mining as well as application services to support development of customized mining applications. Intelligent Miner enables users to harvest valuable information from enterprise data sources and present that information to business users for analysis and decision making.

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, that is:

- **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 Global Business Intelligence Solutions (GBIS)**: GBIS 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.

Features

Scalable and with support for multiple platforms, the Intelligent Miner for Data provides a single framework for database mining using proven, parallel mining techniques. Business applications for this technology vary widely, and a variety of mining algorithms is provided.

You can use the mining algorithms available in Intelligent Miner for Data in the following ways:

- Clustering for market segmentation, store profiling, and to reveal buying behavior
- Associations enable you to discover product associations in a market basket analysis, site visit patterns for an e-commerce site, and combinations of financial offerings purchased in different geographical areas.
- Sequential patterns reveal buying patterns in a series of purchases made or multiple Web site visits over time.
- Classification algorithms enable you to profile customers based on a desired outcome, such as propensity, to buy high-end electronics.
- Use predictive algorithms to score customers by factors such as likelihood of fraud, credit risk, or propensity to buy.

- Similar time sequences can reveal examples of similar stock price fluctuations over a period of time.

New with V6R1

- A highly interactive Associations Visualizer facilitates the interpretation of mining results produced by Associations Discovery.
- 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.
- 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.

References

You can find the following books in the iSeries Information Center:

- *Using the Intelligent Miner for Data V6.1*, SH12-6394
- *Intelligent Miner for Data V6.1 API* , SH12-6395
- *Intelligent Miner for Data V6.1 Using the Associations Visualizer*, SH12-6396

The Information Center is located on the Web at:

`http://www.ibm.com/eserver/iseries/infocenter`

Search for “intelligent miner” on the following Web sites:

`http://www.redbooks.ibm.com`
`http://www.ibm.com/software/data/iminer/fordata/`

IBM Query for AS/400 (5722-QU1)

Query for iSeries is recommended for non-programming users of 5250-family workstations or remotely attached 3270-family Web links who must extract, display, and format reports containing data from the iSeries database, and merge resulting data into documents.

Query for iSeries Version 5 is a functional superset of AS/400 Query Version 1, with an identical look and feel except for the implementation of the enhancements.

IBM Query for AS/400		
Product number	5722-QU1	
Minimum OS/400 level	V5R1	
Program size	7 MB	
HIPO	1009	
Availability	25 May 2001	
Software type	Software subscription (keyed media) 5733-SW1 or 5733-SW3	
Prerequisites	Any RISC model of the iSeries	
Related products	IBM DB2 Query Manger and SQL development Kit for iSeries (5722-ST1)	
Replaces product	IBM Query for AS/400 (5769-QU1)	
Web link	`http://publib.boulder.ibm.com/iseries/v5r2/ic2924/index.htm`	

Solutions and benefits

Query for AS/400 is an interactive query definition, management, and execution facility that allows users to extract and analyze data from their databases. You can 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 iSeries is also very useful to format reports from DB2 UDB database, regardless of how the data has been acquired. For example, users could use ILE COBOL for iSeries, 5722-WDS, programs with embedded SAA SQL/400 statements to extract the data to a database file, and then format a report containing data using Query for iSeries.

Features

Query for iSeries offers a user-friendly and easy method of extracting data from data base files. All iSeries database files are supported.

- Menu-driven definitions
- A list-processing option for selection assistance
- Run queries interactive or non-interactive
- Report-writing functions for SQL users

New with V5R2

Query for iSeries includes the following enhancements at V5R2:

- Use DB2 UDB for iSeries Predictive Query Governor to control long-running queries
- A redesigned query engine for performance improvement

Ordering

IBM Query for AS/400 is shipped as a chargeable, processor group-based OS/400 Licensed Program Option (LPO).

A software key is required. This software is included on the Distribution Keyed Media CD.

References

For more information on IBM Query for AS/400, see:

`http://www.ibm.com/eserver/iseries/infocenter`
`http://publib.boulder.ibm.com/iseries/v5r2/ic2924/index.htm`

IBM DB2 Query Manager and SQL Development Kit for AS/400 (5722-ST1)

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 application programs in high-level programming languages.

The DB2 Query Manager and SQL Development Kit for iSeries provides an SQL Development Kit for relational database access using programming languages such as C, RPG, COBOL, PL/I, and REXX. The interactive query interfaces, *Query Manager* and *Interactive SQL*, are provided for users to generate queries and reports, and for programmers to test complex SQL statements.

IBM DB2 Query Manager and SQL Development Kit for AS/400		
Product number	5722-ST1	
Minimum OS/400 level	V5R1	
Program size	22 MB	
HIPO	1101	
Availability	25 May 2001	
Software type	Software Subscription (Keyed Media) 5733-SW1 or 5733-SW3	
Prerequisites	Any RISC model of the iSeries or AS/400 except the Model 236	
Related products	IBM Query for AS/400 (5722-QU1)	
Replaces product	IBM DB2 Query Manager and SQL Development Kit for AS/400 (5769-ST1)	
Web link	`http://www-1.ibm.com/servers/eserver/iseries/db2/db2sql.htm`	

Solutions and benefits

The DB2 Query Manager and SQL Development Kit for iSeries provides precompilers and tools to assist in developing SQL applications and queries. Once created, the applications and queries can be restored and run on other systems that do not have this product installed.

A significant advantage of the DB2 UDB for iSeries database manager, along with Query Manager and SQL Development Kit, is that DB2 UDB for iSeries SQL objects are compatible with OS/400 objects.

Features

Most SQL functions may be performed either interactively or in application programs written in one of the following high-level programming languages: RPG, COBOL, C, PL/I, and REXX. Other features include:

- SQL may be used to define tables (physical files) and views (logical files). This is similar to a DDS definition of a file. For example, you can create tables and views that include column/field definitions, such as the name and data attributes. A user may also maintain the tables/files and views.
- SQL statements may be used to perform a query on a table or view. The system will respond with the records that meet the criteria for the columns/fields requested.
- SQL statements may be used to perform maintenance of table/file data by specifying selection criteria and new values.
- The support of SQL allows program developers to write applications that can be easily transported to different IBM system architectures that also support SQL.

Nonprogrammer's functions

Query Manager furnishes a report customizing interface, enabling nonprogrammers to tailor reports separately from the method of extracting the data. This improves productivity by permitting the users to change report design without re-accessing the original database. The resulting report objects are compliant with the OS/400 Query Management CPI and, therefore, are portable to other Systems Application Architecture (SAA) environments.

Components

- **Query Manager**, an interactive query and report generator, allows users to define and run queries accessing DB2 UDB for iSeries databases. Data edit and report capabilities are also provided.
- **SQL Development Kit** provides precompilers and tools for processing SQL statements embedded in the C, RPG, COBOL, PL/I, and REXX programming languages. Support is also included for the Integrated Language Environment (ILE) compilers. Runtime support for the programming languages is provided directly by the DB2 UDB for iSeries database manager.
- **Interactive SQL** is a query environment that allows users and programmers to enter and execute SQL interactively.

New with V5R2

Query Manager and SQL Development Kit for AS/400 includes the following enhancements at V5R2:

- An SQL Assist function in iSeries Navigator helps you create SQL statements that can be used to create and run queries and reports.
- A redesigned query engine that may provide performance improvement for many SQL read-only queries.
- Use DB2 UDB for iSeries Predictive Query Governor to control long-running queries.

Ordering

IBM Query Manager and SQL Development Kit for AS/400 are shipped as a chargeable, processor group-based OS/400 LPO.

A software key is required. This software is included on the Distribution Keyed Media CD.

References

For more information, see the following Web sites:

`http://www.ibm.com/eserver/iseries/infocenter`
`http://www.ibm.com/servers/eserver/iseries/db2/`

Query Management Facility for Windows for AS/400 V7.02 (5697-G24)

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 UDB for iSeries.

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.

Query Management Facility (QMF) for Windows for AS/400 Version 7		
Product number	5697-G24	
Minimum client and OS/400 level	Microsoft Windows (on the Integrated xSeries Server) or client based. Server capable of running OS/400	
Availability	March 2002	
Software type	Software Subscription	
Web link	http://www-3.ibm.com/software/data/qmf/	

Solutions and 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.
- Run more than one query at a time in the foreground or background.
- Query more than one DB2 for iSeries database server at a time.
- 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.
- Call on QMF for Windows services with its API.
- Bring industrial strength to ordinary desktop languages.
- Query in native DB2 syntax (the server's SQL).

- Get the reliability, performance, and security of DB2.
- 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 them from within Windows applications.

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.

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.

Features

QMF for Windows allows the user to specify 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
- DB2 stored procedures
- Creating and running QMF linear procedures

- Command line parameters that allow you to more easily automate startup procedures and integration with other applications, such as Visual Warehouse.
- Enhanced object tracking that 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 that allows you to convert a standard QMF form to an HTML format.
- Specialized form variables for HTML publishing that lets you build advanced Web features into your QMF report, such as hyperlink, e-mail link, and embedding images in reports. Includes a report preview feature.
- Euro currency symbol
- Multiple formatted reports are displayed on your desktop at the same time, while performing other application functions.
- Import/Export data, using the IXF format, allows you to use your QMF query results to create new (or append to existing) DB2 tables.

New with Version 7.02

Key QMF for Windows for iSeries, Version 7.02, enhancements include:

- ODBC connectivity
- Addition of inner, outer, left, right, and full joins in Prompted Query
- Native browser-based charting capability
- SQL Expression Builder
- Support for the @IF REXX function
- Secondary authorization ID improvements
- Improved catalog administration

Ordering

QMF for Windows for AS/400 uses the IBM processor-based pricing model. A license key is distributed on the media with the product.

References

For more information, see the following Web sites:

```
ftp://ftp.software.ibm.com/software/data/qmf/pdfs/r202046.pdf
http://www.ibm.com/servers/eserver/iseries/db2/db2udbprod.htm
http://www.ibm.com/software/data/qmf/library.html
```

You can also find information about QMF for Windows V7 “Try and Buy” on the QMF Web site at:

`http://www.ibm.com/software/data/qmf`

DB2 Warehouse Manager for AS/400 V7.2 (5724-B08)

Data warehousing is the foundation for Business Intelligence and customer relationship management (CRM). 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 V7.2		
Product number	5724-B08	
Minimum OS/400 level	V4R4	
Availability	08 June 2001	
Software type	Passport Advantage	
Installation prerequisites	Warehouse server and administrative client components of DB2 UDB Enterprise Edition V7.1	
Replaces product	5697-VW5 Visual Warehouse 5.2 DB2 Warehouse Manager for AS/400 V7.2 (5697-G23)	
Web link	`http://www-3.ibm.com/software/data/bi/`	

Solutions and benefits

DB2 Warehouse Manager for AS/400 provides access to IBM and non-IBM data source, including Microsoft OLE DB objects and Microsoft Data Transaction Services packages. 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.

Features

- **Data Warehouse Center:** The power of Visual Warehouse and the simplicity of the DB2 Control Center provide a single user interface for Business Intelligence customers.
- **Star Schema Builder:** Within the Data Warehouse Center, the warehouse schema modeler is a specialized tool for generating and storing schema associated with a data warehouse. Any schema resulting from this process can be passed easily as metadata to the OLAP Integration Server, which is part of the OLAP Starter Kit and the DB2 OLAP Server.
- **Process Modeler:** The Process Modeler allows users to graphically link the steps needed to build and maintain data warehouses and dependent datamarts. Dependency relationships, conditional processing, and notifications can all be included in the model. Processes can be scheduled for one-time or repeated execution, or can be triggered by internal or external processes.
- **Enhanced support for creating and changing warehouse target tables:** With DB2 V7R2, the Data Warehouse Center provides additional flexibility for creating and changing warehouse target tables. When a change to a warehouse step creates additional columns, you can have the Data Warehouse Center create automatically the new columns in the target table and map the results of the step to these new columns.
- **New warehouse sources:** With DB2 V7R2, you can access many new and diverse warehouse sources. New warehouse data sources include Microsoft OLE DB objects and Microsoft Data Transaction Services packages.
- **Microsoft OLE DB and Data Transaction Services support:** The Data Warehouse Center now enables you to access data from an OLE DB provider as a DB2 database view. A wizard is provided to create a DB2 OLE DB table function and the DB2 view through which you can access the data.

New with V7.2

DB2 Warehouse Manager for iSeries V7.2 introduces the following key enhancements:

- Data Warehouse Center
- Star Schema Builder
- Process Modeler
- Enhanced support for creating and changing warehouse target tables
- Mandatory fields
- New warehouse sources
- Microsoft OLE DB and Data Transaction Services support

Ordering

DB2 Warehouse Manager for AS/400 V7R1 customers with OS/400 Software Subscription are entitled to a free upgrade to DB2 Warehouse Manager for iSeries V7R2.

Note: Visual Warehouse Versions 3.1 and 5.2 cannot be used with the Data Warehouse Center or the Warehouse Manager. Visual Warehouse products will be uninstalled when DB2 UDB Version 7 products are installed.

A client is also necessary. See announcement letter AP01-1176.

References

For more information about DB2 Warehouse Manager for AS/400, see:

`http://www.software.ibm.com/data/db2/udb/support.html`
`http://www-3.ibm.com/software/data/db2/datawarehouse/`

IBM System/38 Utilities for AS/400 (5722-DB1)

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.

IBM System/38 Utilities for AS/400		
Product number	5722-DB1	
Minimum OS/400 level	V5R1	
Program size	24 MB	
HIPO	1021	
Availability	25 May 2001	
Software type	Software Subscription 5733-SW1 or 5733-SW3	
Replaces product	IBM System/38 Utilities for AS/400 (5769-DB1)	

Solutions and benefits

The System/38 Utilities for AS/400 program provides functions that are compatible with System/38 Release 8 functions to allow applications dependent upon those functions to be migrated to the iSeries server. These functions are also tools used by the application developer on System/38.

Features

Data File Utility/38 (DFU/38) permits users to establish their own data entry application, optimized for their use, and unique to their requirements, similar to the System/38 Release 8 Interactive Database Utilities for OS/400 DFU function.

Query/38 provides the capability to access (but not change) information in database files. The user first creates the Query application by responding to a series of menus and prompts. The application may then be executed to produce the report (printed or displayed) or output to a database file. Query/38 provides compatibility with the System/38 Release 8 Interactive Database Utilities for the OS/400 Query function.

Text Management/38 provides word processing capabilities to migrating System/38 customers with no integrated iSeries office support. Text Management/38 allows users to create, store, retrieve, revise, check document spelling, provide synonyms and automatic hyphenation, and print documents. The user can access the database interactively from the Text Management/38 program at edit time or at print time to include database information in a text document. In addition, forms can be created and filled in on the display or stored in the system for later use.

Ordering

IBM System/38 Utilities for AS/400 is shipped as a chargeable processor group based OS/400 LPO (licensed program option).

This software is processor based. No further enhancements are planned for this product.

Prerequisites

Not supported on the Model 236.

The programs require 10.2 MB of auxiliary storage. The System/38 Environment support must be installed on the iSeries server for the System/38 Utilities for AS/400 to run.

The extended language support provided by Text Management/38 requires the Language Dictionary (5716-DCT) product as a corequisite. This product (5716-DCT) is shipped with the System/38 Utilities product (5722-DB1).

References

For more information about IBM System/38 Utilities for AS/400, see:

`http://www.ibm.com/eserver/iseries/infocenter`

IBM DB2 DataJoiner Version 2.1.1 (5801-AAR)

DB2 DataJoiner Version 2.1.1 allows access to the joining of data from different data sources with a single Structured Query Language 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.

IBM DB2 DataJoiner Version 2.1.1		
Product number	5801-AAR	
Minimum OS/400 level	AIX and Windows NT (on the Integrated xSeries Server) only	
Related products	DB2 Spatial Extender Version 2.1.1	
Replaces product	IBM Data Joiner Version 2.1	
Web link	`http://www-3.ibm.com/software/data/datajoiner/`	

Solutions and benefits

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 (that supports LOBs, such as 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.
- **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.
- **Recursive Global SQL Queries:** DataJoiner supports multi-vendor bills-of-material queries and 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 air fares on multi-hop routes. For example, this query can be formulated using recursive SQL:

Return all possible flights from San Jose, CA, to Perth, Australia, 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.
- **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 UDB for iSeries 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 (DUOW):** This 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.

  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.

  This lightweight, update-anywhere capability with row conflict detection is designed for the Microsoft Office environment. It 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.

Components

DataJoiner runs on a client system. AIX and Windows are supported.

Note: The Lotus Approach database is not included within IBM DB2 DataJoiner Version 2.1.1.

New with 2.1.1

Enhancements to DB2 DataJoiner Version 2.1.1 include:

- Two Phase Commit
- Support for Oracle 8 and Sybase SQL Anywhere
- Transparent Data Definition Language (DDL) support

Ordering

Order DB2 DataJoiner Version 2.1.1 using the program name (5801-AAR), part number (31L0453 for English), and quantity. This entitles the customer to run one installation on a single processor, with access to all DB2 data sources and a single user.

References

For more information, see:

`http://www-3.ibm.com/software/data/datajoiner/`
`http://www.ibm.com/software/data/datajoiner/brochure/index.html`
`http://www-3.ibm.com/software/data/datajoiner/features.html`

DB2 Spatial Extender Version 2.1.1 (5801-AAR)

The DB2 DataJoiner base offering includes a free-of-charge, 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

DB2 Spatial Extender Version 2.1.1		
Product number	5801-AAR	
Minimum OS/400 level	AIX and Windows NT (on the Integrated xSeries Server) only	
Related products	IBM Data Joiner Version 2.1	
Web link	http://www-3.ibm.com/software/data/datajoiner/	

Solutions and benefits

DB2 Spatial Extender allows you to discover and exploit the spatial intelligence of your database. You can store spatial and business data in the same database, and retrieve both kinds of data with the same query. Thus, with DB2 Spatial Extender, your spatial and business data can be integrated, letting you add a location dimension to query results.

Features

- Leverages the power of SQL for spatial data analysis
- Provides functions to query spatial data
- Enhances the intelligence of existing applications by using spatial data as query parameters

Ordering

Charges for DB2 Spatial Extender V2.2.1 are based on server installations and users. To order, specify the product number (5801-AAR) and part number (31L1137). This entitles the user to one server installation and 10 users.

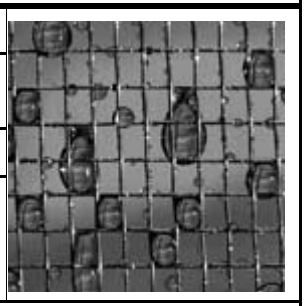
DB2 Table Editor for iSeries, Version 4.3 (5697-G84)

DB2 Table Editor lets you easily support your business processes and empower novice end users, with customized task-specific table editing forms. Database experts get a robust set of tools to perform ad hoc table editing tasks across

multiple databases and platforms. Since end users only need a browser, the solutions you choose to create with DB2 Table editor have maximum reach.

DB2 Table Editor makes it possible to provide direct DB2 database access to anyone, for creating, reviewing, or updating data. Task-specific forms restricted to specific data and actions can be quickly built and rolled out to novice end users An expert interface can be used for browsing existing databases and ad hoc actions.

A Java-enabled browser is all you need on the client machine for using DB2 Table Editor solutions.

DB2 Table Editor for iSeries, Version 4.3		
Product number	5697-G84	
Minimum OS/400 level	V5R1	
Availability	26 July 2002	
Software type	Software Subscription 5733-SW1 or 5733-SW3	
Replaces product	IBM DB2 Forms for iSeries V2 5697-G14	
Web link	http://www-3.ibm.com/software/data/db2imstools/	

Solutions and benefits

DB2 Table Editor supports multiple DB2 database platforms, mission-critical DB2 features, such as existing DB2 security and referential integrity, and advanced DB2 features, like large object support. Customers who need to safely provide data editing and data entry capabilities to end users at the front lines of a business or to database administrators will find DB2 Table Editor a valuable offering.

Features

DB2 Table Editor for iSeries, V4.3 includes the following features:

- Gives database experts tools to perform table editing tasks across multiple databases and platforms
- Provides for general data entry
- Allows customer information self-service via the Web

- Enhanced support for large objects
- Support for new types of forms

New with Version 4.3

Key DB2 Table Editor for iSeries, V4.3 enhancements include:

- **Edit with formulas**: With Table Editor, apply a formula to change a column value in one or more rows.
- **Usability enhancements**:
  - When editing data, the input text size is limited by the column data type and definition.
  - The thousands separator is now displayed in numeric columns.
  - The ability to migrate forms from test to production environment (list and change tables used)
  - For form layout forms, position on last row of result set after reaching the end.
  - The ability to lock columns for list control
  - The ability to work with tables with ROWID columns
  - Object list window can stay open (Windows only).
  - Support for refer back in validation rules.
- **Enhanced support for LOBs**: A new button--Launch LOB--supports the association of a file extension/program for a LOB column. There is also an enhanced internal LOB control that can display additional LOB data types.
- **Previous row support**: The Table Editor Java player now supports the Previous Row button.
- **Support for new types of forms**: Table Editor allows you to create a form without having to associate it with a primary table. This new feature allows you to build new types forms. For example, you can create a “menu form” that simply controls the launching of other forms.

Ordering

DB2 Table Editor for iSeries V4.3 is shipped as a chargeable processor group-based OS/400 LPO.

References

For more information on DB2 Table Editor V4.3, see:

`http://www-3.ibm.com/software/data/db2imstools/db2tools/db2tabledit.html`

DB2 Web Query Tool for iSeries V1.3 (5697-G85)

IBM DB2 Web Query Tool connects all your users directly to multiple enterprise databases, securely and simultaneously, regardless of database size, hardware, operating system, or location.

DB2 Web Query Tool for iSeries V1.3		
Product number	5697-G85	
Minimum OS/400 level	V5R1	
Availability	26 July 2002	
Software type	Software Subscription 5733-SW1 or 5733-SW3	
Prerequisites	DB2 UDB for iSeries Version 4 or later	
Replaces product	DB2 Web Query Tool for iSeries, Version 1.2	
Web link	`http://www-3.ibm.com/software/data/db2imstools/`	

Solutions and benefits

When any part of your business operations require faster, more creative, or more complex data operations, DB2 Web Query Tool is the authoring environment to use. Web Query Tool's advanced SQL functionality extracts the full performance out of DB2 databases while making it easy for users at all levels to access enterprise-wide data. Wherever data access and data integration can bring value, DB2 Web Query Tool can deliver that value. DB2 Web Query Tools are capable of accessing DB2 data on z/OS, iSeries, AIX, Linux, Windows, HP-UX, and Sun platforms. The products run on Web servers, which need not be on the same platform as the database servers.

Features

DB2 Web Query Tool for iSeries Version 1.3 can:

- Connect Web-based users to multiple enterprise database platforms and brands simultaneously
- Use any client via a JDBC connection and Web browser
- Support large objects

New with V1.3

- **J2EE support**: Web Query is now a J2EE-compliant Web application. As such, it can now be deployed on WebSphere V4.
- **Shared catalog**: To avoid having to set up a separate catalog at each location or connection, you can choose to share saved objects (queries and results) in a Web Query catalog.
- **Usability enhancements**: A number of usability enhancements are included in this new release including the ability to save and reuse settings and filters, additional filter specification (including case sensitive filters), a streamlined query execution path, and context-sensitive help. An SQL assistant component is also included that helps less technical users write and run queries.
- **Server-side XSL**: Server-side XSL transformations are now applied to the generated XML or XSL data. It removes all requirements for client side XML translation software components.
- **Stored procedure support**: You can run a DB2 stored procedure by selecting it from the Web Query object tree. You can also run a stored procedure by specifying a CALL statement in your query.
- **Web Services (Simple Object Access Protocol (SOAP))**: A saved query can be published as a SOAP service that any SOAP requester can access.
- **Scalable Vector Graphing**: Result sets can be transformed to graphs or charts using the Scalable Vector Graphics (SVG) model.
- **Large Object Support**: You can retrieve LOB data in Web Query. Web Query can also launch the appropriate viewing application to render the LOB data (picture, video, audio, etc.).

Ordering

DB2 Web Query Tool for iSeries Version 1.3 is shipped as a chargeable processor group based OS/400 LPO.

DB2 Universal Database Extenders for iSeries, Version 7.2 (5722-DE1)

Web-enabled e-business is driving most companies to redefine their IT strategy. Moving away from proprietary data formats toward an open, interchangeable format, such as eXtensible Markup Language (XML), to transact business on the Web is a key part of the strategy.

In this electronic age, the bulk of a company's managed data (90%), including e-mail, technical and business documents, contracts, problem reports, and customer complaints, is still in textual form. Companies continue to look for efficient ways to leverage such massive textual data to provide valuable information.

DB2 Universal Database Extenders for iSeries Version 7.2		
Product number	5722-DE1	
Minimum OS/400 level	V5R2	
Program size	73 - 300 MB + indexes	
HIPO	1004	
Availability	4 June 2002	
Software type	Software Subscription (Keyed Stamped Media) 5733-SW1 or 5733-SW3	
Web link	http://www.ibm.com/software/data/db2/extenders/	

Solutions and benefits

Together, the DB2 UDB XML Extender and DB2 UDB Text Extender help you leverage iSeries to manage your critical business information in DB2 databases to engage in business-to-business (B2B) and business-to-customer (B2C) solutions in the next generation of e-business

Features

It is now possible to combine structured XML information with traditional relational data. You can choose whether to store entire XML documents in DB2 as an XML Character Large Object (XMLCLOB), or you can map the XML content as traditional data in relational tables. The DB2 UDB XML Extender adds the ability for powerful searching of rich data types of XML element or attribute values, even for nontraditional XML data types.

The DB2 UDB XML Extender for iSeries, for the most part, provides the same function as on other DB2 platforms. The exceptions are:

- There is no table function UDF support.
- A uniform CCSID needs to be used among the job, DB2, and XML files.
- The “Getting Started” tutorials are supported using the Operations Navigator interface, and the OS/400 command line.

The DB2 UDB Text Extender provides full-text search through a set of UDFs. These extend the SQL query language by providing additional functionality. It is easy to combine full-text search with parametric search. Text search capabilities depend on index type chosen when the documents are indexed

The Text Extender for iSeries has the following differences:

- The search_result UDF supported on the workstation platforms is not available on the iSeries.
- It is not possible to define referential constraints on tables that are enabled for text search. Text Extender does not support automatic index update for delete of records in a table with defined referential constraints. However, tables containing referential constraints can be enabled for text search.
- The workstation command GET ENVIRONMENT to retrieve the setting of the Text Extender environment variables is not required and not supported on the iSeries.
- It is not possible to index and search on date information and numeric data.

New with Version 7.2

DB2 Universal Database Extenders for iSeries Version 7.2 provides new functions that use the new IASPs provided by the V5R2 operating system. Additional functions improve performance and usability.

DB2 UDB XML Extender enhancements in OS/400 V5R2:

- Allows databases on IASPs to be enabled for XML extender.
- Two new composition stored procedures that return the XML document in a CLOB and does not require a result table
- New extract user-defined functions that return table values. The extracting functions extract the element content or attribute value from an XML document and return the requested SQL data types. As some element or attribute values have multiple occurrences, the extracting functions return either a scalar or a table value. In V5R1, XML Extenders only supported returning scalar values.

Text Extender enhancements in OS/400 V5R2 include:

- The Text Extender can function with a database on the system or user ASP, or with one/several databases on independent ASPs.
- A new SEARCH_RESULT function returns the result of a search in an intermediate table. It can be used in a FROM clause of an SQL statement. This UDF is faster than CONTAINS or RANK when processing large tables.

Ordering

DB2 Universal Database Extenders for iSeries Version 7.1 is shipped as a chargeable processor group based OS/400 LPO.

References

For more information, see:

`http://www-1.ibm.com/servers/eserver/iseries/db2/`

TCP

TCP

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TCP/IP Connectivity Utilities (5722-TC1)

TCP/IP is an extremely popular protocol that is now regarded as the de facto standard for computer networking. TCP/IP is fundamental to the network computing paradigm. Much of the 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.

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.

The TCP/IP communication protocol function, along with related administration and configuration support, are 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 line printer requester (LPR)/line printer daemon (LPD) (remote print support) are part of the TCP/IP Utilities, along with the Pascal-based application programming interface (API). These TCP/IP Utilities are automatically shipped to all customers that order OS/400.

TCP/IP networking on iSeries is administered and managed directly from iSeries Navigator running on a PC client. You can define Dynamic Host Configuration

Protocol (DHCP), Domain Name System (DNS), and Dynamic Domain Name System (DDNS) servers from a single graphical interface.

iSeries TCP/IP configuration can be managed through graphical user interfaces integrated with iSeries Navigator. Included is a graphical wizard that provides simplified step-by-step guidance for configuring TCP/IP. The administration service based on the DHCP is built into OS/400 to centrally administer all workstation configuration data for IP networks. 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. This results in significant improvements in capacity for TCP/IP users.

TCP functions are introduced in this chapter. For a full description, refer to *iSeries IP Networks: Dynamic!*, SG24-6718.

IBM TCP/IP Connectivity Utilities	
Product number	5722-TC1
Minimum OS/400 level	V5R1
Program size	56 MB
HIPO	-
Availability	25 May 2001
Software type	Software Subscription
Related products	Included free of charge with OS/400
Replaces product	5769-TC1
Web link	`http://www-1.ibm.com/servers/eserver/iseries/tcpip`

New with V5R2

For V5R2, many TCP/IP enhancements are implemented with additional security features. TCP/IP is updated to include:

- Enhancements to iSeries Kerberos support
- Enhancements for Digital Signatures
- Implementation of new Java security standards
- Firewall friendly virtual private networks (VPN)
- Enhancements for Cryptographic Accelerators. When installed, it is automatically used by the system to off load compute-intensive public-key

processing to improve cryptographic performance for transactions using Secure Sockets Layer (SSL)/Transport Layer Security (TLS).

- Support for IPv6, the next generation (version) of TCP/IP, via the IPv6 Application Developer's Platform. IPv6 expands the IP address space from 32 bits to 128 bits, and is configured through iSeries Navigator by using a wizard.
- Network Quality of Service (QoS) enhancements including inbound admission policies and policies stored in Lightweight Directory Access Protocol (LDAP)
- Proxy ARP routing for virtual IP interfaces, allowing the iSeries to respond to ARP requests for the virtual IP address
- Remote Access enhancements including PPPoE (Point to Point Protocol (PPP) over Ethernet), and PPP dynamic resource sharing for analog connections. DSL traditionally uses existing copper telephone lines. With PPPoE in V5R2, the iSeries can exploit DSL for Internet access.
- TCP/IP availability improvements: Three new records are added to the TCP/IP QUSRSYS/QATOCTCPIP attributes file to support Network Fast Cache, TCP/IP Close Connection Logging, and TCP minimum retransmit time.

Features

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
- DNS server
- DDNS server
- 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 base protocols are implemented within OS/400 and OS/400 microcode for excellent performance, security, and stability. A wide range of physical interfaces is supported, 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)

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.

TCP interfaces, routes, and APIs

The interface, routing, and APIs functions of TCP are described in this section.

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.

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.

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 Serial Line Internet Protocol (SLIP), PPP, and twinax connections. This is because it can make devices appear to be all logically on the same local LAN subnet. Therefore, it avoids the need to implement either dynamic routing protocols or static route definition.

Application programming interfaces: 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 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.

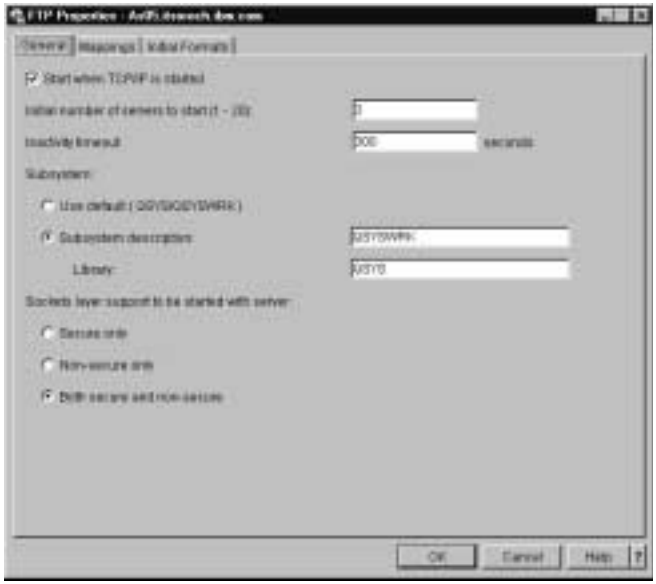
Asynchronous I/O Completion Port support and APIs for OS/400 sockets

TCP/IP includes support for Asynchronous I/O Completion Ports (Async IOCP) as part of the OS/400 socket API 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 using 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 are needed by Async IOPCP-enabled applications.

Sockets on the system are based on and 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 is a security protocol that provides privacy over an open communications network (for example, the Internet). The SSL protocol allows client/server applications to communicate in a way that is designed to prevent eavesdropping, tampering, and message forgery. Many applications on iSeries servers are SSL enabled in V4R4, including TELNET, HTTP server, Client Access/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.

TCP tools and supporting protocols

This section describes the tools and supporting protocols of TCP.

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 supports 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 the security protocols IPSec and IKE are supported. iSeries TCP/IP conforms to all relevant RFCs. Its communications performance characteristics are equal to or better than SNA in most cases.

Network Status (NETSTAT)

Network Status 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 includes the ability to map a socket connection to a list of jobs for that connection.

Trace Route in iSeries Navigator

iSeries 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 iSeries Navigator Lookup hot utility can search a host name for an IP address or 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 iSeries Navigator utility is ideal.

Point-to-Point Protocol

PPP is an open protocol for wide area network (WAN) 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 standard for connecting to the Internet through an Internet Service Provider (ISP). PPP is a more robust alternative to SLIP, when used as a dial-up protocol. PPP IDSN support enables the 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 connectivity

iSeries Navigator improves ease-of-use when configuring and managing Point-to-Point connectivity. iSeries Point-to-Point connectivity features include:

- Multilink 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 used, the PPP connection can 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.

TCP applications

This section describes the TCP applications.

Simple Network Management Protocol (SNMP)

Simple Network Management Protocol 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 subagents 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 perform 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).
- The 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 Quality of Service (QoS)

OS/400 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. 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. In addition, QoS admission control capability is provided for controlling bandwidth management requests. The QoS functions that are 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 wildcards. This support includes a policy agent, and a wizard-based GUI in iSeries Navigator for configuring the QoS policies.
- QoS monitoring APIs and a GUI for monitoring the effectiveness of your QoS policies

TCP/IP servers and services descriptions

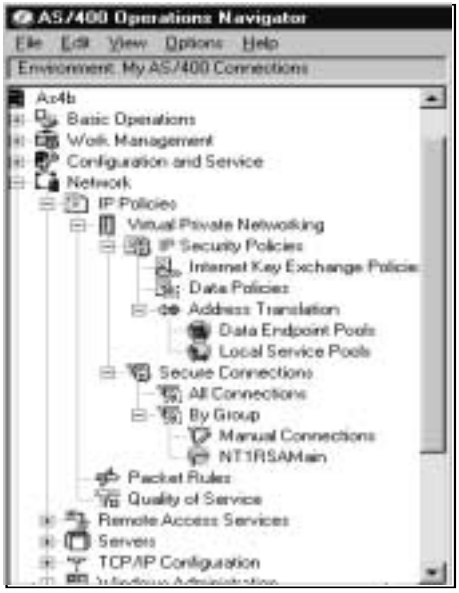
Anonymous FTP

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. Anonymous FTP supports graphical FTP clients and Web server development tools.

File Transfer Protocol client and server

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
- Transferring database files that contain 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.

- Using 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
- Transferring 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 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 request loads simultaneously (for example, after a power outage).

Lightweight Directory Access Protocol 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.

Directory Services implements SecureWay Directory for OS/400. This provides support for LDAP V3. LDAP V3 includes support for internal characters (UTF-8), which is a mixed, multibyte codepage and supports national language data. 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, by 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

Information about iSeries printers and NetServer print shares can 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

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.

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 to 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 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

OS/400 DNS (Domain Name System) services are based on the widely used industry-standard DNS reference implementation. A dynamic update capability is offered that transforms the DNS into a Dynamic DNS (DDNS).

The Version 8.2 BIND option of the DNS services requires the installation of OS/400 Option 33 (PASE).

Combined with iSeries Dynamic Host Configuration Protocol server, dynamic DNS update transactions can be sent to enable an integrated Dynamic IP solution that automatically manages TCP/IP addresses and their associated DNS host names on your networks.

Dynamic Host Configuration Protocol 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.

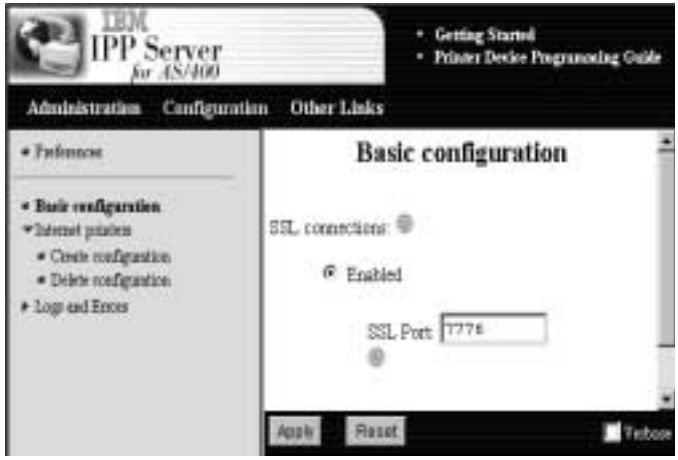
OS/400 includes a full-function DHCP server with an intuitive GUI administrative interface. OS/400 also comes with a DHCP relay agent (also called a BOOT-P relay agent), which can be deployed to route DHCP requests from multiple subnetworks to one or more central DHCP servers.

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, 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 612 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 (region).

The IPP Server for iSeries provides security features for user authentication and encryption of print jobs using Secure Sockets Layer 3.

Line printer requester and line printer daemon

LPR and 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 full-screen modes 3270, 5250, VT100, or VT220. The iSeries Telnet server operates in ASCII line mode or in one of the 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.

A 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 terminals (IBM 3812-1 and IBM 5553-B01) that 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 select a virtual printer device through enhanced negotiation or via assignment by the initialization exit program.

A Telnet server supports secure Telnet sessions via SSL.

TCP security protocol and support

TCP security protocol and support are described in this section.

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, 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.

Transport Layer Security support on iSeries

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 IBM 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 VPN support provides additional security, greater reliability, improved performance. iSeries Navigator allows you to intuitively navigate VPN configurations. 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 to use in VPN configurations to authenticate the identities of the VPN endpoints. An integral part of iSeries VPN is IP packet filtering, which allows filter activation and deactivation on a per-interface basis.

iSeries VPN support is based on industry standards that include:

- IP Security Protocol (IPSec)
- Internet Key Exchange (IKE)
- Layer 2 Tunneling Protocol (L2TP)

The iSeries 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

Layer 2 Tunneling Protocol

Layer 2 Tunneling Protocol 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 uses Point-to-Point Protocol to complete the connection at the network layer. L2TP is typically used in conjunction with virtual private networks 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 automatically initiates a tunnel to connect to the remote system that 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 acts as both an LNS to one or more LACs at the same time as acting as an 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, and therefore, reduce network costs. This represents another improvement to the overall TCP/IP enablement package for iSeries that can be accessed through the industry standard Sockets API.

WebSphere

WebSphere

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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
IBM WebSphere Application Server Version 4.0, Advanced Edition for iSeries (128-bit)	5733-WA4	“WebSphere Application Server V4 Advanced Edition for iSeries (5733-WA4)” on page 628
IBM WebSphere Commerce for iSeries 5.4	5733-WC5	“IBM WebSphere Commerce for iSeries, V5.4 (5733-WC5)” on page 631
IBM WebSphere Payment Manager for iSeries V3.1	5733-PY3	“IBM WebSphere Payment Manager for iSeries V3.2 (5733-PY3)” on page 636
Connect for iSeries	5733-B2B	“Connect for iSeries 1.1 (5733-B2B)” on page 639

Product name	Product number	Refer to
IBM WebSphere Host Publisher for iSeries	5648-D31	Now part of iSeries Access and WebSphere Host Integration
IBM WebSphere Personalization for iSeries, V4.0	5733-A69	“IBM WebSphere Personalization for AS/400, V4.0” on page 643

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:

- **WebSphere Application Server, Advanced Single Server Edition**: This is a Java application server based on a servlet-based engine that turns your existing Web server (IBM HTTP Server for iSeries) into a Java Web application server. As the core element of the Application Framework for e-business, Advanced Edition, single server option is the foundation of the WebSphere application server family.
- **WebSphere Application Server Advanced Edition**: This is a powerful Java-based development and deployment environment for e-business applications. WebSphere Advanced Edition provides 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 support Servlets, JavaServer Pages (JSP), Enterprise JavaBeans, and more.

Some iSeries customers want a basic, no-cost Web application server that supports servlets and JavaServer 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, do not consider Jakarta Tomcat as an alternative Web application server. Examples of IBM products that require WebSphere Application Server as the base Web application server include WebSphere Commerce, 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, is not J2EE compliant, and does not provide Domino integration.

Suggested reading

For more information, see *iSeries e-business Handbook: A Technology and Product Reference*, SG24-5694.

WebSphere Application Server Standard Edition for iSeries (128-Bit) Version 3.5 (5733-AS3)

WebSphere Application Server Standard Edition for iSeries is a deployment environment for e-business applications. 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.

WebSphere Application Server Standard Edition for iSeries (128-bit)		
Product number	5733-AS3	
Minimum OS/400 level	V4R5	
Program size	650 megabytes	
Availability	25 May 2001	
Software type	Part of OS/400 under Software Subscription	
Installation prerequisites	http://www-1.ibm.com/servers/eserver/iseries/software/websphere/wsappserver/docs/as400v35std/docs/instprrq.html	
Replaces product	5733-AS2 WebSphere Applications Server V3.0.2 5769-AS1 WebSphere Applications Server	
Web link	http://www-1.ibm.com/servers/eserver/iseries/software/websphere/wsappserver/indexSE35.html	

Solutions and 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 that supports 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 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 and 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 using 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 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) Version 3.5 (5733-AS3)” on page 621 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.

New with Version 3.5

WebSphere Application Server Version 3.5, Standard Edition for iSeries, features include:

- 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
- Improved usability for administration

Ordering

WebSphere Application Server Standard Edition for iSeries 3.5 is shipped as a free OS/400 LPO. The V3.5.6 FixPak is now available via a Group PTF and should be applied after the LPO is installed.

Prerequisites

Use the IBM Workload Estimator for iSeries to help with sizing all system configurations:

`http://www-912.ibm.com/servlet/EstimatorServlet`

Systems hosting applications using servlets and JavaServer Pages only:

- Any of the following iSeries servers (recommended minimum):
  - Model 270 with processor feature #2248
  - Model 820 with processor feature #2395
- 512 megabytes of memory (recommended minimum)

References

For more information about WebSphere Application Server Standard Edition for iSeries, see:

- *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
- `http://www-1.ibm.com/servers/eserver/iseries/software/websphere/wsappserver/`
- `http://www-1.ibm.com/servers/eserver/iseries/software/websphere/wsappserver/services/service.htm`

IBM WebSphere Application Server V4.0, Advanced Single Server Edition for iSeries (5733-WS4)

WebSphere is a set of software products that help you develop and manage high-performance Web sites to ease the transition from simple Web publishing to advanced e-business Web applications.

WebSphere Application Server, Advanced Single Server Edition V4.0, is a Java application server based on a servlet-based engine that turns your existing Web server (IBM HTTP Server for iSeries) into a Java Web application server. As the core element of the Application Framework for e-business, Advanced Edition, single server option is the foundation of the WebSphere application server family. It offers application developers a solution to build, deploy, and manage e-business Web sites.

WebSphere Application Server, Advanced Single Server Edition, provides companies with an open, standards-based Web server deployment platform and supports servlets and JSP components. WebSphere Application Server also offers XML document services that implement server-side SML document processing and support to enable iSeries to run Enterprise JavaBeans (enterprise beans). Advanced Edition, single server option provides an excellent way to put your business on the Web.

IBM WebSphere Application Server V4.0, Advanced Single Server Edition for iSeries	
Product number	5733-WS4
Minimum OS/400 level	V4R5
Program size	650 megabytes
Availability	19 October 2001
Software type	Software Maintenance
Installation prerequisites	`http://publib.boulder.ibm.com/was400/40/AE/english/docs/iicprrq.html`
Related products	DB2 Query Manager and SQL Development Kit (5769-ST1)
Replaces product	5733-WA3 WebSphere Applications Server Advanced Edition V3.5 5733-WA3 WebSphere Applications Server Advanced Edition V3.0.2 5733-WA2 WebSphere Applications Server Advanced Edition V3.0
Web link	`http://www-3.ibm.com/software/webservers/appserv/`

Solutions and benefits

WebSphere Application Server, Advanced Single Server Edition for iSeries, is a leading commercial business server that offers the best of two worlds:

- Outstanding server for robust commercial applications
- Great server for modern e-business applications
- Features the proven strengths of iSeries:
  - Reliability
  - Scalability
  - Security
- Positions you for new technologies:
  - Web
  - Java
  - XML
  - Domino
  - Windows NT Integration
  - Business Intelligence
  - Wireless
- Powerful interoperability between Web services and J2EE-enabled solution offerings for:
  - Collaboration
  - B2B
  - Portal serving
  - Content management
  - Commerce
- Pervasive computing

Features

- Java 2 Enterprise Edition (J2EE) 1.2 support including robust integration and transaction technology
- Full Web services: SOAP, UDDI, WSDL, and XML
- Performance enhancements including dynamic reload of EJBs, dynamic caching (multi-tier), and JNDI caching
- A new single-server configuration featuring browser-based administration
- Enhanced Java, leveraging Java 2 Platform V1.3
- Usability enhancements throughout the product

- Support for JavaServer Pages:
  - Support for specifications 1.1
  - Extended tagging support for queries and connection management
  - An XML-compliant DTD for JSPs
- Support for Java Servlet API specification 2.2 including automatic user session and user state management
- High-speed pooled database access using JDBC
- XML server tools, including a parser and data transformation tools
- XSL support
- Improved integration with IBM VisualAge for Java and WebSphere Studio to help reduce development time by allowing developers to remotely test and debug Web-based applications
- Full support for the Enterprise JavaBeans (EJB) 1.1 specification, including both session beans and entity beans (container-managed and bean-managed persistence)

Ordering

The IBM WebSphere Application Server V4.0, Advanced Single Server Edition for iSeries (5733-WS4 or P/N 29P4603), is shipped as a chargeable OS/400 LPO product:

- Maintenance 1-year (5733-MA1)
- Maintenance 3-year (5733-MA2)

Prerequisites

Systems hosting applications using enterprise beans require:

- Any of the following iSeries servers (recommended minimums):
  - Model 270 with processor feature #2252
  - Model 820 with processor feature #2396
- 1 GB of memory (recommended minimum)

Systems hosting applications using servlets and JavaServer Pages only require:

- Any of the following iSeries servers (recommended minimums):
  - Model 270 with processor feature #2250
  - Model 820 with processor feature #2395
- 512 MB of memory (recommended minimum)

References

You can search for “WebSphere V4” on the following Web site:

`http://publib-b.boulder.ibm.com/Redbooks.nsf/Portals/AS400Redbooks`

You can find the prerequisites for installing and running WebSphere Application Server at the following Web site:

`http://publib.boulder.ibm.com/was400/40/AEs/english/docs/iicprrq.html`

WebSphere Application Server V4 Advanced Edition for iSeries (5733-WA4)

IBM WebSphere Application Server V4.0 Advanced Edition is a comprehensive Java technology-based Web application server providing integrated support for key Web services open standards and full Java 2 platform Enterprise Edition (J2EE) V1.2.1 compatibility. As the foundation of the WebSphere software platform, WebSphere Application Server provides the core software to deploy, integrate, and manage e-business applications.

WebSphere Application Server Version 4.0, Advanced Edition for iSeries enables IBM HTTP Server for iSeries to serve servlets and JavaServer Pages. WebSphere Application Server also offers eXtensible Markup Language document services that implement server-side XML document processing. WebSphere Application Server also provides support to enable the iSeries to run Enterprise JavaBeans (enterprise beans).

IBM WebSphere Application Server V4 Advanced Edition for iSeries		
Product number	5733-WA4 p/n 20P4303	
Minimum OS/400 level	V4R5	
Program size	650 megabytes	
HIPO		
Availability	14 August 2001	
Software type	Software Maintenance	
Installation prerequisites	`http://www-3.ibm.com/software/webservers/appserv/doc/latest/prereq.html`	
Related products	DB2 Query Manager and SQL Development Kit (5769-ST1)	

IBM WebSphere Application Server V4 Advanced Edition for iSeries	
Replaces product	5733-WA3 WebSphere Applications Server Advanced Edition V3.5 5733-WA3 WebSphere Applications Server Advanced Edition V3.0.2 5733-WA2 WebSphere Applications Server Advanced Edition V3.0
Web link	http://www.ibm.com/servers/eserver/iseries/software/websphere/wsappserver/

Solutions and benefits

WebSphere Advanced Edition builds on and enhances Single Server Edition with additional support for scaling Web sites into security-enhanced, transactional e-business application sites.

Features

- Java 2 Enterprise Edition (J2EE) 1.2.1 support including robust integration and transaction technology
  - Integrated support for key Web services open standards, including SOAP, UDDI, WSDL, and XML
  - Support for multiple machine topologies
  - Performance enhancements including dynamic reload of EJBs, dynamic caching (multi-tier), and JNDI caching
- Enhanced Java, leveraging Java 2 Platform V1.3
- Usability enhancements throughout the product
- Support for JavaServer Pages:
  - Support for specifications 1.1
  - Extended tagging support for queries and connection management
  - An XML-compliant DTD for JSPs
- Support for Java Servlet API specification 2.2 including automatic user session and user state management
- High-speed pooled database access using JDBC
- XML server tools, including a parser and data transformation tools
- XSL support
- Improved integration with IBM VisualAge for Java and WebSphere Studio to help reduce development time by allowing developers to remotely test and debug Web-based applications

- Full support for the Enterprise JavaBeans (EJB) 1.1 specification, including both session beans and entity beans (container-managed and bean-managed persistence)
- Deployment support for EJBs, Java servlets, and JSPs with performance and scalability improvements, including:
  - Application-level partitioning
  - Load balancing
- Support for distributed transactions and transaction processing
- Management and security controls, including:
  - User and group level setup
  - Method level policy and control
- Supports real time performance data analysis (Resource Analyzer)

New this release

- J2EE roles-based authorization
- J2EE Web application (.war file) Web Seal of the IBM Policy Director product
- JavaServer Pages 1.1
- Support for EJB V1.1
- Customer Service Support
- WebSphere connection pooling and support for dynamic reloading of EJB components
- Java-based installation including “silent” install
- HTTP Transport Support
- X ML Parser XML4 V3.1.1
- Performance monitoring Interface (PMI) APIs
- Support for bean-managed and container-managed persistence storage, with EJB and container services
- Enhanced support for protocol and APIs

Ordering

WebSphere Application Server Version 4.0, Advanced Edition for iSeries (5733-WA4 or P/N 20P4303), is shipped as a chargeable OS/400 LPO:

- Maintenance 1-year (5733-M37)
- Maintenance 3-year (5733-M38)

Prerequisites

Systems hosting applications using enterprise beans, servlets, and JSP files require the following hardware configuration:

- Any of the following servers (recommended minimums):
  - iSeries Model 270 with processor feature #2252
  - iSeries Model 820 with processor feature #2396
- 1 GB of memory (recommended minimum)

Systems hosting applications using only servlets and JSP files require the following hardware configuration:

- Any of the following iSeries servers (recommended minimums):
  - Model 270 with processor feature #2250
  - Model 820 with processor feature #2395
- 512 MB of memory (recommended minimum)

References

Search for “WebSphere V4" on the following Web site:

`http://publib-b.boulder.ibm.com/Redbooks.nsf/Portals/AS400Redbooks`

You can find the prerequisites for installing and running WebSphere Application Server at the following Web site:

`http://publib.boulder.ibm.com/was400/40/AE/english/docs/iicprrq.html`

IBM WebSphere Commerce for iSeries, V5.4 (5733-WC5)

IBM WebSphere Commerce for iSeries V5.4 is a complete e-Commerce solution for your Business-to-Consumer (WebSphere Commerce Professional Edition (WCPE)) or Business-to-Business (WebSphere Commerce Business Edition (WCBE)) Web sites.

WebSphere Commerce V5.4 is a comprehensive set of integrated software components that help to build, maintain, and manage stores to sell goods and services on the Web. It also allows for business-to-consumer or business-to-business transactions. V5.4 builds on the reputation for dependability, scalability, and performance by adding new capabilities beyond V4.1 in an industry-standard Java base. Marketing and sales teams can attract and retain customers, and store developers can create and maintain their stores using an improved set of tools.

WebSphere Commerce V5.4 includes the following components:

- **WebSphere Commerce Server** handles the store and commerce-related functions within your e-commerce solution.
- **Store Services** provides a central location for creating, customizing, and maintaining certain operational features of a store.
- **Loader package** allows the initial load of product information through ASCII and XML files, as well as incremental updates of complete or partial information. Online catalogs are updated using this tool.
- **WebSphere Commerce Accelerator** is used to manage your store and to facilitate your business strategies. WebSphere Commerce Accelerator delivers function for operating an online store, such as store and product management, marketing, customer orders, and customer service.
- **WebSphere Commerce Administration Console** allows a Site Administrator or Store Administrator to perform tasks related to site and store configuration, including:
  - User and group management (access control)
  - Performance monitoring
  - Messaging configuration
  - IBM WebSphere Payment Manager functions
  - Brokat Blaze Rules administration

WebSphere Commerce V5.4 provides more choice, function, power, flexibility and scalability than previous versions of WebSphere Commerce Suite (WCS). Make your products and services available worldwide with WebSphere Commerce Professional Edition and WebSphere Commerce Business Edition for iSeries.

IBM WebSphere Commerce for iSeries V5.4		
Product number	5733-WC5	
Minimum OS/400 level	V4R5	
Program size	1.25 Gigabyte	
HIPO		
Availability	29 March 2002	
Software type	Software Maintenance	
Related products	IBM WebSphere Payment Manager V3.1 (5733-PY3)	
Replaces product	IBM WebSphere Commerce Suite Pro Edition for AS/400 V5.1 IBM WebSphere Payment Manager for iSeries (5722-PY2) V2.2	

IBM WebSphere Commerce for iSeries V5.4	
Web link	http://www.ibm.com/servers/eserver/iseries/software/websphere/wsappserver/

Features

WebSphere Commerce for iSeries offers the following features:

- Java-based Commerce Server
- Multicultural support
- Payment Manager with SET Secure Electronic Transaction support including CyberCash and VisaNet cassettes
- Pervasive computing enablement
- WebSphere Application Server Advanced Edition
- Advanced store development tool
- WebSphere Commerce Suite Accelerator for business users
- Advanced relationship marketing including rules-based personalization
- Auctions (open cry, sealed bid, and Dutch bid)
- WebSphere Commerce Analyzer and Macromedia LikeMinds

Solutions and benefits

Tap into the vast Internet market and increase your business by creating an e-commerce site with WebSphere Commerce for iSeries V5.4:

- Implement a complete e-commerce solution, including payment processing and fulfillment.
- Conduct business-to-consumer or business-to-business transactions.
- Engage in mobile commerce.
- Improve your business and extend your reach:
  - Reduce the cost of sales transactions.
  - Attract and retain customers with enhanced relationship marketing.
  - Create and manage marketing campaigns and promotions with WCS Accelerator.
  - Track shoppers' past purchasing activities for improved customer service.
  - Use WCBE to provide online buyer/seller collaboration and advanced user management and access control.

WebSphere Commerce for iSeries V5R4 enhancements

Security enhancements include improved password validation, migrating of password changes, logon timeout, re-entry of passwords, cross-site scripting attack prevention, HTTP, and request tracing.

For your business-to-consumer site, functional improvements include enhancements in several areas:

- Order management
- Catalog Management Interface and Editor Tool
- Commerce accelerator
- Live help collaboration
- Commerce Analyzer
- Auctions
- Payment management

For your business-to-business site, the enhancements include:

- Business-to-business store model
- Additional payment types

The following features are only available in WCBE:

- Sell-side managed contracts
- Sell-side Request for Quotation (RFQ)
- Approvals workflow
- Requisition lists
- Business-to-business store model
- Advanced organizational management
- Advanced user management and access control
- Additional payment types
- Online buyer-seller collaboration

Products included with WebSphere Commerce for iSeries V5.4

The following products are packaged with WebSphere Commerce V5.4:

- WebSphere Commerce Components
  - WebSphere Commerce Server
  - WebSphere Commerce Accelerator
  - WebSphere Catalog Manager
  - WebSphere Commerce Administration Console
  - Product Advisor
  - Blaze Rules Server and Blaze Innovator Runtime
  - Macromedia LikeMinds client
- WebSphere Application Server V4.0

- IBM WebSphere Payment Manager V3.1.2, which includes:
  - Payment Manager SET Cassette V3.1.2
  - Payment Manager Cassette for CyberCash V3.1.2
  - Payment Manager Cassette for VisaNet V3.1.2
  - Payment Manager Cassette for BankServACH V3.1.2
- IBM WebSphere Commerce Analyzer V5.4
- Brio Broadcast Server V6.2
- IBM SecureWay Directory Server V3.2.1
- Segue SilkPreview V1.0
- WebSphere Commerce V5.4 Recommendation Engine powered by LikeMinds
- QuickPlace V2.9.8
- Sametime V2.5

Ordering

IBM WebSphere Commerce for iSeries V5.4 (5733-WC5) is shipped as a chargeable OS/400 LPO:

- Maintenance 1-year (5733-A75)
- Maintenance 3-year (5733-A76)

Prerequisites

- Hardware requirements:

  The recommended minimum is WebSphere Commerce for iSeries V5.4. The requirements for most customers are 1.25 GB free disk space for program files and a minimum of 1 GB memory running on one of the following processors:

  - iSeries Model 270 processor #2252 with a CPW rating of 950
  - iSeries Model 820 processor #2396 with a CPW rating of 950
  - CD-ROM drive to install the product and a workstation for WebSphere Commerce Studio. The workstation must be an IBM PC, or compatible, server with Pentium microprocessor at 733 MHz or higher and:
    - 512 MB RAM
    - 1 GB free disk space for program files
    - CD-ROM drive
- **Software requirements:** WebSphere Commerce for iSeries requires:
  - OS/400 V5R1 (5722-SS1), which includes:

- DB2 Universal Database (UDB) for iSeries V5R1
- HTTP Server for iSeries V5R1 (5722-DG1)
- Crypto Access Provider for iSeries V5R1 (5722-AC3)
- Digital Certificate Manager (5722-SS1 Option 34)
- Qshell Interpreter (5722-SS1 Option 30)

– iSeries Development Kit for Java V5R1 (5722-JV1), including Java Developer Kit 1.3

– DB2 Query Manager and SQL Development Kit for iSeries (5722-ST1)

– iSeries Toolbox for Java (5722-JC1)

– TCP/IP Connectivity Utilities for iSeries, V5R1 (5722-TC1)

– Lotus Domino for iSeries (5722-LNT) to use Domino

– E-mail and discussion database from WebSphere Commerce

– For WebSphere Commerce Administrator and Accelerator, Internet Explorer, V5.5

– iSeries Access Family (5722-XW1 and 5722-XE1) (recommended)

– Payment Manager for iSeries (5733-PY3) V3.1.2

– WebSphere Application Server (5733-WA4) V4.0

Note: Payment Manager for iSeries (5733-PY3) V3.1 and WebSphere Application Server (5733-WA4) V4.0 are shipped with the product WebSphere Commerce Professional and Business Editions (5724-A18) V5.4.

References

For more information, see:

- *e-Commerce Patterns Using WebSphere Commerce Suite, Patterns for e-business Series*, SG24-6156
- *e-Marketplace Pattern using WebSphere Commerce Suite, MarketPlace Edition Patterns for e-business Series*, SG24-6158
- `http://www-1.ibm.com/servers/eserver/iseries/software/`

IBM WebSphere Payment Manager for iSeries V3.2 (5733-PY3)

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.

Note: IBM WebSphere Payment Manager for iSeries, V3.1 is only available as part of WebSphere Commerce Suite.

IBM WebSphere Payment Manager for iSeries V3.2		
Product number	5733-PY3	
Minimum OS/400 level	V4R5	
Program size	255 MB	
Availability	25 May 2001	
Software type	Passport Advantage (Software Maintenance)	
Installation prerequisites	IBM WebSphere Application Server for iSeries, Version 3.5 Standard Edition (5733-AS3) or Advanced Edition (5733-WA3) IBM Crypto Access Provider 128-bit for iSeries V5R1 (5722-AC3)	
Replaces product	IBM WebSphere Payment Manager for AS/400V 2.1 and V2.2 IBM Payment Server (5733-PY2)	
Web link	`http://www.ibmlink.ibm.com/ussman?parms=H_5733-PY2`	

Solutions and benefits

This solution is ideally suited for customers that use payment transactions over the Web:

- Banks
- Financial institutions
- Internet Service Providers
- Commerce Service Providers
- Others that offer payment service to e-commerce merchants

Medium, large, and enterprise businesses need planning, consulting, implementation services, management, and customizing to integrate payments into business processes:

- Payment processing integrated into business applications such as accounting, inventory management, and shipping (ERP candidate).
- Customer relationship management - Customer Call Centers: Customer orders for goods or services are placed and payments are initiated.

- Security and protection of critical business data

Payment Manager users benefit from:

- Ease of adding, modifying, removing, and provisioning remote merchants
- A Multipayment Framework (MPF), the ability to add new payment methods (cassettes) to the system and deploy for merchant use
- Dynamic configuration updates without system disruptions
- Capability to host a payment service for multiple remote merchants
- A browser-based user interface with security to manage multiple merchants with individual business data privacy, protection, and integrity
- Tivoli-ready network management support
- Multilevel trace capability to enhance serviceability
- Ability to select specific payment types (cassettes) from all made available by a Payment Manager administrator
- Role-based access controls for granting privilege levels to a merchant's employees
- Enable/disable event notification service
- Search, with parameters/criteria, for customer transaction and batch data history

Features

Some of WebSphere Payment Manager's features are:

- Receives and processes payments on the Internet
- Works with existing credit card processors and emerging payment methods
- Offers easy installation, configuration, and operation
- Integrates with existing business processes or applications
- Enables payment hosting service for multiple businesses
- Delivers security for access control, data integrity, and operations
- Generic Cashier
- Branding of user interface
- OfflineCard cassette
- CustomOffline cassette
- SampleCheckout application

Components

WebSphere Payment Manager manages Internet payment transactions for e-commerce includes:

- Multipayment framework (MPF) application
- Cassette for SET Secure Electronic Transaction
- OfflineCard cassette that enables the review of credit card transactions information made using some other system
- CustomOffline cassette in support of manual payment methods

The following components are available separately:

- Cassette for Cybercash CashRegister Service, Version 3
- Cassette for VisaNet

Ordering

IBM WebSphere Payment Manager for iSeries (5733-PY3) is shipped as part of IBM WebSphere Commerce Suite 5733-WC5, ordering ID 5724-A18.

Prerequisites

Any iSeries or AS/400e RISC system with:

- Minimum 512 MB of RAM
- Minimum 250 MB of disk space for Payment Manager as packaged
- Minimum 5 MB of disk space in the /tmp temporary directory
- Network communications adapter that supports the TCP/IP protocol

Any iSeries or AS/400e attachable workstation capable of running one of the following Web browsers:

- Netscape Communicator 4.08 or later
- Microsoft Internet Explorer, Version 4.01, with Service Pack 2, or later

References

For further information, see the following Web sites:

```
http://www.software.ibm.com
http://www.redbooks.ibm.com
http://www.ibm.com/software/webservers/commerce/payment/
```

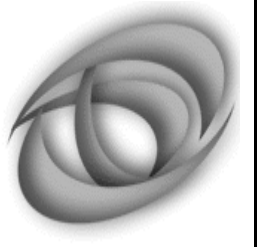
Connect for iSeries 1.1 (5733-B2B)

Connect for iSeries V1.1 is a software integration framework for small to midsize suppliers who want a low-cost, high-function entry to the business-to-business Internet world. Connect for iSeries provides the key enablement tools you need

to more securely connect your business applications to your trading partners, either directly or through an intermediary (e-marketplace).

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 V1.1 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.

Connect for iSeries 1.1 (5733-B2B)		
Product number	5733-B2B	
Minimum OS/400 level	V4R5	
Software type	Software Subscription	
Installation prerequisites	Advanced Edition (5733-WA3) Cryptographic Access Provider for AS/400 (5769-AC3 or 5722-AC3)	
Related products	WebSphere Application Server, WebSphere Commerce Suite, Lotus Domino	
Web link	http://www-1.ibm.com/servers/eserver/iseries/btob/connect/	

Solutions and benefits

This product provides application integration runtime, tools, and aids for creating business-to-business solutions. It includes and leverages MQSeries messaging, which is part of IBM's MQSeries family of application integration software and has affinity with the other MQSeries products that can optionally be part of a total solution. The product can be used to enable iSeries applications to participate in a larger multisystem solution based on IBM's WebSphere B2B Integrator product. This product can be used to extend applications based on both Domino and WebSphere Application Server platforms. It also supports integration with WebSphere Commerce Suite.

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.

Features

Connect for iSeries Version 1.1 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
- Mapping tools
- Improved catalog management capabilities
- Support for the latest middleware from IBM

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. The 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 wizards. 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 tools allow 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.

New with Version 1.1

Enhancements in Connect for iSeries Version 1.1 include:

- Support for the latest versions of the cXML protocol from Ariba and the mXML protocol from Metiom.
- Connect for iSeries has opened up interfaces to allow business partners the ability to create their own protocols to support point to point and private exchanges.
- Better integration with your back-end applications is now possible 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 outbound message handler provides the capability to initiate messages such as advanced shipping notices and invoices from back-end applications to buyers and trading partners.
- The Connect for iSeries Flow Manager is enhanced to allow multiple back-end applications or database calls to be made for a single trading partner request. This allows for much more complex flow processing to be specified, therefore greatly enhancing the flexibility of the product.
- Enhancements to the Business Process Editor tool makes it even easier to create Application Connector Documents (ACDs) and multistep Process Flow Models (PFMs).
- New catalog features allow you to create and publish a subset of a catalog in order to provide categorizations appropriate for particular buyer organizations

and customer specific pricing. Catalogs can now be generated from multiple database tables.

- Connect for iSeries now has increased flexibility that enables integration with existing online catalog or storefront solutions.
- Connect for iSeries Version 1.1 supports WebSphere Commerce Suite Version 4.1 and Version 5.1, WebSphere Application Server Version 3.5, and MQSeries Version 5.2.

Ordering

Connect for iSeries is shipped as a chargeable processor group-based OS/400 LPO 5733-B2B. This product is covered under Software Subscription 5733-SW1 or 5733-SW3.

Prerequisites

The minimum recommended iSeries server is the Model 270 with processor feature #2250. Or the Model 820 with processor feature #2395 and 512 MB of memory is also recommended.

References

For further information, see the following Web sites:

`http://www.software.ibm.com`
`http://www.redbooks.ibm.com`

You can also find information on available connectors and PTFs on the IBM Connect for iSeries Web site at:

`http://www.ibm.com/eserver/iseries/btob/connect`

Connect for iSeries: Refer to “Product Previews” on page 62 for information on support for Connect for iSeries at V5R2.

IBM WebSphere Personalization for AS/400, V4.0

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.

IBM WebSphere Personalization for AS/400, V4.0		
Product number	5733-A69	
Minimum OS/400 level	V5R2	
Availability	28 June 2002	
Software type	Software Maintenance	
Installation prerequisites	WebSphere Application Server Advanced or Enterprise Edition 5733-WA4	
Related products	WebSphere Application Server	
Web link	`http://www-1.ibm.com/servers/eserver/iseries/software/websphere/wspersonal/index.html`	

Solutions and benefits

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.

Features

WebSphere Personalization for AS/400 supports:

- Randomizing the order of results returned by actions and rules.
- Updating data contained in a session variable or in an online data store by using a new action type.
- Using inline classifiers to build simple rules, when only one condition is required to be evaluated for an action to be taken.
- Creating business rules that base personalization strategies on what is taking place during a session. The Rules Editor enables you to develop classifier and action rules using the current Web site visitor's Page Request input or User Session information.
- Creating resource classes that support multi-value properties (lists) using the Studio User and Content wizards. A multi-value property can contain and return several values (for example, lists of stocks, interests, skills) using a single rule.

- E-fixes 1 and 2 (PQ45394, PQ46779, and PQ47090) for multiplatforms that contained fixes and an optional utility. These updates solved performance degradation problems, fixed transaction serialization for Personalization EJBs (causes errors on Oracle databases and inefficiencies in other databases), fixed problems caused by empty values in a multivalue list, fixed problems using effective dates in rules, and provided the optional Publish to Production utility.

Components

WebSphere Personalization includes:

- *Rules Engine*: Executes the business rules that determine which content is displayed to each site visitor.
- *Resource Engine*: Web site owners can optimize their personalization strategy by calling upon content and profile information from multiple sources.
- *Recommendation Engine* (via Macromedia LikeMinds): Uses collaborative filtering to offer content and product recommendations to site visitors, enabling cross-selling and up-selling.
- Easy entry of business rules using WebSphere Studio Advanced Edition, V3.5.2.2

Ordering

IBM WebSphere Personalization for AS/400 V4.0 is shipped as a chargeable OS/400 LPO 5733-A69:

- Maintenance 1-year (5733-M29)
- Maintenance 3-year (5733-M30)

Prerequisites

WebSphere Personalization V4.0 for iSeries Resource and Rules Engines requires one of the following processors:

- AS/400e Model 170 with processor feature #2385 or Model Server 720 with processor feature #2062 (recommended minimum)
- iSeries Model 270 with processor feature #2252 or Model 820 with processor feature #2396 (recommended minimum)
- 1 GB of memory (recommended minimum)

Use the IBM Workload Estimator for iSeries to help in sizing all system configurations. See:

`http://www-912.ibm.com/servlet/EstimatorServlet`

WebSphere Personalization V4.0 for AS/400 Recommendation Engine requires:

- A dual Pentium PC running Windows 2000 Advanced Server
- Support for a communications adapter
- 1 GB of disk space
- 1 GB memory
- CD-ROM drive

References

- *WebSphere Personalization Solutions Guide*, SG24-6214
- `http://www-1.ibm.com/servers/eserver/iseries/software/websphere/wspersonal/order_cd.htm`
- `http://www-1.ibm.com/servers/eserver/iseries/software/websphere/wspersonal/wspdetails.htm`

Application Development

Application Development

29

IBM licensed programs: Application development products

Application development is a founding strength of the iSeries server. This chapter describes today's Licensed Program offerings.

Product name	Product number	Refer to
IBM VisualAge Generator Server for iSeries	5769-VG1	on page 650
IBM CICS Transaction Server for iSeries	5722-DFH	on page 652
IBM Application Program Driver for AS/400	5722-PD1	on page 654
IBM Java for iSeries	5722-JC1 5722-JV1	on page 656
IBM WebSphere Development Studio for iSeries Application Development ToolSet ILE COBOL ILE RPG ILE C ILE C++ ADTS	5722-WDS	on page 669 on page 672 on page 669 on page 676 on page 680 on page 680 on page 672

Product name	Product number	Refer to
IBM WebSphere Development Tools for iSeries	5724-A81	on page 685
System/36 Migration Aid	5727-MG1	on page 692
System/38 Migration Aid	5714-MG1	on page 692

IBM VisualAge Generator Server for iSeries (5769-VG1)

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.

IBM VisualAge Generator Server for iSeries		
Product number	5769-VG1	
Minimum OS/400 level	V4R4	
Program size	6.5 MB	
Availability	25 May 2001	
Software type	Software Subscription	
Installation prerequisites	ILE COBOL for AS/400 (5769-CB1 or 5722-WDS) for compile on server	
Replaces product	VisualGen Host Services for OS/400	
Web link	http://www.ibm.com/software/ad/visgen/	

Solutions and benefits

IBM's VisualAge Generator makes traditionally skilled developers more productive as they build high-volume transaction-processing applications in

multi-platform environments. Scalable and flexible, VisualAge Generator is perfect for today's changing business environments

Features

To address the first primary design point of programmer productivity, VisualAge Generator is equipped with four core facilities:

- Data model driven automatic code generation
- Visual construction from components
- High level 4GL specification facility
- Interactive Test Facility (ITF) integrated with the development facilities

Fulfilling the enterprise requirements

An “enterprise-class” application development solution must be capable of fulfilling the following key requirements:

- Provide a robust development workbench that can scale up to large development teams
- Deliver systems that can scale up to the highest available transactional throughputs
- Produce systems that can run on a wide variety of platforms
- Ease the integration with existing legacy systems, allow access to legacy data
- Deliver enterprise IT assets to the Web
- Be usable by traditionally-skilled programmers

Delivering e-business solutions

Developing e-business solutions is quickly becoming the next strategic direction as companies see the potential for cost saving, better customer service, and streamlined business processes.

- Web Transaction Rapid Application Development (RAD)
- Integration with VisualAge for Java
- Generation of Java bean and Enterprise JavaBean components

Components

VisualAge Generator consists of a family of products:

- **VisualAge Generator Developer for OS/2 and Windows NT**: Provides the development workbench to define, test, and generate traditional, as well as Web-based systems. Standard templates are included to allow a highly productive model-driven approach to programming.

- **VisualAge Generator Templates Customizer**: Provides the ability to tailor the standard templates or create new templates to meet unique business requirements.
- **VisualAge Generator Server for OS/2, AIX, Windows NT, HP-UX, and Sun Solaris**: Provides a set of runtime libraries invoked by VisualAge Generator programs generated for workstation platforms.
- **VisualAge Generator Server for MVS, VSE, and VM**: Provides a set of runtime libraries invoked by VisualAge Generator programs generated for System/390 platforms.
- **VisualAge Generator Server for iSeries**: Provides a set of runtime libraries invoked by VisualAge Generator programs generated for the iSeries platform.

Ordering

VisualAge Generator Server for iSeries is shipped as a chargeable processor group based OS/400 LPO 5769-VG1. This product is covered under Software Subscription 5733-SW1 or 5733-SW3.

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.

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

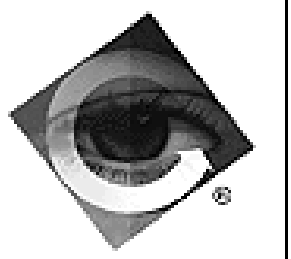
CICS clients over SNA APPC links, without the need for an intermediate CICS OS/2 server.

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 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 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 CICS Transaction Server for iSeries		
Product number	5722-DFH	
Minimum OS/400 level	V5R1	
Program size	92 MB	
Availability	25 May 2001	
Software type	Software Subscription	
Installation prerequisites	ILE COBOL for AS/400 (5769-CB1 or 5722-WDS) for compile on server	
Replaces product	CICS Transaction Server for AS/400 (5769-DFH)	
Web link	`http://www-3.ibm.com/software/ts/cics/`	

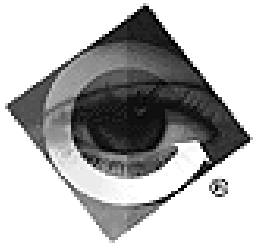
New with V5R2

Programs written for the CICS Clients and the CICS Transaction Gateway can access CICS transactions on iSeries over a TCP/IP network. This provides an identical function to what is available only over SNA networks.

CICS client/server programming allows existing host-based applications to be enabled for client environments. The CICS Transaction Gateway enables these same applications to be used in Web serving environments. Both of these environments are available through either SNA or TCP/IP networks.

IBM Application Program Driver for AS/400 (5722-PD1)

Application Program Driver (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.

IBM Application Program Driver for AS/400		
Product number	5722-PD1	
Minimum OS/400 level	V5R1	
Program size	68 MB	
Availability	25 May 2001	
Software type	Software Subscription	
Installation prerequisites	ILE COBOL for AS/400 (5769-CB1 or 5722-WDS) for compile on server	
Replaces product	IBM Application Program Driver/400 Version 3 (5763-PD1) IBM Application Program Driver/400 Version 4 (5769-PD1)	

Solutions and benefits

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.

Features

It provides the following major functions:

- Menu creation and control
- Security (authorization and conflict management)
- Direct access to menus and programs (fastpath between applications)
- Backup/restore
- Batch job scheduling and support
- Restart supervision routines
- Multiple data set and multi-installation support
- System services
- Application installation procedures

In addition to these major application functions, APD for AS/400 provides the following features, intended to broaden the applicability and appeal of the product:

- Windowing features within APD for AS/400's menu design and control automatically cause the APD for AS/400-defined menus to be presented in a more modern, window format:
  - Menu bars with up to six choices
  - Pull-down windows with up to nine choices and dynamically determined window height
  - Menu windows with up to 99 scrollable options
  - An unlimited number of cascaded windows
  - Customizable colors for menus, window bars, and borders
- APD for AS/400 administrative menus are also presented in windows.
- Multilingual support is provided for user applications that are coded to support multi-lingual environments.
- Support for updating user applications via APIs is provided to permit users to update the APD for AS/400 information tables about their applications whenever they have new releases or important changes.

New with V5R2

The new functions provided include:

- Windowing support for APD for AS/400-defined menus (to include menu bars, pop-up and pull-down windows, and cascaded windows)
- Windowing support for APD for AS/400 system's own administrative menus
- Multilingual support for user applications which contain multilingual support
- Multilingual support for APD for AS/400 itself

The major functions of APD for AS/400 remain unchanged. These are:

- Menu creation and control
- Security (authorization and conflict management)
- Backup/restore
- Batch job scheduling and support
- Restart supervision
- Multiple data set and multi-installation support
- System services
- Application installation services

Ordering

IBM Application Driver for AS/400 is shipped as a chargeable processor group based OS/400 LPO 5722-PD1. This product is covered under Software Subscription 5733-SW1 or 5733-SW3.

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.

Components

Java for iSeries includes:

- iSeries Developer Kit for Java (5722-JV1)
- iSeries Toolbox for Java (5722-JC1)

Both are included with every OS/400 order of V5R1and V5R2.

Solutions and benefits

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.

Features

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 V5R1 and later. Supported SQL statements include SQL data-manipulation statements to operate on data stored in tables in relational databases.

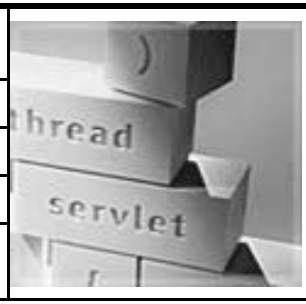
References

For more information, see:

`http://www-1.ibm.com/servers/eserver/iseries/toolbox/`

iSeries Toolbox for Java (5722-JC1 included with 5722-SS1)

The iSeries Toolbox for Java enables a Java applet or application to easily access iSeries data. Toolbox for Java is a set of Java classes that allow you to use Java programs to access data on your iSeries and AS/400e servers. You can use these classes to write client/server applications, applets, and servlets that work with data on your iSeries. The Toolbox also provides a set of GUI classes. These classes use the access classes to retrieve data, and then present the data to the user. The classes use Java's Swing 1.0.03 framework.

iSeries Toolbox for Java 5722-JC1		
Product number	5722-JC1 (included free of charge with the operating system 5722-SS1)	
Minimum OS/400 level	V4R5	
Program size	67 MB	
Availability	23 April 2001	
Software type	Software Subscription	
Installation prerequisites	Host Server (option 12 of 5722-SS1) and TCP/IP http://publib.boulder.ibm.com/iseries/v5r2/ic2924/index.htm	
Related products	The IBM Developer Kit for Java, WebSphere Application Server for iSeries, Qshell	
Web link	http://publib.boulder.ibm.com/iseries/v5r2/ic2924/index.htm	

New with V5R2

New packages

IBM Toolbox for Java 2 Micro Edition is a new package for IBM Toolbox for Java. The new com.ibm.as400.micro package provides a set of classes that enable you to write Java programs that run on wireless devices such as personal digital assistants and cellular phones. You must separately download the Micro Edition package.

The iSeries System Debugger provides your workstation with a new graphical debugging environment for your ILE, Java, C and C++ programs on an iSeries server.

New classes

IBM Toolbox for Java V5R2 also features many new classes in existing packages. The new classes enable you to:

- Use the ClusteredHashTable classes to share and replicate nonpersistent data among nodes in a cluster.
- Use the CommandPrompter class to prompt for parameters on a given command.
- Use the RecordFormatDocument class to use the new Record Format Markup Language (RFML) component to specify record formats and create, read, and write data records.

- IBM Toolbox for Java V5R2 JDBC support features new classes and enhanced functions, including support for the JDBC 3.0 application programming interface (API). Notable changes include:
  - AS400JDBCSavepoint is a new class (supporting JDBC 3.0) that provides finer control over transaction rollbacks.
  - AS400JDBCParameterMetaData is a new class (supporting JDBC 3.0) that enables you to retrieve the types and properties of parameters in PreparedStatement and CallableStatement objects.
  - Added ability for connecting to independent auxiliary storage pool (IASPs)
  - New methods in binary large object (blob) and character large object (clob) (supporting JDBC 3.0) allow you to update values of these data types.
  - A new JDBC property extended metadata improves the reporting of ResultSetMetaData attributes.

Enhanced classes

IBM Toolbox for Java V5R2 also includes enhancements to existing classes:

- The addition of Kerberos support to iSeries objects, which now use the Java Generic Security Service (JGSS) framework to authenticate to Toolbox for Java servers.
- Secure iSeries objects can now use the Java Secure Socket Extension (JSSE) framework to encrypt data flowing between the client and the server.
- Changes to some Program Call Markup Language (PCML) tags and functionality:
  - New attributes for the <data> tag add support for Unicode strings and enable users to specify how to trim spaces from strings.
  - New and modified attributes for the <program> tag allow the path to be specified at runtime and allow a CCSID specification for the service program entry point name.
  - For tracing, PCML now requires the use of the Trace class (com.ibm.as400.access.Trace) instead of the PcmlMessageLog class.

New XML component

In V5R2, IBM Toolbox for Java has added the Record Format Markup Language (RFML), an XML extension similar to PCML. RFML enables you to use XML in your Java programs to specify the format of data buffers and physical file record formats and to examine the contents of retrieved buffers and records.

Graphical Toolbox

The Toolbox incorporates the following new features:

- Displays cells in a table column as check boxes
- Specifies a minimum height and width for dialogs to ensure proper display of dialog elements
- Specifies that the first column in a table contains a dynamic hierarchical tree, where each cell corresponds to a tree node

Programmed access to PDF and e-mail services

A new spooled file copy method is shipped with the Java Toolbox at V5R2. This Java method provides an identical copy of a target spooled file to be made and routed to an output queue. Using this method, application developers can set up a dynamic, programmed interface to PDF and e-mail services. This is the same technique used by both iSeries Navigator and iSeries Access for Web to use Infoprint Server PDF and e-mail functions.

The spooled copy method enables the application developer to create an API-like process to access PDF services. The developer can monitor the PDF data queue to see when PDF processing has completed and then proceed with any "downstream" function with the PDF file. The spooled copy method performs three functions:

- Provides an identical copy of the target spooled file, leaving the target spooled file as is for other disposition.
- Enables PDF and e-mail parameters to be associated with the new copy.
- Drops the spooled file in the target PDF writer queue, which automatically invokes PDF processing.

Solutions and benefits

- The Toolbox supports the Secure Sockets Layer (SSL) specification. Data flowing between the workstation and an iSeries running OS/400 V5R1 or later can run across an SSL connection providing data encryption and server authentication.
- IBM Toolbox for Java uses the iSeries Host Servers as access points to the system. Because Toolbox for Java uses communication functions built into Java, you do not need to use IBM iSeries Access Express for Windows to use Toolbox for Java. Each server runs in a separate job on the server, and each server job sends and receives data streams on a socket connection
- 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 Java beans for most public interfaces. It uses

OS/400 servers as the access points to the iSeries server and is fully NLS enabled.

- 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 those provided by Client Access APIs. It uses the OS/400 host servers (part of OS/400) to access the iSeries data and resources.

Features

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.
- 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.

- 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
- 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 V5R1 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.
- 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

Compatibility

- IBM Toolbox for Java no longer supports running in the default JVM in Netscape Navigator or Microsoft Internet Explorer. For applets that use Toolbox for Java classes to run in a browser, you should install a plug-in such as the Sun Java 2 Runtime Environment (JRE) 1.3.0 plug-in.
- Toolbox for Java no longer includes data400.jar. The classes that were in data400.jar are now in jt400.jar. Remove data400.jar from your CLASSPATH statements.

- The getObject() methods for ResultSet and CallableStatement now return Integer objects when the SQLType is SMALLINT. Previously, these methods returned Short objects. If you use readObject to read SMALLINT columns, you must alter your Java application to accommodate the new type of returned object.
- Different error reporting when throwing data truncation errors results in warnings that do not cause your application to fail.
- You cannot use this release of IBM Toolbox for Java to deserialize some objects that you serialized using releases prior to V5R1.
- If you are using Secure Sockets Layer (SSL) to encrypt data flowing between the client and the server, you must use one of the following options:
  - Java Secure Socket Extension (JSSE)
  - SSL objects delivered in a V5R1 or later version of IBM iSeries Client Encryption licensed program 5722-CE2 or 5722-CE3. This release of IBM Toolbox for Java does not work with V4R5 and earlier versions of iSeries Client Encryption.
- IBM Toolbox for Java continues to provide support for:
  - Swing 1.1, which is required to use GUI classes or the Graphical Toolbox
  - Java 2 Platform, Standard Edition (J2SE), with continued support of the Java Development Kit 1.1.8

Ordering

iSeries Toolbox for Java is included free of charge with OS/400.

Prerequisites

HTTP Server for iSeries (5722-DG1, OS/400 Option 34 (Digital Certificate Manager)), IBM Cryptographic Access Provider 128-bit for iSeries (5722-AC3), and iSeries Client Encryption (128-bit) (5722-CE3) are required.

iSeries Developer Kit for Java (5722-JV1 included with 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.

Your iSeries server supports multiple Java Development Kits (JDKs) and Java 2 SDK (J2SDK), Standard Edition. Your iSeries server supports the use of multiple JDKs simultaneously, but only through multiple Java virtual machines (JVM). A single Java virtual machine runs one specified JDK. Find the JDK that you are using or want to use, and select the coordinating option to install. You can install more than one JDK at one time. The java.version system property determines which JDK to run. Once a Java virtual machine is up and running, changing the java.version system property has no effect.

Note: In V5R2, Options 1 (JDK 1.1.6) and 2 (JDK 1.1.7) are no longer available. They cannot be installed or used.

iSeries Developer Kit for Java 5722-JV1		
Product number	5722-JV1 (included free of charge with operating system 5722-SS1)	
Minimum OS/400 level	V5R1	
Program size	Varies	
Availability	23 April 2001	
Software type	Software Subscription	
Installation prerequisites	None	
Related products	The IBM Developer Toolbox for Java, WebSphere Application Server for iSeries, Qshell	
Replaces product	None	
Web link	http://publib.boulder.ibm.com/iseries/v5r2/ic2924/index.htm	

Solutions and benefits

- 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.

- The SQL99 Command Language Interface (CLI), on which the JDBC API is based, is the basis for ODBC. Java Database Connectivity (JDBC) provides a natural and easy-to-use mapping from the Java programming language to the abstractions and concepts defined in the SQL standard.

Features

The iSeries Developer Kit for Java includes such features as:

- 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
- 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 java.awt APIs
- 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 iSeries Navigator interfaces to the iSeries Developer Kit for Java.
- Option 5 includes support for J2SE 1.3 and is added to OS/400 V5R1 and V5R2. You gain concurrent support for all major versions of Java (1.1, 1.2, 1.3, and 1.4) 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 you can find it 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
- 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.

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`

New with V5R2

The changes to the iSeries Developer Kit for Java in V5R2 include.

- Customization: There are new system properties, including properties for Cache class loaders.
- Database access:
  - The JDBC section has had extensive revision. The IBM Developer Kit for Java JDBC driver, also known as the “native” driver, provides programmatic access to iSeries database files. Using the JDBC API, applications written in the Java language can access JDBC database functions with embedded Structured Query Language (SQL), run SQL statements, retrieve results, and propagate changes back to the database. The JDBC API can also be used to interact with multiple data sources in a distributed, heterogeneous environment.

  - Java stored procedures and Java user-defined scalar functions sections have been added.

- Run on a host without a GUI: If you want to run your Java application on a host that does not have a graphical user interface (GUI), such as an iSeries server, you can use the Remote Abstract Window Toolkit (AWT), the Class Broker for Java (CBJ), or the Native Abstract Windowing Toolkit (NAWT).
- Commands and tools:
  - The Analyze Java Virtual Machine (ANZJVM) command has been added to the CL commands section.
  - The *Java IDL-to-Java compiler (idlj) tool* has been added. The idlj tool generates Java bindings from a given Interface Definition Language (IDL) file. It is compatible with the idlj tool that is supplied by Sun Microsystems, Inc. This tool only works for Java Development Kits 1.3 and 1.4.
  - The iSeries Navigator commands that are supported by Java was changed to reflect several changes to iSeries Navigator.
- Optional packages: The JNDI LDAP (Java Naming and Directory Interface Lightweight Directory Access Protocol) programming guide has been added.
- Debugging: There is new debug support for Java classes loaded through a custom class loader.

References

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 Java bean 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:

- Professional Edition
- 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 IDE of VisualAge for Java, ET/400 makes the job of developing Java client and server programs to target iSeries servers 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. After you add the ET/400 feature, the Toolbox classes are 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 the 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, 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.
- Use iSeries-specific Java beans 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.

New with 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

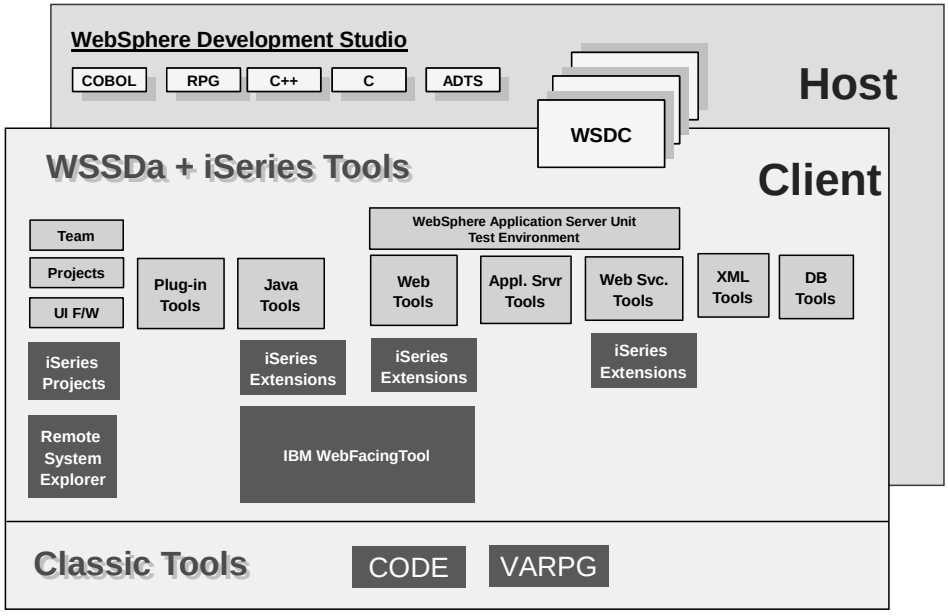
Suggested reading

For additional JDK support information, including service requirements, refer to the online publication iSeries Developer Kit for Java, which is available in the iSeries Information Center at:

`http://www.ibm.com/eserver/iseries/infocenter`

WebSphere Development Studio for iSeries (5722-WDS)

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 are 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.



IBM WebSphere Development Studio for iSeries		
Product number	5722-WDS	
Minimum OS/400 level	V5R1	
Program size	22 - 449 MB based on installed components	
Availability	V5R1: 25 May 2001, V5R2: 30 August 2002	
Software type	Software Subscription	
Related products	IBM WebSphere Development Tools for iSeries (5724-A81) IBM WebSphere Application Server Advanced Edition (5733-WA4)	
Replaces product	5769-CB1 ILE COBOL for AS/400 5769-CL2 VA RPG and CODE/400 5769-CL3 WebSphere Development Tools for AS/400 5769-CX2 ILE C for AS/400 5769-CX5 VisualAge for C++ for AS/400 5799-GDW ILE C++ for AS/400 PRPQ 5769-PW1 Application Development ToolSet for AS/400 (ADTS) 5769-RG1 ILE RPG for AS/400 **Note:** Customers with Software Subscription can upgrade, at no additional charge, to 5722-WDS from any of the products listed, except 5799-GDW.	
Web link	`http://www.ibm.com/software/ad/wds400/`	

Solutions and benefits

WebSphere Development Studio for iSeries offers existing tools such as RPG and ADTS for traditional development. It also offers new tools such as Web, Java, XML, Web Services, and IBM WebFacing Tool for e-business development.

For customers and solution providers who need to create e-business applications for the iSeries server, WebSphere Development Studio for iSeries provides a comprehensive, cost-effective suite of tools that helps them to:

- Convert existing 5250 interfaces to Web interfaces with minimal changes to the host application with the IBM WebFacing Tool.
- Create new Web applications that access iSeries data and applications
- Build new e-business applications with Java, ILE RPG, ILE COBOL, XML, Web Services, and Web tools
- Port e-business applications from other platforms

- Create Web enabled applications with little Java or Web skills

New with V5R2

WebSphere Development Studio for iSeries V5R2 introduces the Eclipse-based IDE and WebSphere Studio Workbench, for integrating both IBM and non-IBM development tools.

The ILE RPG and ILE COBOL compilers have significant enhancements in V5R2. The workstation tools are new, replacing WebSphere Development Tools for iSeries V5.1 with WebSphere Development Studio Client for iSeries V4.

WebSphere Development Studio Client for iSeries V4 integrates the key iSeries development tools to IBM's Eclipse-based IDE, WebSphere Studio Workbench. This new IDE provides the infrastructure to integrate both IBM and non-IBM development tools and facilitate near seamless interoperation.

The introduction of WebSphere Studio Workbench and the WebSphere Studio family of products is a significant advancement in application development.

Features

ILE RPG (host 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 (host component of 5722-WDS)

COBOL is also a 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 (host component of 5722-WDS)

The ILE C compiler is 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++ (host component of 5722-WDS)

In this release, the C++ compiler has been updated to the most current C++ compiler that IBM offers. 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 latest version of IBM Open Class library.

Improvements to the stream classes in the ILE C++ 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 iSeries file system. This new compiler 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 as previous releases. The C++ PRPQ compiler is included for previous release support and to ease migration to the latest ANSI standard. This iSeries native compiler replaces both the VisualAge C++ cross-compiler and the native C++ PRPQ compiler.

ADTS (host component of 5722-WDS)

Application Development ToolSet is the traditional tool suite for iSeries application development programmers. These tools are included in the package so that existing iSeries programmers can more easily make the shift to the new development tools and environment.

In V5R1, Source Entry Utility (SEU) is updated to support the latest enhancements in the newest language compilers. Support for physical file triggers and constraint violation rollback information processing is added to Data File Utility (DFU).

WebSphere Development Studio Client for iSeries (workstation component of 5722-WDS)

WebSphere Development Studio Client for iSeries V4 is the next generation of WebSphere Development tools for iSeries. WebSphere Development Studio Client for iSeries V4 consolidates key workstation development tools for traditional and e-business application development to the Eclipse-based IDE WebSphere Studio Workbench.

The WebSphere Studio Workbench provides the infrastructure to support the integration and interoperability of IBM and non-IBM development tools.

WebSphere Development Studio Client for iSeries is based on WebSphere Studio Site Developer Advanced V4.0.3. Many functions from VisualAge and WebSphere Studio are merged into WebSphere Studio Site Developer Advanced, a new Eclipse-based offering. WebSphere Studio Site Developer Advanced, Version 4.0.3, our Eclipse technology-based offering includes:

- Java
- A Web development environment
- XML tools
- Web services
- Database support

WebSphere Development Studio Client for iSeries features enhancements that improve the development of iSeries host-based applications and extend their functions into the e-business world. These enhancements are explained in the following sections.

Remote system explorer

WebSphere Development Studio Client for iSeries includes a generic remote systems framework that supports views, tools, and tool extension for working with the iSeries servers to develop host-based applications. The remote systems framework makes it easy to connect to your iSeries servers. The remote system explorer allows you to develop new applications for them.

IBM WebFacing Tool

With the IBM WebFacing Tool component of WebSphere Development Studio client for iSeries, you can quickly and cost-effectively bring your applications to the Web. When your business makes the transition to an application development strategy, you gain a competitive edge and capitalize on the reliability, security, and scalability of iSeries servers to produce the premier toolset for e-business application development. The IBM WebFacing Tool provides an effective way to create Web interfaces for existing 5250 applications.

With the IBM WebFacing Tool, you can create industry-standard JavaServer Pages (JSP) components and Java bean components from the display file data description specification (DDS) source at development time. You can have a simple, cost-effective way to Web enable many 5250 applications. The process requires minimal change to the application's business logic, no separate tool costs, and no runtime charges. You can rapidly deploy generated JSP and Java bean components to an application server, providing a new Web interface for your application.

With IBM WebFacing Tool, the same application supports both 5250 and Web browser interfaces. At runtime, the system determines whether the 5250 or the Web interface is being used. For example, an application started from a 5250

display is automatically shown in a 5250 display. When the same application is started in a Web browser, the input and output is rendered in a Web browser using generated JSP and Java bean components.

CoOperative Development Environment

CoOperative Development Environment (CODE) is a full-featured development environment for writing host applications for iSeries servers. The comprehensive CODE tool suite features workstation-based editing, syntax checking, program verification, compiling and enhanced, multitiered debugging support for your iSeries applications. Code supports RPG, COBOL, C, C++, Control Language (CL), and Java technology.

VisualAge RPG

VisualAge RPG features point-and-click simplicity for RPG programmers at the workstation. Use VisualAge RPG to write RPG applications that run on Microsoft Windows but access iSeries data and programs nondisruptively. Your new applications can be compiled into Windows executables, Java applications, or applets. You can edit, compile, debug, and execute RPG through an easy-to-use GUI. VisualAge RPG includes a GUI builder to help you create your own interface layout. Using an integrated debugger, like those used by CODE, you can dynamically write and check RPG code while you visually build your application.

WebSphere Studio Site Developer Advanced, Version 4.0.3

WebSphere Studio Site Developer Advanced V4.0.3 enables Web site development with easy-to-use tools, wizards, and templates. You can create JSP components or add them to existing Web sites, code new HyperText Markup Language (HTML) and Dynamic HyperText Markup Language (DHTML), and create new applets and graphical image format (GIF) animation.

With WebSphere Studio Site Developer Advanced, you get a common look and feel, one set of access methods and a comprehensive set of extensions. WebSphere Studio Site Developer Advanced offers an IDE. Within the IDE, you can create Web development projects and can easily group all of your Web site files in to a single project for quick, convenient access and management. You can publish a whole project to your Web server and register virtually any tool for any file type.

The IBM WebSphere Studio page designer component offers what-you-see-is-what-you-get (WYSIWYG) editing of HTML and JSP code. The WebSphere page designer component includes a toolbar to convert commonly used HTML and JavaScript code into application code using point-and-click action during application development. The page designer toolbar features wizards that enable JSP code generation to set Web site attributes. HTML and

JavaScript controls, smart entry fields, labels, buttons and subfiles let you quickly add Web functionality to applications.

WebSphere Studio Site Developer Advanced provides the essential tools required to build portable, cross-platform, e-business applications. It includes the award-winning Java IDE, wizards, and an enhanced toolkit for iSeries servers that help you generate servlets, JSPs, and HTML prototypes.

The comprehensive IDE offers:

- A workbench
- A built-in editor and debugger
- An incremental, automatic compiler
- Support for Java 2 Platform technology, including classes, Java bean components, and servlets
- Support for third-party source-control management tools

The Java iSeries extension provides access to iSeries system data, applications, and key functions. You can use built-in support for remote export, compile, run, and debug functions to easily deploy Java applications on iSeries servers. For customers who are new to Java technology, WebSphere Studio Site Developer Advanced offers scenarios to help you learn how to build solutions by customizing prebuilt applications. With these ready-to-deploy applications, you can rapidly build, test, and publish e-business applications to an application server.

Separately orderable components

WebSphere Development Studio for iSeries has two additional, separately priced components:

- Application Development Manager (ADM)
- Application Dictionary Services (ADS)

Note: IBM is planning to discontinue marketing ADM and ADS components in the release after V5R2. IBM is currently working with the key iSeries partners to provide competitive non-IBM products to replace ADM and ADS. See the announcement for details.

IBM intends for V5R2 to be the final release to ship the Open Class Library, which is part of WebSphere Development Studio for iSeries and OS/400. You

can find documentation to assist in migrating from IBM Open Class to the C++ Standard Library at:

http://www.ibm.com/servers/eserver/iseries/support/planning/nav.html

Ordering

WebSphere Development Studio for iSeries (5722-WDS) orders ship the new Workstation Tools, WebSphere Development Client for iSeries V4, and free automatic entitlement.

Prerequisites

You must have OS/400 V5R1 or later. The C++ compiler requires a machine capable of running PASE (option 33) of the operating system (PASE is a separately orderable feature in V5R1 and is included free of charge with V5R2).

References

For more information, see:

http://www.ibm.com/software/ad/library/platforms/as400.html
http://www.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.

Features

- Java enablement to simplify coding of calls to Java classes and methods
- More granular exception monitoring (MONITOR operation code)
- Built-in functions %ALLOC, %REALLOC, %CHECK, %CHECKR, %LOOKUPxx, %TLOOKUPxx, %OCCUR, %SHTDN, %SQRT, and %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
- Predefined /DEFINE names
- Compiler directive /INCLUDE

New with V5R2

The host tools of WebSphere Development Suite offer significant enhancements to ILE RPG at V5R2:

- 31-digit support
- Built-in functions %DEC, %DECH, %INT, %INTH, %UNS, %UNSH, and %FLO are enhanced to allow character parameters.
- New assignment operators allow a variable to be modified based on its old value in a more concise manner.
- Bitwise logical built-in functions allow direct bit manipulation within RPG expressions.
- Externally-described data structures can hold the programmer's choice of input, output, both, key, or all fields.
- A data structure can be specified in the result field when using I/O operations for externally-described files, resulting in enhanced performance if there are many fields in the file.
- Programmers can avoid defining keylists (using KLIST and KFLD), and instead specify their keyfields by listing the keyfields, which can be expressions, as part of the CHAIN, SETLL, REDE or READPE, or by specifying a data structure containing the keyfields.
- A list of fields to be updated can be specified with an UPDATE operation.

- The FEOD operation is enhanced by offering an option to simply write out the blocked buffers locally, without forcing a costly write to disk.
- The ILE RPG compiler can compile source from the IFS, both main source files and /COPY files.
- The ILE RPF compiler can generate an IFS file that contains the PCML representing the parameters to the program (CRTBNDRPG) or the exported procedures (CRTRPGMOD).

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 UDB for iSeries 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 introduce 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.

Features

- 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

  THe QCBLLESRC.JNI file 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.

New with V5R2

The host tools of WebSphere Development Suite offer significant enhancements to ILE COBOL at V5R2:

- New intrinsic functions MAX, MEDIAN, MIDRANGE, MIN, ORD-MAX, ORD-MIN, PRESENT-VALUE, RANGE, STANDARD-DEVIATION, SUM, and VARIANCE
- String conversion to UTF-8 format
- New parameters added to the CRTCBLMOD and CRTBNDCBL commands to give users the ability to tell the compiler to generate PCML source for their COBOL program.
- An optional RECURSIVE clause has been added to provide support for a recursive program, a COBOL program that can be recursively re-entered.
- A new data section that defines storage allocated and freed on a per-invocation basis
- ILE COBOL source stored in IFS stream files can be compiled.

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 features

- Completely refreshed compiler from the 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 spooled 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 latest version of the 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++ features

- Completely refreshed compiler from the latest AIX compiler
- Compliant with the latest ANSI ISO/IEC 14882-1998 C++ standard
- Template library and namespace support
- Replaces that VAC++ cross compiler and native PRPQ compiler
- Support of release V5 of IBM Open Class class libraries bool data type
- Read source and includes from IFS or native database
- Produce native database or IFS spooled file listings
- 64-bit file indexing for stream classes
- Teraspace addressing support to improve portability and performance
- Preprocessor output targeting specified file
- A Qshell command for compiling
- Functions more in-synch with ILE C

ADTS features

- **Source Entry Utility (SEU)**:
  - Support of RPGLE CF Format and Prompt
  - Support of 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
  - Support of an expanded 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**: 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)**: 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)**: Is a full-screen editor that provides 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)**: 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 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)**: 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)**: 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. This allows 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)**: 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)**: 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++, and ILE Cobol compilers, or the Application Development tool set.

WebSphere Development Tools for iSeries V5.1 consists of these five workstation components:

- IBM WebFacing Tool (First Edition)
- WebSphere Studio for iSeries (Professional Edition)
- VisualAge for Java for iSeries (Professional Edition)
- CODE
- VisualAge RPG

The IBM 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

IBM WebFacing Tool (first edition)

The new IBM 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 goal of IBM is to make the conversion process simple and easy for all customers. At development time, the WebFacing Tool creates industry-standard JavaServer Pages and Java beans 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 when 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 supports both the Web and 5250 interface. Since the conversion process generates JSPs and Java beans, 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 IBM 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 IBM 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 IBM WebFacing Tool is preferred when:

- The business is still actively evolving the application.
- The developer can 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.
- **WYSIWYG editing**: The Page Designer provides WYSIWYG editing of HTML pages and JSP. The IDE provides wizards for creating SQL statements, JSPs, and servlets from SQL statements and JSPs and servlets from Java beans.
- **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**: This feature was 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. You can be on 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 the inputs and a JSP is used to display the output. We use a Java bean 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 a lot 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 standard tool for creating end-user interfaces for all iSeries applications. There are four possible reasons why 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 can be installed over your version of WebSphere Studio. Take advantage of the extra capabilities offered by the Advanced Edition and still maintains 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. It also 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 Java bean 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 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 address 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 on 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 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 a 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. It supports source and listing views, interactive and batch programs, and all types of server Java including applications, servlets, and EJBs.

There are other miscellaneous tools inside CODE, 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 a 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 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 (5727-MG1)

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. After they are 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,* SC41-4152.

System/36 Migration Aid	
Product number	5727-MG1
Replaces product	None
Minimum OS/400 level	N/A
Installation prerequisites	None
Related products	None

System/38 Migration Aid (5714-MG1)

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*, SC41-4153.

System/38 Migration Aid	
Product number	5714-MG1
Replaces product	None
Minimum OS/400 level	N/A

System/38 Migration Aid	
Installation prerequisites	None
Related products	None

Lotus

Lotus

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IBM licensed programs: Lotus products

IBM and Lotus work in partnership to provide solutions for today's business environment. This chapter describes the Licensed Program Products that are offered for Lotus Domino.

Product name	Product number	Refer to
Lotus Domino 6 for iSeries	5733-LD6	"Lotus Domino 6 for iSeries (5733-LD6)" on page 699
Lotus Domino R6 Mail Server	Licensing option	"Lotus Domino 6 for iSeries (5733-LD6)" on page 699 and "Lotus Domino R5 Mail Server" on page 707
Lotus Domino R6 Application Server	Licensing option	"Lotus Domino 6 for iSeries (5733-LD6)" on page 699 and "Lotus Domino R5 Application Server (licensing option of 5769-LNT)" on page 706

Product name	Product number	Refer to
Lotus Domino R6 Enterprise Server	Licensing option	“Lotus Domino 6 for iSeries (5733-LD6)” on page 699 and “Lotus Domino R5 Enterprise Server (licensing option of 5769-LNT)” on page 710
Lotus Domino R6 Advanced Enterprise Server	Licensing option	“Lotus Domino 6 for iSeries (5733-LD6)” on page 699 and “Lotus Domino R5 Advanced Enterprise Server (licensing option of 5769-LNT)” on page 707
Lotus Domino R5 Server	5769-LNT	“Lotus Domino for iSeries R5 (5769-LNT)” on page 704
Lotus Enterprise Integrator for iSeries	5769-LNP	“Lotus Enterprise Integrator (5769-LNP)” on page 723
Domino Client	Varies	“Domino Client choices” on page 711
Integrated Domino Fax for iSeries	5733-FXD	“IBM Integrated Domino Fax for iSeries (5733-FXD)” on page 724

Components

Lotus Domino for iSeries (R6 and R5) includes three separately orderable components, as represented in this table.

Domino Server choices	Description
Mail Server	The Domino R6 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 Domino R6 Application Server license gives you the same functions as the R6 Mail Server plus the ability to host custom applications on systems with up to four CPUs with no Domino partitioning. Host applications include: - Lotus Quick Place - IBM WebSphere Application Server - Domino Enterprise Connection Services

Domino Server choices	Description
Enterprise Server or Advanced Enterprise Server	The Domino R6 Enterprise Server license gives you the same functions as the Application Server on systems with up to eight CPUs plus: - Notes clustering - Browser clustering - Partitioning - SMP The Domino R6 Advanced Enterprise Server license gives you Enterprise Server capabilities on systems with more than eight CPUs.

You can download the incremental installers for Lotus Domino and Lotus QuickPlace for iSeries from the Lotus Domino for iSeries support Web site at:

`http://www.ibm.com/servers/eserver/iseries/domino/support/`

Lotus Domino 6 for iSeries (5733-LD6)

With the release of Domino 6, Lotus continues to play a major role in the e-business revolution. To meet the challenges of business globalization, frequent mergers and acquisitions, and the increasing demand for Web-based business tools, Lotus has combined both evolution and innovation in its latest upgrade of Domino server technology. The features in Domino 6 build on the features in Domino 5 to address rapidly changing industry trends and meet their challenges head on.

See “Lotus Domino for iSeries R5 (5769-LNT)” on page 704 to understand the base functions provided in R6.

Lotus Domino 6 for iSeries (5733-LD6)		
Product number	5733-LD6	
Minimum OS/400 level	V5R1	
HIPO	N/A	
Availability	September 2002	
Software type	Software Maintenance	
Installation prerequisites	`http://www.ibm.com/servers/eserver/iseries/domino/`	
Related products	IBM Integrated Domino Fax for iSeries 5733-FXD	

Replaces product	Lotus Domino Server for iSeries R5
Web link	http://www-1.ibm.com/servers/eserver/iseries/domino/ http://www.lotus.ibm.com/products/r5web.nsf/webpi/Domino+for+iSeries?opendocument http://www-10.lotus.com/ldd/domino6

Solutions and benefits

Domino 6 innovations expand the capabilities of the Domino messaging and collaboration server to maximize the value of Domino within your existing infrastructure and provide robust support for your Notes messaging and Web applications. Whether your users are working with the Notes client, a Web browser, or a mobile device, you can ensure that a single application meets their needs. The benefits to your business include:

- Support for multiple organizations simultaneously on the same physical/logical server.
- The multiple organization Domino Directory dramatically reduces the complexity of server administration. The administrator works with only one server, yet each organization on that server can function as if hosted by its own unique server.
- A new Server Activity Logging feature collects data on a per-server basis, allowing the ASP to determine the appropriate billing model for its customers.
- Domino 6 optimizes server startup to speed recovery and improve uptime. Transaction logging of key views ensures views do not need rebuilding should the system crash.
- Enhanced cluster support includes automatic detection of software failures and automatic fault recovery.
- Smart Update lets you install upgrades at the desktop level with the push of a button. Administrators control and maintain version deployment using a Smart Update database on their server.
- Roaming user support allows for user setup so that personal information is stored on a server and replicated to whatever PC they happen to be using.
- Creation and automatic deployment of corporate Welcome pages. You can control which Welcome page should be used and whether users can change their home page.
- A Server Health Monitor to measure system performance and help guide you with short-term and long-term recommendations for improving server performance.

New with R6

Domino 6 is built upon the functions provided in Domino 5, plus enhancements such as:

- Built-in upgrade tools

  The Smart Update feature lets you install upgrades at the desktop level with the push of a button. Administrators control and maintain version deployment using a Smart Update database on their server. When users connect to their home server, they are automatically prompted to upgrade to a new version of Notes.

- Message tracking and monitoring
  - Set up system mail rules for all messages processed on the server
  - Deny and quarantine messages, for example, stop the flow of SPAM through the system

- Directories

  Domino 6 makes it easy to integrate a multi-directory environment. You have the option of moving from a distributed directory architecture and make Domino the central directory. You only need to store the complete Domino directory on a central server and your backup server. Automatic failover of directory servers is completely built into the product. A centralized directory provides more control, less overhead, and is easier to manage.

  The implementation of Lightweight Directory Access Protocol (LDAP) capabilities are enhanced along with improved performance of LDAP directory access. A new Domino LDAP Schema database helps you maintain and extend the schema. There is an automatic schema maintenance process and true object class inheritance. Directory schema can be imported via LDAP Data Interchange Format (LDIF) files. The LDAP upgrade service lets you migrate person and group entries directly from an LDAP directory server into the Domino Directory.

- Flexible security model:

  Support for the PKCS#11 standard for Smartcards provides additional protection for your users. Both a Smartcard password and Smartcard pin are required to unlock the user ID.

- Server startup

  Domino 6 includes a number of enhancements that improve server scalability:

  - Transaction logging of key views to ensure views do not need rebuilding should the system crash
  - Enhanced cluster support including automatic detection of software failures and automatic fault recovery

  - A persistent directory manager cache
  - Optimization of the agent manager startup procedure avoids opening all databases, which would slow server performance

- Streaming replication feature

  A new streaming replication feature improves replication across all servers, and it especially improves mail server performance.

- More efficient client/server interactions

  Client/Server interactions are also more efficient. For example, incremental view reading, used in design information and sometimes user views, means the server provides just the incremental change it takes to fill the screen with the new view.

- Network compression

  Domino 6 features reduce network utilization. Network compression reduces the number of bytes sent during transactions by up to 50 percent. Connections across heavily loaded links, such as WANs and XPCs, realize the most benefit.

- Full-text (FT) search

  Full-text search is enhanced to include update in place, improved caching, and memory balance between NSF and FT and faster boolean search processing.

- Formula engine

  The Domino 6 formula compute engine provides computation performance that is up to twice as fast as previous Domino releases.

- IMAP server

  Native support for IMAP semantics and redesign of the IMAP server to use these new capabilities. The redesign includes multi-threaded and data streaming architecture for much higher performance and scalability.

- Administration improvements

  Includes policy-based management for change management and rapid deployment of changes, Smart Upgrade for automatic client upgrades, roaming users support, several security levels for server administrator, console improvements, and server monitoring.

OS/400 V5R2 includes the following enhancements for Domino:

- Teraspace support

  Domino 6 for iSeries is built teraspace enabled. All compiles are done with the teraspace switch on and the Domino HTTP stack has been modified to use teraspace functions.

- Collection Services

  With OS/400 V5R2, Domino 6 supports the OS/400 Collection Services feature.

- OS/400 IFS file storage options
- Such applications as Domino do their own sharing of data for .NSF files and do not benefit from the OS/400 integrated file system (IFS) function used to open files to cache data across processes. A new function in OS/400 V5R2 allows you to adjust how much memory the IFS function uses so that memory for caching .NSF files is not wasted.
- ASP support

  Application Service Provider (ASP) support allows the user to specify whether the Domino server is ASP enabled. Lotus has added a specific field to the setup wizard. This is not a changeable field. That is, you cannot convert a Domino server from ASP to non-ASP or vice versa.

Removed features

The following features are no longer available with Domino 6 for iSeries:

- Integration via AnyMail/MSF

  Use separate TCP/IP for Domino SMTP and OS/400 SMTP.

- Support for Domino under OS/400 HTTP server (original)

  Domino 6 for iSeries continues to ship a plug-in that allows configuration of Domino to use an OS/400 HTTP stack. At the time of publication, it has not been decided which stack will be recommended. This may be the Apache HTTP stack (not the original HTTP stack) or the one shipped with the IBM HTTP Server for iSeries (5722-DG1).

- Directory synchronization

  With OfficeVision/400 support being removed from OS/400, the value of directory synchronization drops.

- The install/setup and 5250 green screens are offered in English only. However, the iSeries Navigator interface is translated.
- LPP or pre-load support

National language support

With Domino 6 for iSeries, only Language Packs are supported. The user needs to install the English server, then use the Language Pack installation process to change the language. Separating the code from the language permits the use of

different languages in Domino logical partitions without implementing OS/400 logical partitioning, which is the case with Domino 5.

Ordering

Domino 6 is ordered through the standard Lotus Channels only.

Lotus Domino for iSeries R5 (5769-LNT)

Lotus 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.

Lotus 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 Lotus Domino for iSeries delivers. Lotus Domino for iSeries is offered with familiar iSeries terms and conditions for purchase, services, and support.

Lotus Domino Server for iSeries		
Product number	5769-LNT	
Replaces product	None	
Minimum OS/400 level	V4R5	
HIPO	N/A	
Availability	20 August 1999	
Software type	Software Maintenance	
Installation prerequisites	`http://www.ibm.com/servers/eserver/iseries/domino`	
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 iSeries	
Web link	http://www.ibm.com/servers/eserver/iseries/domino http://www.lotus.com/domino http://www.lotus.com/messaging http://www.lotus.com/dominoenterpriseserver

Solutions and benefits

Lotus Domino R5 Mail Server (licensing option of 5769-LNT)

Domino Mail leads the industry in reliability and manageability.

Domino Mail Server gives you the right to use the Domino server for mail on systems with up to four CPUs with no Domino partitioning. Domino Mail leads the industry in reliability and manageability.

Benefits to your business include:

- Power to connect people easily, securely, and reliably with a messaging server for corporate intranets and the Internet.
- Single unified infrastructure 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.
- Optimized add-on products, such as desktop fax and integrated document management, make it easy to add value and extend your messaging infrastructure.
- Domino Mail provides the flexibility you need to increase performance and reduce transmission costs, stop spammers, filter junk e-mail, and easily enforce quotas on message and mail file size.
- Just-in-time encryption enhances mobile security. The highly compressed Directory Catalog lets you put the entire corporate directory on mobile desktops.
- Access the Web, integrated calendar, and group scheduling features, newsgroups, bulletin boards, and shared online work areas with any standards-based mail client.

Lotus Domino R5 Application Server (licensing option of 5769-LNT)

The Lotus Domino R5 Application Server gives you the same functions as the Mail Server, plus the ability to host custom applications on systems with up to four CPUs with no Domino partitioning. Host applications include:

- IBM WebSphere Application Server
- Domino Enterprise Connection Services
- Lotus QuickPlace (5769-LNT) is a pre-requisite

It is a world-class Web Application Server that provides an open platform optimized to support rapid delivery of collaborative Web applications. 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.

Key benefits include:

- Serve Lotus Notes clients and Web browsers with the same application.
- Personalized 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.
- The world's best workflow easily defines processes to route and track documents and to coordinate activities both within and beyond your organization.
- Search domain-wide across all your Domino applications and the file system using built-in search security, universal filters.

Domino Enterprise Server (licensing option of 5769-LNT)

Domino Enterprise Server gives you the same functions as the Application Server on systems with up to eight CPUs in addition to:

- Notes clustering
- Browser clustering
- Domino partitioning
- SMP

Key benefits include:

- 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.
- 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.
- 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.

Lotus Domino R5 Advanced Enterprise Server (licensing option of 5769-LNT)

The Lotus Domino R5 Advanced Enterprise Server gives you Enterprise Server capabilities on systems with more than eight CPUs.

Features

Lotus Domino R5 Mail Server

Domino Mail Server features include:

- 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 these mail and calendaring users without disrupting service or losing valuable data:

  - Lotus cc:Mail
  - Microsoft Exchange
  - Lotus Organizer
  - Other systems

- Choose 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

- 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 and synchronize 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 Internet InterORB Protocol (IIOP) and LDAP clients. Authentication via trusted third-party directories reduces complexity and duplication of information.

Lotus Domino R5 Application Server

Domino Application Server features include:

- CORBA/IIOP support

  Common Object Request Broker Architecture (CORBA) extends Domino application services to Web clients, for integration with your existing applications architecture.

- Enhanced HTTP stack

  The Domino R5 HTTP engine delivers outstanding performance and Java servlet support.

- Flexible, pervasive security

  Personalize access to data and applications based on individual and group roles. Extend Domino security to HTML files and other data.

- Integration with Microsoft IIS

  Use Microsoft Internet Information Server (IIS) as the HTTP engine for Domino.

- Enhanced search services

  Domain-wide searching across all your Domino applications and the file system.

- Domino Enterprise Connection Services (DECS)

  Domino Application Server includes DECS for live access to enterprise systems.

- Comprehensive connectivity

  DECS supports a wide range of enterprise systems, including DB2, Oracle, Sybase, ODBC, EDA/SQL, SAP, PeopleSoft, J.D. Edwards, Oracle Applications, MQSeries, CICS, and more. Connectors for relational databases are included with Domino. Connectors for ERP applications and transaction processing monitors are sold separately.

- Choice of development options

  Connect to enterprise data non-programmatically via the easy-to-use DECS interface, or programmatically from Java or LotusScript.

- Remote server management

  Improve convenience for administrators with remote server management via the Domino Administrator, optimized administrative tools, Web-based administration, and batch console commands.

- Centralized control of Notes desktops

  Organizations that use the powerful Lotus Notes client for mail and applications can centrally configure desktop settings like home server and UI preferences.

Lotus Domino R5 Enterprise Server (licensing option of 5769-LNT)

Domino Enterprise Server features include:

- Failover for mail 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.

- 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.

Domino Client choices

There are several choices for a Domino Client solution, which are discussed in this section.

Domino Client choices	Description
iNotes Access for Microsoft Outlook	The iNotes Client allows you to have one Mail Client Access License (CAL) license.
iNotes Web Access	The iNotes Web Access client is a next-generation Web client that delivers leading Domino messaging, collaboration, and PIM capabilities to Web browsers and Microsoft Outlook clients.
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 is an interactive, graphical development environment for building rapid applications. The Designer client also includes Lotus Notes for Collaboration and Domino Administrator.

Note: Information on enhancements to V6 Domino clients was not available at time of publication. Please refer to the following Web site where information will be published when it becomes available:

`http://www.lotus.com/domino`

Lotus iNotes Access for Microsoft Outlook

Many customers are looking to replace their *many* Microsoft Exchange Servers (server farms) with the Domino Server on iSeries. Microsoft Outlook is a client you can keep. iNotes includes 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 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. The following features are of particular interest:

- 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 Outlook and over 60 million Notes Clients installed worldwide.
- 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 can take full advantage of Domino services through an intuitive, easy-to-use interface, both online and offline, 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.
- Online and offline access: For the first time, give Web browser users access to e-mail, calendar, group scheduling, to-do lists and personal contacts, whether they’re online 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 online, send instant messages, chat with colleagues in real time, and collaborate over the Web.

References

For information on Lotus iNotes Web Access and other Lotus Domino for iSeries Release 5 details, see:

`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. Perhaps the most significant enhancement is an easier-to-use environment that can be customized and easily personalized. You can work the way you want and retain all the power of Notes. The user experience in the R5 Notes for Collaboration client 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.

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.

Features

The Collaboration Client features include:

- Notes R5 works with any server

  Users with ISP-hosted mail accounts can use Notes R5 to send, receive, and manage their Internet mail.
- Supports native image formats, Java, JavaScript, and X.509 certificates
- Full standards support of these protocols:
  - **Mail**: POP3, IMAP4, SMTP
  - **Discussion**: NNTP

  - **Directory**: LDAP
  - **Content**: MIME, S/MIME, HTML

- Fully-integrated X.509 certificates

  X.509 is the open-standard certificate format for inter-application authentication.

- LDAP support
- Native address support

  Notes R5 users can address mail using either the Internet address format or the Notes hierarchical address format.

Notes 5 creates 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 with R5

- The Welcome page:

  The Welcome Page is the first page you see when you start the client. The default for the client is a basic welcome 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: The Headlines page is 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:

  Monitor Domino databases for documents that match your specific criteria.

- The navigation bar:

  Tools are similar to the forward, back, stop, and refresh buttons used with browsers.

- Bookmark bar with bookmark buttons:

  Access such core Notes applications as Mail and Calendar that were previously located on the R4 Notes desktop. 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:

  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

  Preview your documents before printing from the print dialog

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.

Many of the enhanced PIM features of Lotus Organizer are incorporated 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.

Collaboration Client Mail features: New with R5

- Separation of message header
- 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 is used for developing automated tasks with multiple conditions for filtering mail automatically.

- MAPI support

  Notes registers itself as the default mail application.

- Notes Minder

  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 are 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

  Choose to have new mail arrive at either the top or bottom of the inbox with preference options.

Calendar and Scheduling features

Group Calendar makes it easier than ever to stay on top of multiple schedules and plan your time and work for increased productivity. Features include:

- 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 to have everything you need for your important meetings.

- Enhanced alarm support

  Support sound (such as .WAV files) for alarms. Set tasks and appointments, and send alarms 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, such mobile enhancements 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 directory occupies minimal disk space, so that mobile users can easily maintain a copy on their local hard disks. Mobile support features include:

- 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

  Store an optimized local copy of your enterprise directory for 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

  Create Connection documents and Dialup Networking entries for new users automatically as they complete the Location document dialog. 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

  Promptuser allows Notes to display 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 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 (region) 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, such enhancements as the headlines page, bookmarks, and enhanced search capabilities are examples of the knowledge management applications possible with Notes and Domino. Features in R5 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 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 the development environment

A comprehensive development environment includes all the design and development tools needed to develop and deploy applications. Improvements include:

- Comprehensive development environment
- Intuitive visual environment

  The 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.
- 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

Site layout and presentation tools of the Designer

Layout and presentation enhancements include:

- Outline Designer

  This 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

  This 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

  This 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

  The 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

No competitive product can offer the tight enterprise integration and positioning for the future that Lotus Domino for iSeries delivers.

- Domino Enterprise Connection Services (DECS)

  This 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, file directory, and fields within your application that automatically update with external connector data.

- Lotus Connector LSX classes (LC LSX)

  This 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 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

Domino includes all the visual tools you would expect to see in a world-class Web development environment. It includes:

- Designer supports features defined in the W3C HTML specification including HTML 4.
- Mix-and-match WYSIWYG and native HTML code on pages and forms.
- Import existing HTML pages that are automatically rendered as pages in Designer.
- 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

  CORBA and IIOP permit 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

Developers can quickly localize applications into multiple languages and keep them up-to-date as the structure and content of the Web site is updated. This can generate significant savings in Web site structure and content translation.

- 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 appropriate information in the 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 includes euro symbol input and display and rounding. Developers can easily create applications that use the 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 previously, 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.

Lotus Enterprise Integrator (5769-LNP)

The Lotus Enterprise Integrator (LEI) is a server-based product that provides 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.

`http://www.ibm.com/servers/eserver/iseries/domino/lei/qmu/qlei31a02.htm`

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.

Lotus Enterprise Integrator (5769-LNP)		
Product number	5769-LNP	
Minimum OS/400 level	V4R5	
HIPO	N/A	
Availability	20 August 1999	
Software type	Software Maintenance	
Installation prerequisites	None	
Related products	Lotus Domino Enterprise Server for iSeries (5769-LNT)	
Replaces product	None	

Web link	http://www.edge.lotus.com http://www.ibm.com/servers/eserver/iseries/domino/related/lei.htm

Changes to Lotus Notes/Domino Maintenance Strategy

Lotus currently has a four-month development and delivery cycle for their Domino Maintenance Strategy. The R6x Maintenance Releases (MRs) adheres to the 4-month release schedule. However, after shipment of 5.0.11, the R5x Maintenance Releases switches to a 6-month release schedule.

Production of Maintenance Updates (MUs), which are small releases with one or just a few fixes, will remain on an as-needed basis.

References

For more information, including a Notes/Domino Maintenance Release Q&A and the Maintenance Release (MR) Status Page, go to:

http://Notes.net

IBM Integrated Domino Fax for iSeries (5733-FXD)

IBM Integrated Domino Fax for iSeries brings the ability to fax directly to the Notes desktop. Now users can simultaneously fax and send e-mail without leaving their workstation.

IBM Integrated Domino Fax for iSeries enables Lotus Notes users to send and receive faxes directly from their Notes client. Use your current telephone system and Domino infrastructure. Domino Fax for iSeries supports more than just simple text. You can also fax Notes memos containing rich text and graphics. You can format and fax files attached to your Notes memo. And with the Print-to-Fax driver (available for download at no charge), Notes users can send faxes directly from within a Microsoft Windows application, such as word processing or spreadsheet software.

IBM Integrated Domino Fax for iSeries (5733-FXD)		
Product number	5769-FXD V4R4	
Minimum OS/400 level	V5R1	
HIPO	N/A	
Availability	12 December 2000	
Software type	Software Subscription	
Installation prerequisites	http://www-1.ibm.com/servers/eserver/iseries/domino/related/fxd/	
Related products	Lotus Domino 6 for iSeries	
Replaces product	Lotus Fax for Domino V4R1	
Web link	http://www-1.ibm.com/servers/eserver/iseries/domino/related/fxd/	

Solutions and benefits

Integrated Domino Fax for iSeries is more convenient, more reliable, and costs less. With other fax solutions, you usually have to buy an additional server to run fax. With Domino Fax, you can run your fax server on the same iSeries server that handles your mail. Benefits to your business include:

- Domino Fax uses the existing mail server. Administrators do not need to add another server dedicated to fax, as with many other products.
- Domino Fax uses familiar Domino administration tools for configuration and management both locally and remotely.
- Servers can be clustered together for dynamic load balancing for maximum efficiency. Outbound faxes are automatically routed through the most efficient path.
- Outbound faxes are prioritized automatically based on the senders' default priority levels, administrator-defined rules, and the time a fax has waited in the queue.
- Fully preserves appearance of documents during conversion to image format for faxing; full fidelity of fonts and graphics; automatically faxes content of mail memo
- Supports Web browsers and POP3 clients.

Features

Integrated Domino Fax for iSeries features include:

- Send and receive faxes from Notes Desktop as easily as e-mail
- Easily fax rich text, graphics, and attached files
- Automatically delay fax transmission until telephone rates drop
- Easily select cover page and cost codes
- Run on your existing Lotus Domino for iSeries mail server (only requires a Windows NT workstation for fax conversions)
- Supports iSeries or AS/400 fax hardware
- Supports Web browsers and POP3 clients

New with V4R4

- Easy cover page and cost-code selection so users save time by selecting a cover page or a cost code from drop down menus
- Improved queue management for users and administrators to manage faxes in the outbound queue.
- Fax receipt customization enables users to select how they view received faxes.
- Least cost routing so that administrators can leverage their network of fax servers to lower expenses. Outbound faxes can be distributed between servers based on the phone number being dialed, providing the most economical route and significantly reducing the cost of fax phone calls.

Ordering

As of 20 January 2001, Lotus Fax for Domino was no longer available for purchase via Passport Advantage. Support was withdrawn on 31 December 2001. IBM Integrated Domino Fax for iSeries Version 4 Release 4 is provided by IBM, supported by IBM, based on Lotus Fax for Domino (FxD) for AS/400 and includes several enhancements to the 4.1 Lotus version.

Networking

Networking

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IBM licensed programs: Networking products

Access to network resoures is a fundamental requirement for today's business environment.

This chapter describes the Licensed Program Products that serve to connect users to the iSeries server or to link the iSeries server to a network. It also covers licensed programs that support secure network access.

Product name	Product number	Refer to
IBM Netvista Thin Client Manager, Version 2 Release 1	5648-C07/5648-C08	on page 730
IBM Cryptographic Access Provider for iSeries	5722-AC3	on page 733
IBM iSeries Client Encryption	5722-CE2/5722-CE3	on page 732
IBM Cryptographic Support for iSeries	5722-CR1	on page 733
IBM Communications Utilities for iSeries	5722-CM1	on page 734
IBM Distributed Computing Environment (DCE) Base Services for AS/400	5769-DC1	on page 735
IBM Distributed Computing Environment DES Library Routine	5769-DC3	on page 736

Product name	Product number	Refer to
IBM MQSeries for iSeries V5.2	5733-A38	on page 736
IBM MQSeries Integrator for iSeries and DB2 Version 1.1	5697-F49	on page 740
IBM Wireless Connection for AS/400	5798-TBW	on page 755

IBM NetVista Thin Client Manager, Version 2 Release 1 (5648-C07, C08)

The IBM NetVista Thin Client Manager (5648-C07) is available on CD-ROM from IBM Publications. The V2.1 strong encryption support for NetVista Thin Client Manager (5648-C08) provides 128-bit encryption for browser and ICA client functions as well as 5250 and 3270 emulators.

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 is 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 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 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.

IBM NetVista Thin Client Manager V2.1	
Product number	5648-C07, 5648-C08

IBM NetVista Thin Client Manager V2.1	
Replaces product	IBM Network Station Manager V2.1 (name change)
Minimum OS/400 level	V4R4
Installation prerequisites	None
Related products	None

Features

The key features of NetVista Thin Client V2.1 are:

- Improved browser Netscape Communicator 4.5
- Browser helper application support for:
  - RealNetworks audio/video
  - PDF file viewing
  - AU and WAV audio
- New GUI with user-configuration options
- Support across the Network Station/Net Vista thin client families
- 16-bit color support offers a 64,000 color palette
- Support for JVM 1.1.8
- ICA audio and security enhancements for Windows-based applications
- Coexistence with earlier versions of NetVista Thin Client Manager V2R1 on the same server
- 5250/3270 scalable fonts included

For a list of devices supported by client serial port mapping, refer to:

`http://www.pc.ibm.com/ww/netvista/thinclient/choose_country.html`

IBM Cryptographic Access Provider 128-bit for iSeries (5722-AC3)

The Cryptographic Access Provider product provides the support to secure e-business transactions by implementing the security needed to send proprietary or confidential information over the Internet and corporate intranets. This product enables encryption in the iSeries server for use by other products such as HTTP Server for iSeries. Install the Cryptographic Access Provider product 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 128-bit for iSeries (5722-AC3) supports 128-bit data encryption.

Note: IBM Cryptographic Access Provider 128-bit for iSeries (5722-AC3) is not a chargeable feature. This feature usually supports e-business applications on iSeries.

IBM Cryptographic Access Provider	
Product number	5722-AC3
Replaces product	Cryptographic Access Provider 56-bit (5722-AC2)
Minimum OS/400 level	V5R1
Installation prerequisites	None
Related products	IBM iSeries Client Encryption 128 bit (5722-CE3)

IBM iSeries Client Encryption 128-bit (5722-CE3)

Client Encryption provides SSL for use by iSeries Access clients (5722-XW1) and the IBM Toolbox for Java (5722-JC1). The Client Encryption product includes an SSL for Windows 95, 98, Me, 2000, and NT and an SSL for Java. 5722-CE3 provides 128-bit encryption. 5722-CE3 is not restricted to the U.S. or Canada.

Note: IBM iSeries Client Encryption 128-bit (5722-CE3) is not a chargeable feature. This feature usually supports e-business applications on iSeries.

IBM iSeries Client Encryption	
Product number	5722-CE3
Replaces product	5769-CE1
Minimum OS/400 level	V5R1
Installation prerequisites	IBM Cryptographic Access Provider 128-bit for iSeries (5722-AC3)
Related products	IBM Cryptographic Access Provider 128-bit for iSeries (5722-AC3)

IBM Cryptographic Support for iSeries (5722-CR1)

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 iSeries server and your physical security measures. In addition, 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 Cryptographic Support for iSeries is refreshed at V5R2. No code changes are made.

IBM Cryptographic Support for iSeries	
Product number	5722-CR1
Replaces product	None

IBM Cryptographic Support for iSeries	
Minimum OS/400 level	V5R1
Installation prerequisites	None
Related products	None

IBM Communications Utilities for iSeries (5722-CM1)

The Communications Utilities for iSeries comprise the MVS/VM bridge and Remote Job Entry (RJE) functions. These capabilities provide interchange of mail and files and the submitting or of receiving jobs between connected systems.

The MVS/VM bridge provides support to allow the movement of mail and files to and from a zSeries 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. 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 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. 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 Communications Utilities for iSeries	
Product number	5722-CM1
Replaces product	None

IBM Communications Utilities for iSeries	
Minimum OS/400 level	V5R1
Installation prerequisites	None
Related products	None

IBM Distributed Computing Environment Base Services for AS/400 (5769-DC1)

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.

Distributed Computing Environment 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

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 Base Services for AS/400	
Product number	5769-DC1
Replaces product	None
Minimum OS/400 level	V4R3
Installation prerequisites	None
Related products	None

IBM Distributed Computing Environment DES Library Routine (5769-DC3)

The DCE DES Library Routine provides data encryption support for the Distributed Computing Environment 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 Distributed Computing Environment DES Library Routine	
Product number	5769-DC3
Replaces product	None
Minimum OS/400 level	V4R3
Installation prerequisites	None
Related products	None

IBM MQSeries for iSeries V5.2 (5733-A38)

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)

MQSeries for iSeries V5.2 (5733-A38)		
Product number	5733-A38	
Minimum OS/400 level	V4R4	
Availability	October 2000	
Software type	Software Subscription	
Related products	None	
Replaces product	None	
Web link	http://www.ibm.com/software/ts/mqseries	

Business Integration with the MQSeries family benefits

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.

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.

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. Different hardware and software platforms can behave as if they were designed to work together.

New with V5.2

MQSeries for iSeries is enhanced in V5.2 to include:

- Significant performance enhancements to the common MQSeries code base
- The list of supported platforms now includes Linux and Windows 2000.
- Enhancements to iSeries scalability and security.
- More support for SNA
- System administration is significantly reduced by allowing the definition of groups (or clusters) of queue managers.
- Dynamic workload distribution shares workload among available queue managers that are identified as part of the same cluster.

Features

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.

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. 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.

Other features of MQSeries include:

- 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 a 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
- 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

Supported platforms

MQSeries for iSeries supports a message exchange with other users of the MQSeries on over 35 IBM and non-IBM platforms. You can find a complete list of supported platforms on the Web at:

`http://www.ibm.com/software/ts/mqseries/platforms/`

Client software provides a remote interface to a MQSeries server. An MQSeries client of iSeries is not 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/platforms/os400/`

IBM MQSeries Integrator for iSeries and DB2 Version 1.1 (5697-F49)

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 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 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.

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)

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. You can find a complete list of supported platforms 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`

Note: IBM MQSeries Integrator for iSeries and DB2 Version 1.1 *was withdrawn* at V5R2. For more information, see:

`http://www-1.ibm.com/servers/eserver/iseries/support/planning/v5r2software.html`

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iSeries Access products

IBM iSeries Access Family (5722-XW1) consists of these products:

- iSeries Access for Windows (5722-XE1)
- iSeries Access for Web (5722-XH2)
- WebSphere Host Publisher (5724-B81)
- iSeries Access for Wireless (5722-XP1)

Each is described further in this chapter.

Product name	Product number	Refer to
iSeries Access Family	5722-XW1	Chapter 32, “iSeries Access products” on page 743
iSeries Access for Windows	5722-XE1	“IBM iSeries Access for Windows (5722-XE1)” on page 745
iSeries Access for Web	5722-XH2	“IBM iSeries Access for Web (5722-XH2)” on page 750
WebSphere Host Publisher	5724-B81	“IBM WebSphere Host Publisher (5724-B81)” on page 753
iSeries Access for Wireless	5722-XP1	“IBM iSeries Access for Wireless (5722-XP1)” on page 755

IBM iSeries Access for Windows (5722-XE1)

iSeries Access is a single product to solve all your desktop-to iSeries connectivity needs. It provides data connectivity from other systems and platforms to iSeries servers.

Increasingly, application providers are taking advantage of heterogeneous platforms to deliver solutions. iSeries Access provides the middleware so that applications can easily be built to run on the desktop, yet work with iSeries resources simply and efficiently. This combination provides iSeries customers with more application options and helps to lower the cost of management for these solutions.

Deploying PCs to your users should enhance their productivity without increasing your PC network administration costs. The iSeries Access Family is your ideal connectivity solution because it contains a unique set of products that integrate the use of a variety of PCs and workstation desktops with the iSeries. It has the functions that end users need, yet it is built to be centrally administered.

iSeries administrators and operators can use the same software as end users and programmers. iSeries Access also ships, installs, and updates code for:

- iSeries Navigator: The GUI for iSeries administration and management
- Operations Console: System console capability that runs on a PC
- EZ Setup: Used to get your new system up and running
- IBM Toolbox for Java: For building iSeries Java applications

iSeries Access for Windows	
Product number	5722-XE1
Minimum OS/400 level	V5R2
Software type	Software subscription and order of 5722-XW1 provides: iSeries Access for Windows iSeries Access for Web Host Publisher 4.0
Replaces product	iSeries Client Access

Components

iSeries Access Family includes the following products:

- iSeries Access for Windows (5722-XE1) (previously known as Client Access Express)
- iSeries Access for Web (5722-XH2)

- WebSphere Host Publisher (5724-B81)
- iSeries Access for Wireless (5722-XP1)

Some iSeries products and functions are renamed in V5R2 as shown in the following table.

V5R1 name	V5R2 name
iSeries Client Access Family	iSeries Access
iSeries Client Access Express for Windows	iSeries Access for Windows
iSeries Operations Navigator	iSeries Navigator

iSeries Access for Windows does not require a license. However, the PC5250 Display and Printer Emulation and Data Transfer components of Access for Windows do require a license.

IBM iSeries Access for Windows (5722-XE1)

iSeries Access for Windows offers a powerful set of capabilities for connecting PCs to iSeries servers. It enables end users and application programmers to leverage business information, applications, and resources across an enterprise by extending the iSeries resources to the PC desktop. Integrated graphical user interface (GUI) features deliver increased productivity for end users who access resources on iSeries servers.

iSeries Access for Windows is compatible with Windows 98, Windows Me, Windows 2000, Windows XP, and Windows NT 4.0 operating systems.

iSeries Access for Windows		
Product number	5722-XE1	
Minimum OS/400 level	V5R1	
Program size	139 MB	
HIPO	N/A	
Availability	4 June 2002	
Software type	Software Subscription	

iSeries Access for Windows	
Installation prerequisites	HTTP Server (Option 12 5722-SS1) http://publib.boulder.ibm.com/iseries/v5r2/ic2924/books/c4155073.pdf
Related products	iSeries Access for Windows (5722-XE1), iSeries access for Web (5722-XH2), and iSeries Access for Wireless (5722-XP1)
Replaces product	5769-XE1 Client Access Express
Web links	http://publib.boulder.ibm.com/iseries/v5r2/ic2924/index.htm http://www.ibm.com/eservers/eserver/iseries/access

Solutions and benefits

iSeries Access for Windows offers a variety of PC-to-iSeries server functions, applications, and enablers. Some of the solutions and benefits include:

- Uses industry standard TCP/IP and provides network security through SSL.

  Leverages the World Wide Web through LANs, WANs, and the Internet. The entire client uses Secure Sockets Layer (SSL) for server authentication. PC5250 emulation provides client authentication. iSeries Access for Windows is tightly integrated with iSeries Key Management to simplify the administration of SSL connections.

- Full function PC5250 Emulation

  Included with iSeries Access for Windows is a full function PC5250 emulation to run 5250 applications and print output on your local PC printer. The system administrator can set up and maintain customized keyboard, toolbar, and printer workstation profiles for each end user.

- Data Transfer
  - Upload or download data from an Excel spreadsheet in one step.
  - Use wizards to create transfer requests. Data conversion is performed automatically.
  - Use API ActiveX controls to perform data transfer requests in your own application.
- Includes middleware for PC-to-iSeries applications
  - It is the best performing iSeries ODBC driver. Use any Windows application written to ODBC to access iSeries database information.
  - Pop-in wizards for writing Visual Basic applications using OLE DB driver. Provides record-level access, works with stored procedures, remote commands, SQL, and more.
  - ActiveX support for all APIs

- Includes PC Network Administration
  - Provides both a Microsoft Windows and OS/400 user profile technique to control user access to iSeries resources.
  - A silent install, auto-update of the PC code simplifies the initial installation and further updates.

Features

iSeries Access for Windows is a Windows client to be used over TCP/IP. It includes these features:

- A full-function client that includes many components from the pre-V5R2 product, Client Access for Windows 95/NT, such as PC5250 and data transfer (with additional enhancements).
- Can communicate with iSeries servers using a secure connection that utilizes SSL
- A streamlined installation that also gives administrators more flexibility and control
- Java-compatible access
- Uses file and print serving capabilities integrated into iSeries Support for Windows Network Neighborhood (iSeries NetServer) function, which is included in OS/400 beginning with V5R1. This improves overall stability and eliminates the need for daemons (background tasks) to run on the client.
- Includes an extensive number of APIs for ODBC, Active X, ADO, OLE DB, and others
- Includes iSeries Navigator connection to your system with a graphical interface that looks and feels familiar to Microsoft Windows platforms. The Navigator provides capabilities for stepping through the initial iSeries and OS/400 setup and configuration, and then moves into providing a GUI for day-to-day management of servers. You get point-and-click functionality to manage a single or hundreds of servers.
- Includes EZ-Setup, which is a set of wizards that guides you through the initial setup of a new iSeries server. EZ-Setup helps you configure OS/400 Operations Console, set system values, configure security, create system administration user profiles, configure a connection from the iSeries to local area networks (LAN), set up a Domino, Internet, or a LDAP server, and back up your server.
- Includes Operations Console, which allows your PC to be used as the system console and to perform control panel functions. You can administer your local iSeries server as well as iSeries servers at different locations. Operations Console provides support for LAN, TCP/IP dial-up connectivity, and direct

cable attachment. This enables you to perform system functions such as IPLing the system and more.

New with V5R2

iSeries Access for Windows at V5R2 is enhanced in the following areas:

- Database Access
  - ODBC and OLE DB now support ROWID, 64K SQL statements, and additional descriptor information.
  - OLE DB can now support updated cursors for the SQL dialect.
  - OLE DB is thread safe.
  - Data transfer can support uploading more than 256 columns of data to a database file.
  - Data transfer now supports Lotus 123 Version 9 file format.
  - Data can be accessed from multiple independent auxiliary storage pools (IASPs).
- Security
  - iSeries Access for Windows can now use a Kerberos server for authentication to an iSeries. Kerberos tickets are sent to the iSeries in place of a user ID and password, so users do not get a security prompt if they choose this option.
  - Users of 56-bit encryption can use 128-bit encryption.
- 5250 emulation
  - Version 5.5 of the Personal Communications 5250 emulator is now included.
  - Bypass signon can now be used in conjunction with Kerberos tickets to avoid a signon screen.
  - Allows copy and paste of text across fields and lines without breaking a word or ending a line with an invalid word.
  - Allows moving the + or - sign before the number when copying and pasting (consistent with other Windows applications).
  - Offers improved error messages.
- Install
  - A task tray icon enables silent installations so that users know when a silent installation is occurring. Users can track the installation progress.
  - Customized install CD images can be created that include the SSL component.

- Windows support
  - Windows XP is supported
  - The ODBC and OLE DB components are ported to run natively on 64-bit Windows (on Intel Itanium hardware). Most other components run in 32-bit mode on 64-bit hardware (print drivers and SSL support do not run with 64-bit applications).

  Note: Windows 95 is no longer supported.

- iSeries Navigator

  The GUI interfaces that work with output queues and spooled files are expanded to include ad hoc access to PDF and e-mail functions. These functions are active when iSeries Navigator detects that Infoprint Server (5722-IP1) is installed. One or more spooled files can be selected and PDF and e-mail operations interactively invoked.

- Migration

  You can migrate to V5R2 iSeries Access for Windows from the following products:

  - Client Access Enhanced for Windows 3.1
  - Client Access for Windows 95/NT (V3R2.0 only)

  See Information APAR II13196 for more information on migration paths.

Ordering

iSeries Access for Windows is included with OS/400.

A license is required to run the PC5250 Emulation and Data Transfer components of iSeries Access for Windows. A license is not required to install these components.

References

For more information, refer to *iSeries Access for Windows–Setup, V5R2*, SC41-5507.

IBM iSeries Access for Web (5722-XH2)

iSeries Access for Web (5722-XH2) is the latest offering in the iSeries Access Family (5722-XW1). It provides lightweight Web browser-based access to iSeries servers.

iSeries Access for Web runs on WebSphere Application Server 4.0 and on Apache Software Foundation's Jakarta Tomcat. This version can be configured to run on more than one Web application server concurrently.

iSeries Access for Web		
Product number	5722-XH2	
Minimum OS/400 level	V5R1	
Program size	170 MB	
HIPO	1013	
Availability	4 June 2002	
Software type	Software Subscription	
Installation prerequisites	iSeries Access (5722-XW1) See *iSeries Access for Web Version5*, SC41-5518	
Related products	iSeries Access for Windows (5722-XE1 and iSeries Access for Wireless (5722-XP1)	
Replaces product	5722-XH1	
Web link	`http://www-1.ibm.com/servers/eserver/iseries/access/web/`	

Solutions and benefits

- IBM iSeries Access for Web is your solution for Web browser-to-server connectivity. Using the iSeries Access for Web functions, you can use your Web browser to access and administer your servers.
- iSeries Access for Web enables end users to leverage business information, applications and resources across an enterprise by extending the iSeries resources to the client desktop through a Web browser.
- Host Publisher and Host Publisher Studio are bundled with the 5722-XH2 iSeries Access for Web product to provide a complete Web-to-host integration solution.
- iSeries Access for Web has the following advantages:
  - Is server based.

- Is implemented using Java Servlet technology.
- Uses industry standard protocols–HTTP, HTTPS, and HTML.
- Is lightweight, requiring only a browser on the client.
- Provides access to 5250 user interface, database, integrated file system, print, jobs, batch commands, and messages.

Features

iSeries Access for Web includes the following features:

- Runs on the iSeries server, not the desktop:
  - Works with any desktop browser, NetScape, Internet Explorer, and more
  - Downloads HTML pages to desktop browser
- Runs on any desktop with a browser
  - Linux, Windows, Macintosh, UNIX, AIX, Network, Stations, OS/2
  - Uses standard HTTP or HTTPS (for SSL) ports
- 5250 interface features include:

  Custom defined workstation (device) ID, interaction with the keyboard (don't have to click the mouse for a key), macros, keypads, 132-columns, and customizable
- iSeries DB2 UDB database access

  GUI access to upload and download data (for example into an Excel spreadsheet). Many database functions such as insert, delete, update, and query are provided
- iSeries Access for Web provides access to iSeries resources
  - Use iSeries printers and printer output (plus .PDF)
  - Work with Jobs, send and receive messages, run non-interactive CL commands (with Prompt support)
  - A simple interface for working with information in the IFS, including download and view capabilities
- Workflow support

  E-mail work output anywhere (from database request, CL commands, or file system), or store in yours or others' Personal Folders.
- Provides a window to your iSeries

  Customize the Access for Web front page to be your iSeries connection starting point or window. Run 5250 applications and other tasks from there.
- Supports the following Web application servers on V5Rx iSeries servers:
  - WebSphere 4.0 Advanced Edition

- WebSphere 4.0 Advanced Single Server Edition
- ASF Tomcat 3.2.4

Note: WebSphere 3.5 users should continue to use V5R1 iSeries Access for Web.

New with V5R2

New functions introduced in this release include:

- iSeries Access for Web now contains its own 5250 interface and no longer uses the WebSphere Host Publisher XML Gateway when starting 5250 sessions. This new 5250 interface contains many additional capabilities, for example:
  - Workstation ID (device ID) can be configured and provides wildcard support similar to the PC5250 emulator in iSeries Access for Windows.
  - Two switchable views, Web view and traditional view, are each fully customizable.
  - Function Keys and Page Up and Page Down support (works with Internet Explorer 5, and later browsers, and requires JavaScript).

  For more details on the capabilities in the 5250 interface, refer to:

  `http://www.ibm.com/eserver/iseries/access/web/5250.html`
- Jobs support is now included in iSeries Access for Web. Users can now view jobs they've submitted and server jobs working on their behalf. These jobs can also be managed using the hold, release, delete, and view job log commands.
- Batch commands have been enhanced. Commands can now be saved and retrieved later. They can also be searched by name or description. For example, users can enter crt*, *dev, or *prt, or work with active jobs to find what they want.
- Database functions have been enhanced. Results of an SQL statement can now be in PDF format. Users can configure functions such as page size, orientation, margins, table header and footer, column heading, table style, and alignment, or upload or download .XML, so that data can be interchanged with other XML-enabled applications.
- Integrated file system (IFS) enhancements include copy file, rename file and directory mail file, delete file and directory, and create directory.
- Mail users can e-mail the results of a database, CL or file command, or PDF view of print information to another user. This can be used as a one-step method of distributing information across a network, even to non-iSeries users.

- Personal folders reside on the Web server and can be accessed only by the owner. This can be combined with the new mail function to notify users when new items are placed in a folder. This is an easy way to avoid sending large attachments and can be used to improve workflow.
- Printer output can now be viewed as PDF. For full-function viewing, the IBM InfoPrint Server (5722-IP1) needs to be installed. PDF viewer is required on the PC. Also, GIF viewing is improved in this release, with better resolution (300 dpi), and more printer-friendly views.
- V5R2 iSeries Access for Web does not support WebSphere 3.5. V5R1 iSeries Access for Web was delivered with a product identifier of 5722-XH1 and supported WebSphere 3.5. In V5R2, a number of changes were made to iSeries Access for Web to use the technology available when running under WebSphere 4.0 or Apache Software Foundation Tomcat Web application servers. These changes do not allow V5R2 iSeries Access for Web to support WebSphere 3.5.

IBM WebSphere Host Publisher (5724-B81)

WebSphere Host Publisher enables 5250 applications to run unchanged on the iSeries in the WebSphere Application Server (standard or advanced) environment. Host Publisher includes two components:

- Host Publisher is the runtime component
- Host Publisher Studio is the development toolkit component

Using the Host Publisher Studio component with a simple graphical wizard-like interface, 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 a simple way to move customer applications to the Web with minimal effort, and allows the iSeries to easily play a powerful role in Web serving.

WebSphere Host Publisher		
Product number	5724-B81	
Minimum OS/400 level	V5R1	
Availability	4 June 2002	
Software type	Software Subscription	

WebSphere Host Publisher	
Installation prerequisites	iSeries Access (5722-XW1) WebSphere Application Server V4 (5733-WA4 or 5733-WS4)
Related products	iSeries Access for Windows (5722-XE1) and iSeries Access for Wireless (5722-XP1)
Web links	http://www.ibmlink.ibm.com/usalets&parms=H_202-132 http://www-1.ibm.com/servers/eserver/iseries/access/pdf/v5r2whitepaper.pdf

Solutions and benefits

WebSphere Host Publisher is a flexible programming tool to modernize your applications and make your users more productive. Benefits include:

- WebSphere Host Publisher enables you to quickly and easily reuse and extend your legacy applications as new Web services and leverage your existing skills and implementations when creating new Web services. WebSphere Host Publisher takes advantage of IBM's strategic WebSphere Application Server technology.
- Turn green-screen applications into exciting and easy-to-use browser applications without modifying any source code.
- Combine multiple applications into a new-looking, single application without modifying source code.
- With WebSphere Host Publisher, you can use parts of a 5250 application, add a database access application, or use parts of a Visual Age for Java application.
- Bring together multiple host and database applications into a single new looking Web application without changing the backend applications

Features

WebSphere Host Publisher allows you to work with 5250 application tasks, such as entering input, extracting output, and representing the tasks as reusable Java bean components without making any changes to the existing 5250 applications. Unlike other telephone twisted pair (TTP)-based products, WebSphere Host Publisher eliminates the need to force-fit a session-based protocol (TN5250) over a sessionless (HTTP) connection, and it keeps the 5250 tasks running on the iSeries server.

Other feature include:

- Work with OS/400 UIM screens using WebSphere Host Publisher and easily turn them into exciting Web applications that can be accessed from a browser

- Create new DB2 UDB for iSeries tasks, such as performing SQL inserts, updates, and deletions, using Java Database Connections (JDBC), and then representing them as reusable Java bean components.
- Integrate Host Java components, such as host access beans, database access beans, or other Java applications using the Studio's interactive application builder JavaServer Pages (JSP) with no changes to the existing Java applications.

New with V5R2

As part of the WebSphere 4.0 environment, the following enhancements are included in WebSphere Host Publisher:

- J2EE application support

  Applications produced by Host Publisher Studio comply with J2EE, an industry-standard architecture intended to reduce the cost and complexity of developing enterprise applications. J2EE applications can be deployed rapidly and enhanced easily as the enterprise responds to competitive pressures. A J2EE application takes the form of an Enterprise Archive (.ear) file into which all the application's pages, Java objects, and resources are assembled.
- If you have Host Publisher applications on the server developed with an earlier level of the product, they must be migrated to Version 4.0. A migration tool is provided.
- JavaServer Pages 1.1 support

  Host Publisher Studio now produces JSP pages at the JSP 1.1 level. Applications with JSP 1.0 tags still run, but applications with JSP 0.91 tags (created prior to Host Publisher Version 3.5) need to be migrated. Two migration tools, one on the Studio machine and one on the server, are provided with the product.
- Enterprise JavaBeans (EJB) 1.1 support

  Host Publisher now builds EJB-based applications supporting the EJB 1.1 specification level. EJB access beans developed with an earlier version of the product must be migrated to the 1.1 level. A migration tool is provided as part of Host Publisher Studio.

IBM iSeries Access for Wireless (5722-XP1)

iSeries Access for Wireless provides access to iSeries administrative functions and development tools intended for wireless devices such as personal digital assistants (PDAs) and Internet-enabled phones. Using the functions of the

iSeries Access for Wireless licensed program, you can use your wireless device to access and administer your servers.

iSeries Access for Wireless consists of two separate services that can be used individually, or together, to provide the access you need:

- iSeries Navigator for Wireless
- IBM Toolbox for Java 2 Micro Edition

iSeries Access for Windows		
Product number	5722-XP1	
Minimum OS/400 level	V5R1	
Program size		
HIPO		
Availability	4 June 2002	
Software type	Software Subscription	
Related products	iSeries Access for Windows (5722-XE1) and iSeries access for Web (5722-XH2)	
Web link	`http://www-1.ibm.com/servers/eserver/iseries/access/expresslinks.htm`	

Solutions and benefits

- iSeries Navigator for Wireless provides a user interface for performing some systems management activities from wireless, handheld devices. As a network administrator, you can monitor your iSeries server while you are away from the office.
- IBM Toolbox for Java 2 Micro Edition provides a set of Java classes that allow you to develop Java programs to access iSeries servers from wireless, handheld devices. You can use these classes to write client/server applications that work with data and resources on your iSeries server. For example, you can access iSeries database data using functions similar to JDBC, an industry standard.
- With iSeries Navigator for Wireless, administrators have even more flexibility in how they access and interact with Management Central. iSeries Navigator for Wireless allows administrators to remotely monitor and manage system performance, status, jobs, and messages using an Internet-ready telephone, a PDA with a wireless modem, or a traditional Web browser on a workstation.

Features

iSeries Access for Wireless allows you to perform the following functions:

- Watch system status.
- View properties of the system.
- View detailed summaries of commands
- Manage Integrated xSeries Servers for iSeries. Run commands on all Integrated xSeries Servers at the same time or on a single Integrated xSeries Server, start the Integrated xSeries Servers, or shut them down.
- Run OS/400 commands across multiple systems.
- View and interact with monitors.
- View the metrics and current values being monitored, as well as the top 20 items (jobs, disk units, and so forth) that make up the metric value. Work with jobs listed in the monitor (display details, hold, release, and end).
- View all jobs and messages across systems matching monitor criteria. See metrics and current values being monitored. Work with the jobs and messages listed in the monitor (display details, hold, release, end, delete, and reply).
- View detailed status of files, including system path, size, date modified, and the text that triggered the file.
- View business-to-business transaction details, and see metrics and current values being monitored.
- Limit what users can do by enabling read-only support, or by setting user-access levels with Application Administration. Allow users to view status information without the ability to take action.

New with V5R2

You can now work with Management Central tasks, work with file monitors and B2B Activity monitors, and customize your display.

System Management

System Management

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IBM licensed programs: System management products and 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 Console: Direct Attach, LAN, and Remote	N/A	on page 762
IBM eServer Technical Support Advantage	N/A	on page 766
IBM Backup Recovery and Media Services (BRMS) for iSeries	5722-BR1	on page 779
PATROL for iSeries - Predict	5620-FIF	on page 790
IBM Advanced Job Scheduler for iSeries	5722-JS1	on page 783
IBM Managed System Services for iSeries	5722-MG1	on page 785
IBM Performance Tools for iSeries	5722-PT1	on page 788
IBM Content Manager OnDemand for iSeries	5722-RD1	on page 791

Product or service name	Product number	Refer to
IBM System Manager for iSeries	5722-SM1	on page 786
IBM Content Manager for iSeries V5R1	5722-VI1	on page 793

iSeries Operations Console: Direct Attach, LAN, and Remote

Operations Console is the evolving interface for systems management for operations. The iSeries 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 iSeries 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 function 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 server and the operations staff are in physically separate locations.

iSeries Operations Console features

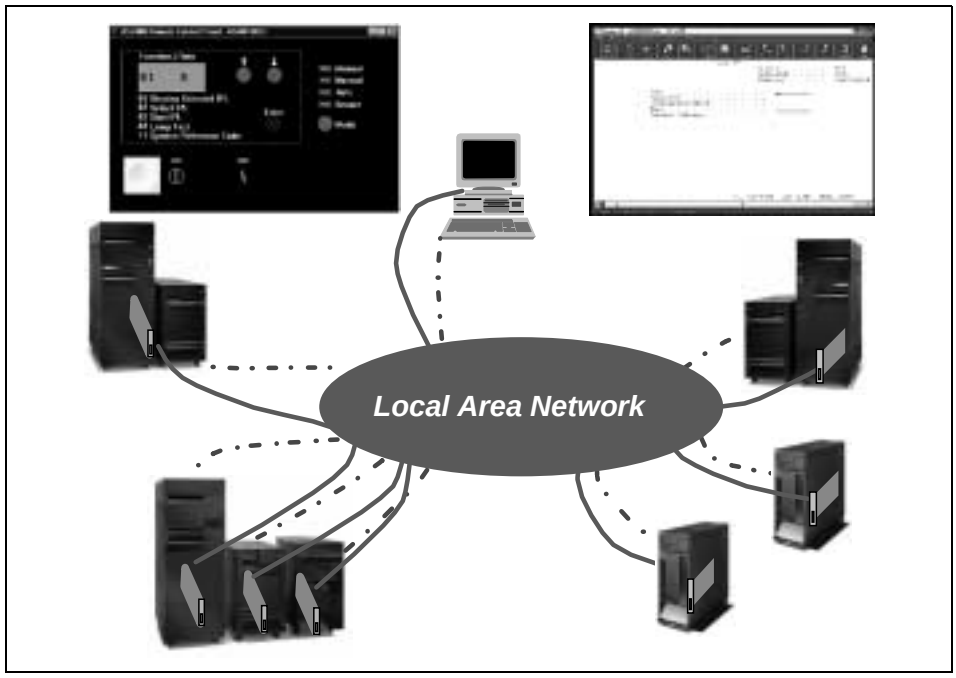
Operations Console enables connections across a local area network (LAN), as well as enabling directly cabled and dial-in (modem) connections. A single PC can have multiple connections to multiple iSeries servers and can be the console for multiple iSeries servers. One implementation example is a logically partitioned server using the same PC as the console for all partitions. Since each partition is considered a separate iSeries server, a separate dedicated 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.

These scenarios are illustrated in the following figure.



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**: This 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**: This is not a new concept. These profiles 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 for which this profile has been granted authorization. New for V5R1, you can create service user profiles yourself and grant authority for specific 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 entries 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 or 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 (that is, the 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 #0382 Remote Control Panel Cable 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 PCI Cable with a new order. It is shipped with an upgrade if that cable is not on the configuration.

With the Service Tools Security enhancements available with OS/400 V5R1, the Operation Console over the LAN connection is highly secured. Only one PC can use a Service Tools Device Profile after a successful connection is established. You can also encrypt the traffic between the console and the server by installing a Client Encryption product on the Operations Console PC (5722-CEx) and the Cryptographic Access Provider product (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 PC operating system (required for local console when remote PC access is desired). 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 #0382 Remote Control Panel Cable was *withdrawn from marketing* on 02 July 2002.

The iSeries Model 270, 820, 830, 840, and 890 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.

iSeries Navigator can be enabled from the Operations Console. Advantages include:

- Centralizing system management functions through a single asynchronous connection to the iSeries server using the iSeries console, Remote Control Panel capabilities, and iSeries Navigator on one PC.
- You can write Windows applications to perform Control Panel functions with an OS/400 Control Panel Sockets API.
- The 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 iSeries 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 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 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 server. This iSeries server runs without a locally attached console device. The 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 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 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. If PC5250 or IBM Personal Communications Version 4.2 or later is not already installed, a 5250 emulator is installed during the Client Access Express installation. 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 control panel). 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 *AS/400e to IBM @server iSeries Migration: A Guide to System Upgrades at V4R5 and V5R1*, SG24-6055.

You can find setup information 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**.

IBM eServer Technical Support Advantage

An important aspect of technology is technical support that helps make that technology work for us as people. The IBM @server Technical Support Advantage is a comprehensive set of resources available to IBM customers, each focused on one objective: the simplification and streamlining support of each IBM @server solution. It offers easier access to total iSeries solutions in this increasingly Web-based world.

The Technical Support Advantage initiative offers total server support that you need for today's e-business world. You receive 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.

Technical Support Advantage is IBM's total solutions focus for iSeries 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 Technical Support Advantage at:

`http://www.ibm.com/eserver/techsupport.html`

IBM has expanded its @server Technical Support Advantage initiative to include more easy-to-use, proactive, and personalized tools.

Note: IBM @server Technical Support Advantage replaces Extreme Support Personalized (ESP) at V5R2.

Technical Support Advantage Registration is now simpler for access to registered iSeries Technical Support Advantage functions on the Web. A single user ID and password through IBM Registration (IR) simplifies the Web logon process. There is no need to keep track of multiple user IDs and passwords. A single user ID (name) and password on the Web enables access to many registered Web functions. Registered users migrate to the new IR function through guided steps on the Web when they access registered Web functions.

An IR user ID and password is required when:

- You already have access to iSeries Technical Support Advantage registered functions
- You need to access registered Technical Support Advantage functions during the migration period using your old user ID and password.
- You need to use the new IR user ID and password.

Notice 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`

Click **Register**.

Technical Support Advantage features and functions for iSeries customers include:

- Management Central-Pervasive for remote management of servers
- Access to IBM @server Technical Support Web sites

- IBM Electronic Services for iSeries
- Universal Connection - ECS over TCP/IP
- PM400e Integrated with Workload Estimator
- Physical Device Placement Assistant (PDPA)
- Software Inventory Utility (SIU)
- iSeries and AS/400 University
- Web interface to manage software keys
- Enhanced software knowledge base
- Online Disk Arms Calculator (ODAC)
- Simplified PTF notification and delivery

For a complete description of the features and functions of IBM @server Technical Support Advantage, go to:

`http://www-1.ibm.com/servers/eserver/techsupport.html`

Management Central-Pervasive

Management Central-Pervasive (MC-Pervasive) is an OS/400 supported function that allows network administrators to monitor the performance and status of their iSeries servers while away from their workstation or office. Using an Internet-capable wireless telephone, personal digital assistant (PDA), or Web browser, the administrator can check on iSeries server status and monitor performance metrics on their systems.

A Web server and WebSphere Standard Edition are setup on the system as a host for Management Central information. This requires the installation and setup of a V4R5 iSeries HTTP application server that supports Java servlets on the Management Central central server. Configure this server to run the Management Central-Pervasive servlet to which the “client” talks. One example of an HTTP application server that supports this function is the no-charge WebSphere Application Server for AS/400 Standard Edition V3.0.2 (or later).

Management Central-Pervasive runs from a Web browser running on PCs or Network Stations. Additional functions include the ability to:

- 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

This support is offered with a functional PTF (offered in the English language only).

Suggested reading

For more information, see the IBM @server Solution Connection Web site at:

`http://www.ibm.com/eserver/iseries/services`

For Management Central-Pervasive information, go to the iSeries Navigator for Wireless Web site at:

`http://www-1.ibm.com/servers/eserver/iseries/navigator/pervasive.html`

Easier access to IBM Technical Support Web sites

You can interlink technical support Web sites with other IBM technical support sites. Easy access simplifies support. You can access what you need from the following 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.

These services are country (region) specific. Contact your IBM Marketing Representative for further information.

IBM Electronic Services for AS/400

IBM Electronic Services for AS/400 supports selected European markets and the United States. 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 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

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 OS/400 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 VPN gateway.

IBM offers connections through VPN to provide secure connections over the Internet.

The Universal Connection enables a variety of Technical Support Advantage 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). IBM secures your customer data behind a firewall and uses the data exclusively to provide you IBM's 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
- **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 iSeries Access. See the following Web site for further details:

`http://www.ibm.com/servers/eserver/iseries/access/`

To take advantage of these capabilities, use the EZ-Setup wizard at system setup or use the Technical Support Advantage wizard located under Management Central in iSeries Navigator.

PM/400e Integrated with Workload Estimator

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 and 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 available from OS/400 V4R5 onward. In addition, the ability to inventory multiple systems hardware and software information is enabled over this connection. Check the following Web site for the PTFs that are required to enable these functions:

`http://www.ibm.com/eserver/iseries`

Workload Estimator currently helps you size system needs based on estimated workloads for specific workload types. Workload Estimator and PM/400e work with one another. Through a Web-based application, 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 Workload Estimator (for example, Domino, WebSphere, Java, and others) can be included in the sizing. With the flexibility to adjust growth rates and time horizons, the output includes a 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 reflect usage and trends at a partition level. The reports include information on:

- **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 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 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.

You can 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 can save time and increase accuracy of feature installations for Customer Setup (CSU) installations. PDPA helps iSeries customers quickly identify where to install features as Customer Install Features (CIFs) are added to the system.

The PDPA tool is available for no additional charge. To access the tool, register for its use 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 170, 270, 8xx, 7xx, 6xx, S20, S30, S40, SB2, and SB3 models, and #5065/#5066 Storage PCI Expansion Towers.

Software Inventory Utility (SIU)

This iSeries software upgrade tool can help IBM Customers and Business Partner sales teams save time and improve the accuracy of their OS/400-related software upgrades. SIU also enables customers to easily manage their iSeries 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 installed 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 in English only and can be downloaded from the Web site:

`http://www-1.ibm.com/servers/eserver/iseries/sftsol/siu.htm`

After the customer submits their request to upgrade, a “local-language” ibm.com center directly contacts the customer to place their order.

Services Network

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 iSeries. You can find a list of service providers on the Web at:

`http://www.ibm.com/as400/service/`

Select the general type of services you need, and you are presented with a list of companies who can provide those services. The Network is a forum for companies who provide iSeries services to promote their services capabilities on the Web site. The Network is a method to collaborate with other service-provider members.

iSeries and AS/400 University

IBM Customers and Business Partners can access iSeries education offerings available through a single 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-1.ibm.com/servers/eserver/iseries/education/`

iSeries Software Knowledge Base

The iSeries-registered Software Knowledge Base contains resolutions to customer-reported problems and many technical tips. The knowledge base is compiled by Support Center experts in Rochester, Minnesota, home of iSeries development. IBM expert technical representatives continually add to the knowledge base.

The knowledge base has several parts that can address your needs for information, whether you need a quick answer or help with a more detailed technical issue:

- **Technical tips:** These include tips and advice beyond the scope of the information typically provided in the system documentation. They are generally focused on installation and configuration issues. Tips can also highlight information critical for a successful implementation.

  There are two types of technical tips:

  - Tips available to all users
  - Tips available to Monthly Support Line users in the U.S., Netherlands, Turkey, and Australia

  Tips for Monthly Support Line users include those offered for all users, with more advanced technical tips and advice. Access to these advanced tips requires an authorized user ID and password.

- **Resolutions to customer-reported problems:** Resolutions to customer-reported problems are useful summaries of actual problems reported by customers, along with a brief description of the resolution. The content included describes usage-related problems and software defects. The searchable repository of unique problems and resolutions is categorized in several ways, including a “hot problem” topic, so you can quickly tell which problems are critical. Access to these problems and resolutions requires an authorized user ID and password.

To access knowledge base documents, go to:

`http://www-912.ibm.com/supporthome.nsf/document/10000051`

Online Disk Arm Calculator (ODAC)

The Online Disk Arm Calculator 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 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 worldwide.

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 on the Web at:

`http://www.as400service.ibm.com/supporthome.nsf/document/23122320`

PTF notification and delivery

Technical Support Advantage offers tools to enable notification and delivery of PTFs, such as:

- The ability to electronically download Group PTFs from IBM Service.
- Commands to manage cover letters on the system such as 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 installation instructions.
- Progress indicators during PTF load and apply processing. This includes progress indicators when PTFs are being applied or removed during the IPL.
- An 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 ECS and Electronic Service Agent connectivity through Universal Connection. In addition to dial-up support over TCP/IP via ATT Global Network Services, the Universal Connection supports Internet connections using a 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 an easy-to-use 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 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 **Submit** to submit your request.

You can locate iPTFs on the Web at:

`http://www-912.ibm.com/supporthome.nsf/document/10000083`

iSeries Software Keys Web Interface

Installing and upgrading software keys is simplified, especially if you manage several systems or if it has been awhile since you initially received the software keys used for an upgrade. You can view, download and install, or print a copy of your software keys directly from the Web. You can e-mail a copy of your keys to your IBM Representative or Business Partner.

The Web-interface solution allows you to directly manage your software keys via the internet for each of your iSeries servers. You can find this service on the Web at:

`http://www.ibm.com/servers/eserver/iseries/wwkms/`

The IBM autonomic computing initiative and the iSeries server

The IBM autonomic computing initiative (formerly known as Project eLiza) is an IBM initiative to develop self-managing for autonomic computing, which reflects a vision to develop and deploy intelligent systems that self manage and regulate themselves, much the way the human autonomic nervous system manages the human body. This vision is motivated by the tremendous complexity in today's computing environments and the resultant difficulties, and expense, of managing them. For a more complete discussion of the autonomic computing direction, see the Autonomic Computing Manifesto:

`http://www.research.ibm.com/autonomic/manifesto/`

Many of the founding elements for the IBM autonomic computing initiative already exist in today's iSeries servers. V5R2 continues to build on many of the Project eLiza elements available in V5R1, such as:

- Self-optimizing dynamic LPAR and workload management
- Self-configuring graphical wizards
- Self-protecting digital certificates

Extensive additional graphical wizards are added with V5R2 to the iSeries Navigator to automate several complex configuration tasks, along with increased flexibility to monitor and manage storage, jobs, and database tasks.

The IBM autonomic computing initiative: New with V5R2

The highlights offered in V5R2 for autonomic computing include:

- Self-protecting Enterprise Identity Mapping for user identity management.
- Self-protecting Digital Certificate APIs for ISV applications to assist with unauthorized application modifications.
- Self-optimizing dynamic LPAR to allow resource movement for virtual processing units between Linux and OS/400 partitions.
- Self-optimizing index advisor and statistic collections for DB2 UDB for OS/400, allowing users to avoid manual tasks associated with SQL optimization.
- Self-healing independent disk pools for switched disk clustering.
- Self-healing Agent Building Learning Environment (ABLE) enabling through building intelligent agents on the iSeries to assist with problem determination and diagnosis processes.

  The ABLE research project is made available by the IBM TJ Watson Research Center. For additional information, see:

  `http://www.alphaworks.ibm.com/tech/able`

  Extensive self-configuring graphical wizards to simplify network, performance, security, storage, work management, and LPAR configuration tasks.

The IBM autonomic computing initiative is a key element of enabling grid computing for commercial applications, and is focused on delivering end-to-end systems management and self optimization across the entire IT infrastructure. This capability allows a variety of dissimilar systems to be aggregated and shared in a transparent manner.

Tivoli Storage Manager (TSM) V5.1 (5698-TSM)

IBM Tivoli Storage Manager V5.1 enables high availability of business applications by providing superior data protection and resource utilization that grows as your business grows. IBM Tivoli Storage Manager has two unique features:

- Incremental backups that only backup the files that have changed since the last backup
- The ability to effectively use the disk and tapes in its storage hierarchy.

The combination of these two benefits means less data being sent over the network, less tape drives needed to write the data, and fewer tapes required to store that data.

TSM does more than just backup your client's data. It has numerous products that integrate directly with the centralized server. These products allow you to backup your application databases, help you generate a plan for recovering from a disaster, and generate in-depth reports to help you analyze and forecast your backup procedures.

On the iSeries server, TSM can be optionally combined with Backup and Recovery Media Services (BRMS - 5722-BR1) to provide a single centralized backup and recovery solution to your entire storage server environment.

Tivoli Storage Manager V5.1	
Product number	5698-TSM
Replaces product	Tivoli Storage Manager V3.1
Minimum OS/400 level	V5R1
Related products	Backup Recovery and Media Services (5722-BR1)
Web links	`http://www.tivoli.com/products/solutions/storage/news.html` `http://www.tivoli.com`

Features

The features and benefits of IBM Tivoli Storage Manager V5.1 are:

- Improved integration with BRMS (5722-BR1). BRMS contains many save and restore functions for the iSeries customer that can optionally be used with TSM V5.1, because some TSM V5.1 functions provided on other platforms (operating systems) can be performed by BRMS on iSeries servers.
- Improved application availability during backups with online, non-disruptive image backups. Applications remain available while online backups create a point-in-time image backup of the file system. Image backups complement progressive incremental backups and can be used for faster recovery of large amounts of data in file systems with large numbers of files.

Performance enhancements

- Recovery on Windows 2000 and Linux is enhanced by fast image restores.
- Parallel restores provide a multisession restore capability to further enhance performance. The time to create recovery tapes for local and off-site vaulting

is reduced with simultaneous writes to multiple copy storage pools during a backup and archive with LAN clients.

- Known as self-tuning, TSM uses an intelligent, adaptive algorithm to optimize performance for individual customer environments, while minimizing administrative intervention.
- Restore time can be improved by staging data to disk or by consolidating data on tape.
- Client backup set restore times are also improved. Backup sets can be used to create media for rapid recovery or instant archive and to restore data to backup-archive clients locally without a network or TSM server.
- Improved backup performance is available with journal-based backup support on cluster configurations.

IBM Backup Recovery and Media Services for iSeries (5722-BR1)

Backup Recovery and Media Services is the IBM strategic solution for planning and managing the backup of your iSeries server.

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, with a significant number of functions enabled through a GUI interface as a plug-in to iSeries Navigator. The list-supported windows and cursor-sensitive help is 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.

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. Parallel backup also supports *ALLUSR and generic names.

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. V5R2 allows these systems to interconnect via Native TCP/IP. A BRMS network system shares the inventory and policies associated with media managed by a central BRMS system.

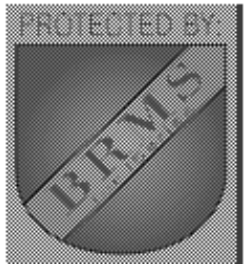
- **BRMS Advanced Functions Feature**

  BRMS Advanced Functions Feature enables Hierarchical Storage Manager (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, and 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 frequency of use.

BRMS is available on the Keyed Stamped Media shipped with every iSeries server. BRMS 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	
Minimum OS/400 level	V5R1	
Program size	Base - 213 MB Option 1 - 88 MB Option 2 - 89 MB	
HIPO	-	
Availability	25 May 2001	
Software type	Software Subscription	
Installation prerequisites	5722-SS1 Option 18 Media and Storage Extensions	
Related products	Tivoli Storage Manager (5698-TSM) Operations Navigator (5722-XE1)	
Replaces product	5769-BR1	
Web link	http://www-1.ibm.com/servers/eserver/iseries/service/brms/	

New with V5R2

BRMS is refreshed at V5R2 to make it more powerful and easier to use. Functions new with V5R2 include:

- Native TCP/IP support for the BRMS Networking feature. Media information (Save History) on a BRMS network can also be shared.
- Lotus online incremental backup and point-in-time recovery of Lotus Server databases. This function is also available with supporting PTFs for V4R4/V4R5 and V5R1.
- Integrated support for named independent auxiliary storage pools (IASPs 33-255)
- The duplication of media supports object detail. Object detail is not copied, but is “keyed” to the original saved object detail.
- The BRMS Maintenance command (STRMNTBRM) includes an option to the reorganize the BRMS databases.
- Additional Tivoli Storage Manager (TSM) client functions, including provision for a 64-character password and support for the Password Access Generate client option.

- iSeries Navigator BRMS plug-in functions include the addition of a Move Policy wizard, more backup history filters and more options for printing BRMS reports.

Features

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. 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). Other features include:

- *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. A 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.
- An *incremental backup and restore of Domino server files* enables the ability to manage only the changes since the previous backup or restore. Version R5.0.7 or later of the Lotus Domino Server for iSeries (5769-LNT) is required.
- 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.
- An *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 all IBM tape drives attached to the iSeries server which support this function.
- *Hierarchical Storage Management* 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 user data on any TSM server, including another iSeries, AS/400e, RS/6000, S/390, or 3466 Network Storage Manager. BRMS can also be used on multiple iSeries servers with a shared inventory support, which allows objects saved from one system onto TSM server storage to be restored to another iSeries or AS/400e server managed by the same TSM server.

The BRMS Application Client has the look and feel of BRMS and iSeries. It is not a TSM Backup or Archive client. A TSM server is simply another device that BRMS uses for your save and restore operations.

Suggested reading

For information related to the BRMS Client to TSM, see *Backup Recovery and Media Services for iSeries*, SC41-5345.

See the following Web site for additional information on BRMS and TSM performance:

`http://www-1.ibm.com/servers/eserver/iseries/service/brms/adsmperf.htm`

IBM Advanced Job Scheduler for iSeries (5722-JS1)

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 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.

IBM Advanced Job Scheduler for iSeries	
Product number	5722-JS1
Replaces product	5769-JS1
Minimum OS/400 level	V5R1
Installation prerequisites	None
Related products	IBM Managed System Services for iSeries (5722-MG1)
Web link	http://www.ibm.com/servers/eserver/iseries/jscheduler

New with V5R2

IBM Advanced Job Scheduler is enhanced with the following functions added to the iSeries Navigator plug-in GUI with V5R2:

- Create a job schedule independent of a job
- Display job creation details based on schedule
- Support of a Holiday Calendar
- The Job Controls and Applications functions are combined.
- Monitor message support
- More parameters for authority, including job and function authorities for printing. A replace authority is available.
- *DAY and *DATE schedule codes are increased to 30 entries.
- Time default is now taken from the QTIME system value.
- iSeries command prompt (F4) is now available.
- The Dependency Report is enhanced to provide an Exception Report.

Features

Leading-edge scheduling functions include:

- Automation of scheduling jobs
- Management of the batch job stream
- Forward planning and production forecasting
- Full calendaring of operations
- Dependency scheduling
- Job, active, and resource dependencies
- An update of job defaults
- Periodic frequency based on start time
- DDM fields to specify device and location

These features allow 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 iSeries Navigator and Management Central functions. The user interface provides a full graphical user interface and inter-operates with users who continue to use a “green screen” interface.
- 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.

IBM Managed System Services for iSeries (5722-MG1)

The Managed System Services for iSeries (MSS) licensed program is part of an integrated offering Operation Control 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 or System Manager for iSeries-based networks.

The central site defines, schedules, and tracks software distribution (change management) requests sent to an iSeries 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).

The ability of the central site to define, schedule, and run these change requests one time or repetitively enhances significantly the unattended operation of remote iSeries 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.

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 performing IPL again can be scheduled to run automatically under IBM Managed System Services for iSeries control. MSS forwards the results of all change requests to the central site for tracking.

MSS supports unscheduled running of iSeries commands issued by the central site, without having to first sign on to the iSeries 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.

Managed System Services is enhanced at V5R1 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.

IBM Managed System Services for iSeries	
Product number	5722-MG1
Replaces product	5769-MG1
Minimum OS/400 level	V5R1
Installation prerequisites	None
Related products	System Manager for AS/400 (5722-SM1)

New with V5R2

Managed System Services is refreshed at V5R2 to include current code updates (via PTFs). No new function is added.

IBM System Manager for iSeries (5722-SM1)

iSeries objects can be sent directly to or received from iSeries libraries or through the local iSeries distribution repository with IBM System Manager for

iSeries. Non-iSeries objects can be received into, stored, and distributed from the iSeries distribution directory. The capability for the central site iSeries 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 System Manager.

Sending iSeries commands to remote iSeries servers using Managed System Services without signing on is intended for unplanned operations to be performed on one or more remote iSeries servers. An example may be deleting a particular file or library that has been found to no longer be in use. This support is generally equivalent to the NetView Remote Operations Manager MVS support and works with either NetView Remote Operations Agent/400 or MSS.

System Manager 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.

The System Manager for iSeries licensed program is part of the integrated offering Operations Control Center/400, which includes Managed System Services for iSeries.

IBM System Manager for iSeries	
Product number	5722-SM1
Replaces product	5769-SM1
Minimum OS/400 level	V5R1
Installation prerequisites	None
Related products	Managed System Services for iSeries (5722-MG1)

Features

System Manager for iSeries provides central site control for:

- Remote iSeries 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 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

  System Manager 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-iSeries (OS/2 and RISC/6000) files, programs and software. The change management functions support the integrated file system.

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.

The RUNSMGCMD, ADDCMDCRQA, and CHGCMDCRQA commands from System Manager for iSeries provide an option that allows end users to select a password that exceeds ten characters in length and does not restrict the character set allowed for password composition.

New with V5R2

System Manager for iSeries is refreshed at V5R2 to include current code updates (via PTFs). No new function is added.

IBM Performance Tools for iSeries (5722-PT1)

Performance Tools for iSeries is a program product that provides a set of reporting, analysis, and modeling functions to assist an iSeries administrator to manage the performance of the system. It provides printed and online reports. These can be in graphic or tabular form. The 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.

IBM Performance Tools for iSeries	
Product number	5722-PT1
Replaces product	5769-PT1
Minimum OS/400 level	V5R1
Installation prerequisites	None
Related products	PATROL for iSeries - Predict (5620-FIF)

New with V5R2

- Selected functions available in Performance Tools for iSeries are supported on the iSeries Navigator plug-in
- A graphical view of metrics is now available with the Display Performance Data (DSPPFRDTA) command.
- The ability to drill down to the intervals of interest
- Users can launch performance reports from the GUI and view them with the spooled file viewer.
- A simple interface is provided to convert down-level database files to the current release and delete old members.

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, BEST/1-400 Capacity Planner is integrated into Performance Tools for AS/400 at V5R1 and earlier. With V5R2, BEST/1-400 is replaced by PATROL for iSeries - Predict. All BEST/1-400 related commands and menu options are removed from Performance Tools for iSeries (5722-PT1) at V5R2 in all geographies except People's Republic of China.

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 previously. Select Status Type, Performance Reports, Capacity Planning, Programmer Performance Utilities, System Activity, Performance Graphics, and all the functions of the Agent.
- **Agent and Enabler** give the equivalent of Performance Tools Subset functionality for 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 servers based on PowerPC technology.

PATROL for iSeries - Predict (5620-FIF)

PATROL for iSeries - Predict is a new performance analysis and capacity planning product for iSeries at V5R2. Using existing performance data from Collection Services or STRPFRMON, PATROL for iSeries - Predict provides comprehensive response-time analysis and predictive modeling capabilities. The “what-if” analysis capabilities reveal the impact of changes, such as load, configuration, and users across the iSeries environment. With this approach, users can prevent performance, service and response-time problems before they occur, and ensure ongoing success by provisioning the right hardware upgrades, at the right time.

PATROL for iSeries - Predict provides powerful graphical planning, and is made up of two components:

- Create Model functions (similar to BEST/1) for identifying OS/400 jobs and assigning work to workloads based upon user ID, job name, OS/400 subsystem, and other categories. Performance Monitor database files from V4R2 and later are supported for input to creating the model.
- A work-station based (Windows PC) GUI for validating the model and performing capacity planning scenarios. The capacity planning component provides the following functions:
  - CPU, disk, and ASP (logical volume) capacity planning
  - Interactive feature utilization, variable interactive CPW for LPAR partition

- Percent growth per “time-period”
- HTML-based graphical displays for “reports” and bar charts
- Many more reports are now available, divided into seven report groups.
- Validate model (predicted compared to measured)
- Multiple CPUs can co-exist in a single model.
- Task pads for status messages, icons to indicate warning (threshold reached) and guideline reached per resource
- Ability to process performance data from multiple releases
- Allows for “what-if” scenarios by changing the system configuration or workloads

PATROL for iSeries - Predict	
Product number	5620-FIF
Minimum OS/400 level	V4R4
Availability	02 September 2002
Related products	5722-PT1
Replaces product	BEST/1-400 function of 5722-PT1

Limitations

Customers who use BEST/1 should be aware of the following limitations in this first release of PATROL for iSeries - Predict:

- No explicit modeling of IOPs and IOAs
- No explicit modeling of separate memory storage pools
- Limited RAID modeling detail
- No batch job modeling
- No release-level or application type performance adjustments
- No configuration recommendations
- No individual communications object modeling

IBM Content Manager OnDemand for iSeries (5722-RD1)

IBM Content Manager for iSeries delivers industry leading Enterprise Report Management, with high volume capture of computer output, advanced client solutions for desktop and standard Web browsers, automated storage management with advanced search and report mining capabilities, while

providing a platform for leading Electronic Document/Bill Presentment and Payment deployments.

Note: Prior to V5R1, Content Manager was known as EDMSuite OnDemand for AS/400 (5733-218) and Report/Data Archive and Retrieval System (R/DARS) for AS/400 (5763-RD1, 5716-RD1).

IBM Content Manager OnDemand for iSeries	
Product number	5722-RD1
Replaces product	EDMSuite OnDemand for AS/400 (5733-218) 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)

New with V5R2

The functions added in V5R2 include:

- Spool File Archive to Common Server.
- Common Server now provides access to data stored in both Spool File Archive and Common Server Formats.
- Migration tool to assist with migration to the Common Server.

Features

IBM Content Manager OnDemand for iSeries provides a high volume computer output to laser disk (COLD) system (which was recently renamed to Enterprise Report Management System) and extended archiving functions on disk, optical, or tape storage media.

Graphical administration functions are provided through iSeries Navigator, making OnDemand easy to setup, administer, and manage. Content Connect and client-based integration with ImagePlus Content Manager for iSeries 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 iSeries 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 98, Windows, Windows 2000 and Windows NT 4.0 SP5 or later, which 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 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.

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. An implementation of workflow functions

can improve process consistency, control, and quality and reduce process cycle time.

IBM Content Manager for iSeries V5R1	
Product number	5722-VI1
Minimum OS/400 level	V5R1
Installation prerequisites	**iSeries 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.
Related products	Content Manger OnDemand for iSeries (5722-RD1)
Web link	`http://www-4.ibm.com/software/data/cm/cmgr/`

Features

Capture, Audit, and Storage Management functions include:

- Import options provide the capability on the iSeries server to import and index an object into Content Manger for iSeries.
- 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 allows the VI/400 server to log user activity.

Folder options include a Recursive Auto-folder. Auto-folder is a VI/400 client application function and is supported for a single level of indexing. Auto-folder is a server function and is recursive.

Workflow decision point

VI/400 supports workflow variables of four categories:

- Workflow system variables
- Workflow user-defined variables
- Library variables
- External application variables

IBM Content Manager for iSeries 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 iSeries 5250 emulation
- Host-based application programming interfaces

Printing and Document Handling

Printing and Document Handling

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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
IBM Advanced Function Printing Utilities for iSeries	5722-AF1	on page 803
IBM Advanced Function Printing (AFP) PrintSuite for OS/400	5798-AF3 (V5 and later releases)	on page 805
IBM Advanced DBCS Printer Support for iSeries	5722-AP1	on page 808
AFP Font Collection	5648-B45	on page 800
IBM Dictionary and Linguistics Tools for AS/400	5769-DL1	on page 810
IBM Business Graphics Utility for iSeries	5722-DS1	on page 811
IBM Facsimile Support for iSeries	5798-FAX	on page 815
IBM Advanced Function Printing (AFP) Fonts for AS/400	5769-FNT	on page 813

Product name	Product number	Refer to
IBM Advanced Function Printing DBCS Fonts for AS/400 V4R3	5769-FN1	on page 814
IBM Infoprint Designer for iSeries	5733-ID1	page 746
IBM Infoprint Server for iSeries	5722-IP1	page 749
IBM Content Manager for iSeries	5722-VI1	on page 801
IBM Print Service Facility (PSF/400)	5722-SS1 options 36, 37 38	page 751

AFP Font Collection (5648-B45)

The IBM AFP Font Collection for Workstations and OS/400 provides fonts that can be used by most Advanced Function Presentation products. Skillful use of fonts in typography can dramatically improve the readability and effectiveness of your documents. The IBM AFP Font Collection CD is bundled and shipped with all orders of PSF/400.

The AFP Font Collection is designed to support printing on AFP/IPDS printers that accept host downloaded fonts using Print Services Facility or InfoPrint Manager.

AFP Font Collection		
Product number	5648-B45 V2.1.1	
Minimum OS/400 level	V5 or later	
HIPO	N/A	
Availability	30 June 2000	
Software type		
Installation prerequisites	5722-SS1 Option 36, 37, or 38	
Related products	Infoprint Server, Infoprint Designer, PSF/400 Advanced Print Utility, Page Printer Formatting Aid, AFP Toolbox, and iSeries Access	
Replaces product	5648-B45 V2.1.0	
Web link	http://www.printers.ibm.com/R5PSC.NSF/Web/AFPFontHome	

Solutions and benefits

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 in 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.

Features

- Provides a comprehensive set of AFP fonts for more effective, competitive documents
- Provides fonts for printing at 240 or 300 dpi, or higher resolutions using outlines
- Provides support for 48 languages, including double-byte (DBCS) languages
- Font design feature converts Adobe and TrueType fonts to AFP

Components

AFP Font Collection includes an optional Type Transformer and Utilities.

References

You can learn more about printing with the AS/400 or iSeries server at the following Web sites:

`http://www.redbooks.ibm.com`
`http://www.printers.ibm.com/R5PSC.NSF/Web/fsfont`
`http://www.printers.ibm.com/R5PSC.NSF/Web/as400overview`

IBM Content Manager for iSeries (5722-VI1)

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.

IBM Content Manager for iSeries		
Product number	P/N 20P5400	
Minimum OS/400 level	V5R1	
Program size	135.5 MB	
HIPO	1034	
Availability	25 May 2001	
Software type	Software Maintenance ► One Year 5733-M81 ► Three Year 5733-M82	
Installation prerequisites	http://www-3.ibm.com/software/data/cm/2002announcements.html	
Related products	Infoprint Server, Infoprint Designer, Advanced Print Utility, Page Printer Formatting Aid, AFP Toolbox, Client Access, and Client Access Express	
Replaces product	IBM Content Manager for AS/400 (5769-VI1)	
Web link	http://www-3.ibm.com/software/data/cm/cmgr/400/	

Solutions and benefits

This document imaging and work management system saves you money in many ways. Content Manager for iSeries 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.

Features

Content Manager for iSeries controls the capture, indexing, storage, and retrieval of documents as images. Content Manager for iSeries also provides both production and adhoc 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 Content Manager for iSeries. Workfolder Application Facility offers two interfaces, either traditional iSeries 5250 emulation or application programming interfaces (APIs).

Content Manager for iSeries can serve the needs of a small departmental organization or serve as an enterprise solution for a large corporation.

New with V5R2

- Enhanced Content Manager Advanced Workflow
- New multiple Windows Client and folder options
- Web access via standard browsers
- Multiple capture, audit, and storage management usability improvements
- Archive capabilities for SAP R/3 via support for Content Manager CommonStore for SAP

References

For additional information on Content Manager for iSeries, visit the IBM Image Web site at:

`http://www-3.ibm.com/software/data/cm/cmgr/400/`

IBM Advanced Function Printing Utilities for iSeries (5722-AF1)

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.

IBM Advanced Function Printing Utilities for iSeries		
Product number	5722-AF1	
Minimum OS/400 level	V5R1	
Program size	18.1 MB	
HIPO	1001	
Availability	23 April 2001	
Software type	Software Subscription 5733-SW1 or 5733-SW3	
Installation prerequisites	5722-SS1 Option 36, 37, or 38 PSF is required	
Related products	Infoprint Server, Infoprint Designer, Advanced Print Utility, Page Printer Formatting Aid, AFP Toolbox, and iSeries Access	
Replaces product	IBM Advanced Function Printing for AS/400 (5769-AF1)	
Web link	`http://www.printers.ibm.com/R5PSC.NSF/Web/AFPutilitiesHome`	

Solutions and benefits

Through the near What You See Is What You Get (WYSIWYG) editor, the user can interactively design, create, and verify AFP resources such as overlays. In addition to the AFP resource creation and management, it provides the capability to print users' data contained in a database file in various formats, with various fonts and barcodes on the IPDS printer without developing any application programs. As an example, it allows users to print barcode labels from data stored in the database file. With this program, users with various levels of experience, including non-programmers and users with a variety of industry requirements, can easily take full advantage of IPDS printer capability that is either not accessible to them now or accessible only with great difficulty.

Features

- **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.

New with V5R1

Advanced Function Printing (AFP) Utilities is enhanced with expanded duplex printing, image handling and application document design support, color and new barcodes (Australian Postal).

Ordering

IBM Advanced Function Printing Utilities for iSeries is shipped as a chargeable processor group based OS/400 licensed program option (LPO).

References

You can learn more about AFP on the following Web sites:

`http://www.redbooks.ibm.com`
`http://www.printers.ibm.com/R5PSC.NSF/Web/software+overview`

IBM AFP PrintSuite for iSeries (5798-AF3)

AFP PrintSuite for iSeries is a family of products to create electronic printing applications. The AFP PrintSuite for iSeries 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 iSeries family of advanced printing solutions is separately orderable. Versions of all four AFP PrintSuite solutions are available for V5R1 and later OS/400 versions.

The Print Services Facility feature of OS/400 is required to print the output generated by AFP PrintSuite.

IBM Advanced Function Printing (AFP) PrintSuite for iSeries	
Product number	5798-AF3
Minimum OS/400 level	V5R1
HIPO	N/A
Availability	25 May 2001
Software type	Software Subscription 5733-SW1 or 5733-SW3
Installation prerequisites	5722-SS1 Option 36, 37, or 38 PSF is required
Related products	Infoprint Server, Infoprint Designer, Advanced Print Utility, Page Printer Formatting Aid, AFP Toolbox, Client Access and Client Access Express
Web link	http://www.printers.ibm.com/R5PSC.NSF/Web/AFPPrintsuiteHome

Solutions and benefits

IBM AFP PrintSuite provides a selection of enabling tools to create advanced electronic documents from current application output. With AFP PrintSuite, you can:

- Improve the readability and appearance of documents with overlays, images, boxes, barcodes, and the use of typographic fonts
- Reduce paper and storage costs by replacing pre-printed forms with electronic forms
- Streamline production printing by automating the selection, processing, and distribution of spooled files using the Advanced Print Utility (APU) Monitor
- Connect SAP R/3 applications with new and existing AFP/IPDS printers

Features

The AFP PrintSuite for iSeries solution includes:

- Advanced Print Utility (APU) (Included as Part of 5798-AF3) 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.
- Page Printer Formatting Aid (PPFA) (5798-AF3) is a compiler for page and form definitions, to format 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. Infoprint Designer for iSeries (5733-ID1) provides a fully graphical interface to designing iSeries page/form definitions and should be selected instead of PPFA for most form document applications.

- AFP Toolbox for OS/400 (5798-AF3) 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:
  - Invoked from C, COBOL, and RPG programs
  - SAP R/3 AFP Print
- SAP R/3 (5798-AF3) 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.

Components

IBM AFP PrintSuite for iSeries is composed of:

- Advanced Printing Utility
- Page Printer Formatting Aid
- SAP R/3 AFP Print

Each can be ordered separately.

Ordering

IBM Advanced Function Printing Suite for iSeries is shipped as a chargeable processor group based OS/400 LPO.

References

You can search for AFP on the following Web sites:

`http://www.redbooks.ibm.com`
`http://www.printers.ibm.com/R5PSC.NSF/web/as400overview`

IBM Advanced DBCS Printer Support for iSeries (5722-AP1)

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

IBM Advanced DBCS Printer Support for iSeries		
Product number	5722-AP1	
Minimum OS/400 level	V5R1	
Program size	15.5 MB	
HIPO	1014	
Availability	25 May 2001	
Software type	Software Subscription	
Related products	Infoprint Server, Infoprint Designer, Advanced Print Utility, Page Printer Formatting Aid, AFP Toolbox, Client Access, and Client Access Express	
Replaces product	5769-AP1	
Web link	http://www.printers.ibm.com/R5PSC.NSF/Web/software+overview	

Features

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: 5722-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.

Ordering

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.

References

You can search for AFP on the following Web sites:

`http://www.redbooks.ibm.com`
`http://www.ibm.com/eserver/iseries/infocenter`

IBM Dictionary and Linguistics Tools for iSeries (5769-DL1)

Dictionary and Linguistics Tools provides 36 dictionaries and a set of dictionary access methods (APIs) to allow customers to write applications to access the dictionaries directly. There are advanced linguistic information built into each dictionary, such as hyphenation, synonyms, spelling aid, morphological identification, and tokenization.

IBM Dictionary and Linguistics Tools for iSeries	
Product number	5769-DL1
Minimum OS/400 level	V5R1
Program size	69MB
HIPO	1026
Availability	25 May 2001
Software type	Software Maintenance ► One Year 5733-M89 ► Three Year 5733-M90
Installation prerequisites	None
Related products	

IBM Dictionary and Linguistics Tools for iSeries	
Replaces product	Language Dictionaries (5716-DCT)

Solutions and benefits

Dictionary and Linguistics Tools allow you to write your own APIs and support more languages than the Language Dictionary product.

Features

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)

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.

Exercise and tutorial materials are supplied in the BGU User's Guide to provide the necessary familiarization.

IBM Business Graphics Utility for iSeries		
Product number	5722-DS1	
Minimum OS/400 level	V5R1	
Program size	6.3 MB	
HIPO	1027	
Availability	25 May 2001	
Software type	Software Subscription 5733-SW1 or 5733-SW3	
Installation prerequisites	None	
Replaces product	IBM Business Graphics Utilities for AS/400 (5769-DS1)	

Solutions and benefits

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.

Features

A chart management facility provides convenient storage, retrieval, deletion, modifications, renaming, and copying of charts. BGU highlights include:

- Menu-driven interface to business graphics functions
- Programming not required
- Extensive user options for creating charts such as:
  - Bar charts
  - Line graphs
  - Surface charts
  - Histograms
  - Pie charts
  - Venn diagrams
  - Text charts

Ordering

IBM Business Graphics Utility for iSeries is shipped as a chargeable processor group-based OS/400 LPO.

IBM Advanced Function Printing (AFP) Fonts for AS/400 (5769-FNT)

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 for OS/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 (AFP) Fonts for AS/400		
Product number	5769-FNT	
Minimum OS/400 level	V5R1	
Program size	0.5 - 50 MB	
HIPO	1520	
Availability	25 May 2001	
Software type	Software Subscription	
Installation prerequisites		
Related products	Infoprint Server, Infoprint Designer, Advanced Print Utility, Page Printer Formatting Aid, AFP Toolbox, and iSeries Access	
Replaces product	None	
Web link	`http://www.printers.ibm.com/R5PSC.NSF/Web/AFPFontHome`	

IBM Advanced Function Printing DBCS Fonts for AS/400 (5769-FN1)

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 IBM Advanced Function Printing are:

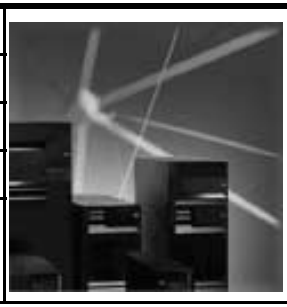
- Provides a double-byte font library for use with 240 dots-per-inch, non-impact printers attached to an iSeries server.
- Enhances system management flexibility with AFP resources transfer.
- Allows for growth and flexibility in the use of AFP printers.
- Enhances user productivity by printing the same object on AFP printers attached to an S/370 or iSeries server.

IBM Advanced Function Printing DBCS Fonts for AS/400		
Product number	5769-FN1	
Minimum OS/400 level	V5R1	
Program size	1 - 129 MB	
HIPO	1535, 1536, 1537, 1538, 1539	
Availability	25 May 2001	
Software type	Software Subscription	
Installation prerequisites		
Related products	Infoprint Server, Infoprint Designer, Advanced Print Utility, Page Printer Formatting Aid, AFP Toolbox, Client Access, and Client Access Express	

IBM Advanced Function Printing DBCS Fonts for AS/400	
Replaces product	5716-FN1
Web link	http://www.printers.ibm.com/R5PSC.NSF/Web/fonts

IBM Facsimile Support for iSeries (5798-FAX)

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.

IBM Facsimile Support for iSeries		
Product number	5798-FAX	
Minimum OS/400 level	V5R1	
HIPO	N/A	
Availability	23 April 2001	
Software type	Software Subscription 5733-SW1 or 5733-SW3	
Installation prerequisites	For hardware and software requirements, see: http://www-1.ibm.com/servers/eserver/iseries/fax400/	
Related products	IBM Integrated Domino Fax (5733-FXD)	
Replaces product	IBM Facsimile Support for AS/400 (5769-TBY)	
Web link	http://www-1.ibm.com/servers/eserver/iseries/fax400/	

Solutions and benefits

IBM Facsimile Support for iSeries can be used in all industry segments to add an enhanced migration path for future growth of Fax communications. With Facsimile Support for iSeries, Fax becomes a “load and go” solution on the iSeries server. It is designed to be easily integrated with existing or new application programs.

Features

- Growth and flexibility, as it is supported on the entire range of iSeries servers and can grow as your needs grow
- Fax distribution lists
- DTMF routing
- View received faxes
- Detailed auditing of all outbound and inbound transactions
- Security for transmission of sensitive information
- Full function end-user interface
- Capabilities to send faxes during off-shift hours when telephone rates are less expensive
- Faxing of documents from PC applications

Ordering

IBM Facsimile Support for iSeries is shipped as a chargeable processor group based OS/400 LPO.

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
- #2805/#2806 Quad Modem IOA with four integrated 56Kbps modems
- 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.

Check the following Web page for details and updates to supported hardware:

`http://www.ibm.com/servers/eserver/iseries/support/planning`

References

You can search for Fax on the following Web sites:

http://www.ibm.com/eserver/iseries/infocenter
http://www.redbooks.ibm.com
http://www.ibm.com/servers/eserver/iseries/fax400

IBM Infoprint Designer for iSeries (5733-ID1)

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.

IBM Infoprint Designer for iSeries	
Product number	5733-ID1
Minimum OS/400 level	V5R1
HIPO	N/A
Availability	25 May 2001
Software type	Software Subscription 5733-SW1 or 5733-SW3
Installation prerequisites	5722-SS1 and option 37, 38, or 39 are optional iSeries Access for Windows
Related products	Infoprint Server, Advanced Print Utility, Page Printer Formatting Aid, AFP Toolbox, iSeries Access, and PSF/400
Replaces product	IBM Advanced Function Printing Utilities for iSeries 5722-AF1
Web link	http://www.printers.ibm.com/R5PSC.NSF/Web/ipdesignerHome

Solutions and benefits

- Infoprint Designer for iSeries provides an end-to-end e-business output solution. It has a fully graphical, application-independent document composition interface to the iSeries printing system.
- Affordably priced, Infoprint Designer for iSeries provides exceptional value. It is software application independent so you don’t need to change line of

business programs. This helps save time and money, making it a real business advantage.

- With Infoprint Designer for iSeries, you can build complex print applications easily. It enables you to design image components, design electronic forms, automatically retrieve current application data or spooled files, design the final page layout, and upload all component resources to the iSeries or AS/400 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
  - You design iSeries page resources in native formats
  - The application resources enable the designed 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-AS/400 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 V5, OS/400 automatically writes these applications as full AFP (ensuring viewing and PCL support).

Features

- Provides a fully graphical document design system for the iSeries
- Facilitates access to the outstanding printing capabilities of the iSeries, featuring AFP and IPDS
- Enables easy development of iSeries native print resources
- Integrates completely with iSeries servers from design through printing and “e-output”
- Designed for the non-programmer, providing superior ease of use, functionality, and precision
- Delivers an affordable, comprehensive e-business solution

Components

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

New with V5R2

Infoprint Designer is enhanced on an ongoing basis via interim PTFs. The following enhancements are planned for 2002:

- Two-dimensional barcode support includes UPS Maxicode, PDF417, and Datamatrix. These are new barcode symbologies that are far denser in data than traditional barcodes. For example, a UPC barcode can store 10 to 12 characters of data (representing a product ID). In contrast, a PDF417 barcode can store up to 3000 characters of data.
- Infoprint Designer will now be available in French, Italian, German, and Spanish language versions.
- Font selection in Infoprint Designer will be simplified by enabling selection by code page and character set. This provides more flexibility than the coded font selection currently available.
- Finishing by subdocument or subgroup means that a spooled file can be electronically segmented (using several new options in V5), and finishing, such as stapling, can be performed on these subgroups of the spooled file.
- Infoprint Designer will also come with MICR fonts for checking applications and expanded project samples.
- Conditional design wizard enables greater ease of use in designing more complex document applications.

Ordering

IBM Infoprint Designer for iSeries is shipped as a chargeable processor group based OS/400 LPO. Infoprint Designer is available on a demo CD, which you can ordered from:

`http://www.ibm.com/eserver/iseries/printing`

Prerequisites

A client workstation is required and when applications designed using Infoprint Designer are printed with PSF/400. The fonts in the AFP Font Collection for Workstations and OS/400, program product 5648-B45, are required.

References

For more information, see:

`http://www.printers.ibm.com/R5PSC.NSF/Web/fsipdes`

IBM Infoprint Server for iSeries (5722-IP1)

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 may need to change and flow electronically to the consumer of that output. For enterprise printing requirements, Infoprint Server delivers improved efficiency, improved reliability, and lower overall printing costs by applying iSeries printing management and iSeries-attached printers to the task of handling all of the essential printing generated across the network.

IBM Infoprint Server for iSeries		
Product number	5722-IP1	
Minimum OS/400 level	V5R1	
Program size	102 MB	
HIPO	1006	
Availability	25 May 2001	
Software type	Software Subscription 5733-SW1 or 5733-SW3	
Prerequisites	OS/400 Option 33 PASE is required for PostScript, PCL, or PDF to AFPDS transforms	
Related products	PSF/400, Infoprint Designer, and Content Manager OnDemand	
Replaces product	None	
Web link	`http://www.printers.ibm.com/R5PSC.NSF/Web/ipserv400Home`	

Solutions and benefits

Infoprint Server for iSeries provides a wide range of capabilities to address the print and electronic communication requirements of e-business and network applications.

Infoprint Server delivers five print and e-output components:

- **PDF services for iSeries**: On the e-output side, Infoprint Server provides Portable Document Format (PDF) and portable AFP support for the iSeries. Any standard iSeries and AS/400 output format can be transformed into PDF. The PDF is text-based, fully navigable and offers high-performance. In addition, enhancements to DDS (OS/400) enable you to segment an output file, triggering the PDF server to create multiple PDF files. This is an “electronic burst and bind” function.
- **Integrated e-mail of iSeries output, including electronic segmentation**: E-mail of output (via PDF) has been integrated and automated. Output files can be transformed to PDF and automatically sent to any destination. Integrated e-mail also provides user exits for customization (for example, using the trigger field, such as a customer number, to look up an e-mail ID in an address book)
- **Support for Web AFP and spooled file indexing/segmentation**: Infoprint Server provides portable AFP support for the iSeries. A new command, Create AFP Data (CRTAFPDTA), provides three critical functions:
  - Convert print formatted with page definitions to AFP
  - Create a portable file by pulling in external fonts, page segments, and overlays
  - Insert indexing to facilitate easy navigation when viewing the print file.
- **Transforms for Web image – TIFF, GIF, and JPEG – to iSeries image**: The standard Web, e-business image formats are GIF, TIF, and JPEG. Infoprint Server provides transforms (Windows-based) to convert those to iSeries and AS/400 images (IOCA - page segments).
- **Transforms for network print data streams – PostScript, PCL, and PDF – to AFP**: The other key focus of Infoprint Server is iSeries management of network output. Infoprint Server provides transforms for PCL, PostScript, and PDF into AFP so output generated in those formats can be brought into the iSeries and effectively managed to the printer. The PostScript and PDF transforms are the result of joint development by IBM and Adobe and deliver full-function Level 3 capability.

Features

With Infoprint Server, you can:

- PDF output from iSeries applications to enable them for Web presentation, e-mail, or PDF printing
- Automatically e-mail iSeries output files, including segmentation of files, to a distribution list

- Print the output from LAN and Web-based applications on Intelligent Printer Data Stream (IPDS) printers
- Index and segment application output files, and bundle AFP resources with the data so that it can be used with Web browsers and archival systems
- Extend new application-independent formatting of output (iSeries page definitions) for viewing, server-to-server transfer, and printing

New with V5R2

With V5R2, Infoprint Server is enhanced as follows:

- Comprehensive control over e-mail content is enhanced. You now control dynamically (programmatically) any aspect of e-mail, including addressing, contents, and attachments.
- Limitation of one specific mail server (OS/400 Send Distribution) is removed. You can now use virtually any SMTP mail server. This includes Domino.
- New PDF functions for indexing and performance have been added. Indexing functions normally used for electronic segmentation of spooled files can now be redirected to provide PDF indexing, also called *PDF bookmarking*. In addition, customers can now control whether fonts are embedded within PDF files. This provides for smaller PDF file sizes and increased system and network performance.
- Infoprint Server functions are now accessed with iSeries Navigator and iSeries Access for Web. iSeries Navigator adds an ad hoc, interactive option to apply PDF and integrated e-mail operations on iSeries spooled files. Web Access uses Infoprint Server PDF services to deliver spooled files to the Web Access browser in PDF format.
- Infoprint Server works with a new spooled file method shipped with the Java Toolbox. This spooled file copy method enables you to create an API-like, programmable interface to PDF services.
- The Change Spooled File Attributes (CHGSPLA) command of OS/400 has been enhanced to enable update of the User Defined Data parameter in the printer file. This access enables data for PDF and e-mail operations (such as e-mail ID) to be defined after the spooled file has been created.

Ordering

IBM Infoprint Server for iSeries is shipped as a chargeable processor group-based OS/400 LPO.

References

For more information, see:

http://www.printers.ibm.com/R5PSC.NSF/Web/ipserv400Home

IBM Print Services Facility for iSeries (5722-SS1)

Print Services Facility for OS/400 (PSF/400), a feature of OS/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.

To create an IPDS printer on the iSeries server, you must (after specifying the device type as IPDS) specify AFP(*YES) in the printer device description. Any printer defined as Type (*IPDS) and AFP (*YES) needs the Print Services Facility (PSF) of OS/400. Twinax-connected IPDS printers may 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. All IP-connected IPDS printers must be configured with AFP(*YES) and, therefore, require PSF/400.

IBM Print Services Facility for iSeries	
Product number	5722-SS1 options 36, 37 and 38
Minimum OS/400 level	V5R1
Program size	0.5 MB
HIPO	1501, 1502 or 1503
Availability	23 April 2001
Software type	Software Subscription
Installation prerequisites	None
Related products	Infoprint Server for iSeries, AFP Font Collection/ Type Transformer for Windows, Infoprint Designer for iSeries, and Facsimile Support for iSeries
Replaces product	5769-SS1 PSF/400
Web link	http://www.printers.ibm.com/R5PSC.NSF/Web/psfas400Home

Solutions and benefits

PSF/400 is the common denominator across the many trends impacting business and e-business communications and occupies a central role in the flow of output from applications to users.

- 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 also be transformed to AFP and thus managed by PSF/400 to IPDS printers.

Features

PSF/400 provides:

- 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 the following services:
  - Establish communication and query printer capabilities and status
  - Manage overlay, image, and font resources required in the printer
  - Transform the AS/400 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
- The level of print management provided by PSF/400 ensures each 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 much more limited than traditional AS/400 print management. The Send Network Spooled Files (SNDNETSPLF, LPR in TCP/IP terminology) command simply sends a spooled file with limited instructions and no feedback as to whether it was received and printed correctly. Applying IPDS to a TCP/IP network restores the same level of print support (as described above) as twinax-connected printers. This includes sending standard SCS spooled files across the network.
- iSeries program products that complement PSF/400 for developing AFP applications include:

- Infoprint Designer for iSeries (licensed program 5733-ID1)
- Infoprint Server for iSeries (licensed program 5722-IP1)
- Advanced Function Printing Utilities (licensed program 5722-AF1)
- Advanced Print Utility (a product of AFP PrintSuite for AS/400) (program offering 5798-AF3 or 5798-AF4).
- IBM AFP Font Collection (program product 5648-B45)

Components

PSF/400 is a feature of OS/400 with the following support tiers:

- Unlimited number of printers from 1 to 45 impressions per minute
- Unlimited number of printers from 1 to 100 impressions per minute
- Unlimited number of printers at any speed

The PSF feature of OS/400 that is required is based on the speed of the fastest printer measured in Impressions per Minute (IPM), not by your iSeries processor tier. The speed of the fastest printer is more important than the number of printers you have.

New with V5R2

PSF/400 V5R2 includes the following enhancements:

- Printing of two-dimensional (2D) barcodes – PDF417, UPS Maxicode, and Datamatrix: 2D barcodes provide far higher data density (up to 4000 characters) than standard barcodes. 2D barcodes are enabled with DDS keywords and with the iSeries page definition. The target IPDS printer must support IPDS 2D barcoding.
- Support for finishing by group: Operations such as stapling can now be selected within a spooled file, on a group of pages (sub-document) within the spooled file. The finishing operation can be specified dynamically via DDS. In addition, group finishing can be defined using page definition and form definition objects.
- Support for dynamic font selection: The font DDS keyword can now be a variable, enabling fonts to be selected by the application program.
- Support for AFP/IPDS printing of XML data. XML data can be formatted into AFP pages using iSeries page definition objects.
- Support for iSeries IPDS printers, including the IBM Infoprint 2085 and 2105.

Ordering

PSF/400 is a feature of OS/400.

Earlier Model Summary

Earlier Model Summary

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Summary of earlier AS/400, AS/400e, and iSeries models

This chapter identifies such resources as hardware and performance characteristics for all AS/400, AS/400e, and iSeries models. This includes the maximum capacities for main storage, disk storage, LAN, and communications.

You can find information about V5R2 operating system limits, such as the maximum members in a database file, maximum objects in a library, and jobs on the system in the Redpaper *OS/400 Maximum Capacities - V5R2*, REDP0204.

You can find limits information for V5R1 on the Web at:

`http://www.redbooks.ibm.com/tstudio/index.htm`

You can also view the limits information for V4R5 and V4R4 systems on the Web at:

`http://www.redbooks.ibm.com/redbooks/`

When you arrive at this site, in the left-hand panel, click **Additional Materials** and the **click here** link on the next page. Then 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) V3R1 (maximum) V3R2 (maximum)	 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) V3R6 (maximum) V3R7 and later (maximum)	 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] V3R6 (maximum) V3R7 and later (maximum)	 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 ASCII LocalTalk	 240 108 186	 400 180 310	 600 270 465	 800 360 620	 1200 540 930	 2000 900 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 ASCII LocalTalk	 360 162 279	 480 216 372	 720 324 558	 1000 450 775	 1400 630 1085	 2400 1080 1860	 2400 1080 1860	 2400 1080 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 ASCII LocalTalk	 480 216 372	 720 324 558	 1000 450 775	 1400 630 1085	 2400 1080 1860	 2400 1080 1860	 2400 1080 1860	 2400 1080 1860	 4800 2160 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 (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	0-1	0-1	0-1	0-1
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
LocalTalk 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	85.8/128.811	128.8	128.8	274.8	704.3
V4R2/V4R3	175.4/236.2[1]	236.2	236.2	561.5	944.8
Maximum external	[1]				
V4R1		--	([12])	([12])	652.8
V4R2/V4R3	--	--	([12])	([12])	893.3
Total maximum	--				
V4R1					704.3
V4R2/V4R3	1				944.8
Disk controllers		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 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
LocalTalk 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 (internal)	0-17	0-17	0-17
8mm cartridge (external)	0-4	0-4	0-4
½-inch reel 9348, 2440	0-4	0-4	0-4
½-inch reel 9347	0-2	0-2	0-2
½-inch cartridge 34XX, 35XX	0-8	0-8	0-8

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
LocalTalk 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
LocalTalk 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] Relative system perf. (CPW value) client/server [1]	5.5 17.1	9.6 32.3	11.6 65.6
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 22.5
Main storage (MB)	16-56	32-384	64-512
Disk storage (GB) (maximum)	8.2	27.5	86.5
Maximum number workstations Twinax ASCII LocalTalk	 7 6 31	 7 6 62	 7 6 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 perf. (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)				
V3R6 (maximum)	23.6	23.6	23.6	23.6
V3R7 and later (maximum)	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 Interactive environment	 66.7 18.7	 85.0 26.9	 106.8 26.9	 132.5 26.9	 198.7 26.9	 299.0 26.9	 349.8 26.9
Relative system perf. (CPW) [1] V3R7 Client/server environment Interactive environment	 77.7 21.4	 104.2 30.7	 130.7 30.7	 162.7 30.7	 278.8 30.7	 459.3 30.7	 509.9 30.7
Relative system perf. (CPW) [1] V4 Client/server environment Interactive environment	 81.6 22.5	 111.5 32.8	 138.0 32.8	 188.2 32.8	 319.0 32.8	 598.0 32.8	 650.0 32.8
Relative system perf. (RAMP-C) [2] Client/server environment Interactive environment	 19.7 5.7	 26.6 8.3	 †	 43.4 8.3	 66.6 8.3	 101.4 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) V4 (maximum)	 318.7 652.8	 318.7 652.8	 318.7 652.8	 520.0 996.4	 520.0-996.4	 520.0 996.4	 520.0 996.4
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 (note 1)			
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 (note 5)	**System Unit Expansion #7102 (note 5)**	**Total maximum (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 (note 3)	1	2	3
Maximum communication lines (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
ASCII	0	0	0
Maximum workstations			
Twinaxial	108	200	228

	Base system for all processors (note 5)	System Unit Expansion #7102 (note 5)	Total maximum (note 5)
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[12]	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
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	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)	240	420	810	1600
Version 4 Release 3 and later				
Processor CPW				
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.

<table>
<tr><td>Note 3</td><td>One line is used for Client Access Console or Operations Console if selected. The maximum is nine if Twinaxial Console is selected.</td></tr>
<tr><td>Note 4</td><td>The #9364 must be configured with #9329 /#9330 (PCI) or #9331 (SPD). Therefore, these columns are mutually exclusive.</td></tr>
<tr><td>Note 5</td><td>Maximum is 175.4 GB on the #2061 Processor.</td></tr>
<tr><td>Note 6</td><td>Any combination of Twinax or ASCII workstation controllers up to either maximum shown is allowed, maximums are not additive.</td></tr>
<tr><td>Note 7</td><td>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="3">#2061</td><td>#1500</td><td>206A</td><td>P10</td></tr>
<tr><td>#1501</td><td>206B</td><td>P20</td></tr>
<tr><td>#1502</td><td>206C</td><td>P20</td></tr>
<tr><td rowspan="4">#2062</td><td>#1500</td><td>206D</td><td>P10</td></tr>
<tr><td>#1501</td><td>206E</td><td>P20</td></tr>
<tr><td>#1502</td><td>206F</td><td>P20</td></tr>
<tr><td>#1503</td><td>207A</td><td>P20</td></tr>
<tr><td rowspan="4">#2063</td><td>#1500</td><td>207B</td><td>P20</td></tr>
<tr><td>#1502</td><td>207C</td><td>P30</td></tr>
<tr><td>#1503</td><td>207D</td><td>P30</td></tr>
<tr><td>#1504</td><td>207E</td><td>P30</td></tr>
<tr><td rowspan="5">#2064</td><td>#1500</td><td>207F</td><td>P20</td></tr>
<tr><td>#1502</td><td>208A</td><td>P30</td></tr>
<tr><td>#1503</td><td>208B</td><td>P30</td></tr>
<tr><td>#1504</td><td>208C</td><td>P30</td></tr>
<tr><td>#1505</td><td>208D</td><td>P30</td></tr>
</table></td></tr>
<tr><td>Note 8</td><td>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.</td></tr>
</table>

9406 Model 730

Model	730			
Processor feature	**#2065**	**#2066**	**#2067**	**#2068**
Relative system perf. (note 1)	560	1050	2000	2890
Version 4 Release 3 and later				
Processor CPW				
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 (note 2)	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

<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">The processor group is determined by a combination of processor and interactive feature. The following table provides a cross reference.</td></tr>
<tr><td></td><td>Processor</td><td>Interactive feature</td><td>System feature code</td><td>Processor group</td></tr>
<tr><td></td><td rowspan="4">#2065</td><td>#1506</td><td>2A6A</td><td>P20</td></tr>
<tr><td></td><td>#1507</td><td>2A6B</td><td>P30</td></tr>
<tr><td></td><td>#1508</td><td>2A6C</td><td>P30</td></tr>
<tr><td></td><td>#1509</td><td>2A6D</td><td>P30</td></tr>
<tr><td></td><td rowspan="5">#2066</td><td>#1506</td><td>2A6E</td><td>P20</td></tr>
<tr><td></td><td>#1507</td><td>2A6F</td><td>P30</td></tr>
<tr><td></td><td>#1508</td><td>2B6A</td><td>P30</td></tr>
<tr><td></td><td>#1509</td><td>2B6B</td><td>P30</td></tr>
<tr><td></td><td>#1510</td><td>2B6C</td><td>P30</td></tr>
<tr><td></td><td rowspan="5">#2067</td><td>#1506</td><td>2B6D</td><td>P30</td></tr>
<tr><td></td><td>#1508</td><td>2B6E</td><td>P40</td></tr>
<tr><td></td><td>#1509</td><td>2B6F</td><td>P40</td></tr>
<tr><td></td><td>#1510</td><td>2C6A</td><td>P40</td></tr>
<tr><td></td><td>#1511</td><td>2C6B</td><td>P40</td></tr>
<tr><td></td><td rowspan="6">#2068</td><td>#1506</td><td>2C6C</td><td>P30</td></tr>
<tr><td></td><td>#1508</td><td>2C6D</td><td>P40</td></tr>
<tr><td></td><td>#1509</td><td>2C6E</td><td>P40</td></tr>
<tr><td></td><td>#1510</td><td>2C6F</td><td>P40</td></tr>
<tr><td></td><td>#1511</td><td>2D6A</td><td>P40</td></tr>
<tr><td>Note 5</td><td colspan="4">The system maximum for internal tapes and CD-ROMs is 18.</td></tr>
</table>

9406 Model 740

Model	740	
Processor feature	**#2069**	**#2070**
Relative system perf. (notes 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 (note 2)	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

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.

<table>
<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.</td></tr>
<tr><td></td><td>Processor</td><td>Interactive feature</td><td>System feature code</td><td>Processor group</td></tr>
<tr><td></td><td rowspan="4">#2069</td><td>#1514</td><td>2D6B</td><td>P40</td></tr>
<tr><td></td><td>#1510</td><td>2D6C</td><td>P50</td></tr>
<tr><td></td><td>#1511</td><td>2D6D</td><td>P50</td></tr>
<tr><td></td><td>#1512</td><td>2D6E</td><td>P50</td></tr>
<tr><td></td><td rowspan="5">#2070</td><td>#1514</td><td>2E6A</td><td>P40</td></tr>
<tr><td></td><td>#1510</td><td>2E6B</td><td>P50</td></tr>
<tr><td></td><td>#1511</td><td>2E6C</td><td>P50</td></tr>
<tr><td></td><td>#1512</td><td>2E6D</td><td>P50</td></tr>
<tr><td></td><td>#1513</td><td>2E6E</td><td>P50</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	1024-24 GB	1024-24 GB	1024-40 GB	1024-40 GB
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 Twinax devices ASCII devices LocalTalk devices	 1-175 7000 3150 0	 1-175 7000 3150 0	 1-175 7000 3150 0	 1-175 7000 3150 0	 1-175 7000 3150 0
Communications lines V4R1/V4R2 V4R3	 1-200 1-300	 1-200 1-300	 1-200 1-300	 -- 1-300	 -- 1-300
Fax adapters Cryptographic processor	0-32 0-1	0-32 0-1	0-32 0-1	0-32 0-1	0-32 0-1
LAN/ATM ports V4R1/V4R2 V4R3	 1-32 1-72	 1-32 1-72	 1-32 1-72	 -- 1-72	 -- 1-72
Integrated PC Servers Optical libraries	0-16 0-22	0-16 0-22	0-16 0-22	0-16 0-22	0-16 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 Maximum internal Maximum external Total maximum Disk controllers	 16.77 34.35 -- 34.35[1] 1	 16.77 34.35 -- 34.35[1] 1	 16.77 34.35 -- 34.35[1] 1	 16.77 34.35 -- 34.35[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) 8mm cartridge (external) ½-inch reel 9348, 2440 ½-inch cartridge 34xx, 35xx	 0-3 0-4 0-4 0-4	 0-3 0-4 0-4 0-4	 0-3 0-4 0-4 0-4	 0-3 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] Interactive environment [24,25]	 20.2 13.8	 20.2 20.2	 20.2 13.8	 20.2 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 Total disk Disk controllers	 4.19 29.9 0	 4.19 29.9 0	 4.19 29.9 0	 4.19 29.9 0
Diskette	0	0	0	0
Tape Attachment ¼-inch internal [27] External and tape libraries	 1 0	 1 0	 1 0	 1 0
System I/O card slots (PCI) PCI I/O card slots [28] Int Netfinity Server & bridge card slots	 5 2	 5 2	 5 2	 5 2
Workstation attachment Controllers minimum/maximum Twinax devices ASCII devices LocalTalk devices	 1 1-7 0 0	 1 1-28 0 0	 0-1 0-7 0 0	 0-1 0-28 0 0
Communications lines Cryptographic processors Fax adapters LAN ports [30] Wireless adapters Integrated Netfinity Servers 100/10 Mbps Ethernet adapters ATM adapters	1-5 0 0 0-2 0 0-1 0-1 0	1-5 0 0 0-2 0 0-1 0-1 0	1-6[29] 0 0 1-2 0 0-1 0-1 0	1-6[29] 0 0 1-2 0 1 0-1 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 Interactive environment	 17.1 5.5	 17.1 5.5	 17.1 5.5	 17.1 5.5
Relative system performance (RAMP-C) [2] Client/server environment Interactive environment	 5.9 1.9	 5.9 1.9	 5.9 1.9	 5.9 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 ASCII Local Talk	 7 0 0	 0 0 0	 0 0 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	OS/400 Query for AS/400 Client Access for AS/400 Novell NetWare Support LAN Server for AS/400 (includes 10 LAN requesters)		O/S400 Query for AS/400 Client Access for AS/400 DB2 UDB for iSeries 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	OS/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] OS/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] V3R6 (maximum) V3R7 and later (maximum)	 23.6 50.3	 23.6 50.3	 23.6 50.3
Maximum number of 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 Interactive environment	 24.5-52.9 8.4-18.3	 24.5-52.9 8.4-18.3	 24.5-52.9 8.4-18.3	 77.3 26.9	 24.5-52.9 8.4-18.3	 77.3 26.9
Relative system perf. (CPW) [1] V3R7 Client/server environment Interactive environment	 27.0-59.8 9.4-20.6	 27.0-59.8 9.4-20.6	 27.0-59.8 9.4-20.6	 87.3 30.7	 27.0-59.8 9.4-20.6	 87.3 30.7
Relative system perf. (CPW) [1] V4 Client/server environment Interactive environment	 27.0-63.0 9.4-21.6	 27.0-63.0 9.4-21.6	 27.0-63.0 9.4-21.6	 91.0 32.2	 27.0-63.0 9.4-21.6	 91.0 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) V3R6 (maximum) V3R7 (maximum)	 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 devices ASCII LocalTalk devices	 7 6 31	 7 6 31	 7 6 31	 7 6 31	 7 6 31	 7 6 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)			

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 48.

2. The 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, and 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 a 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 multifunction 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 multifunction 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.

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

Referenced Lists

Referenced Lists

35

Referenced lists

This appendix accommodates 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 Shorthold 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)
- ATM LAN Emulation

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

Feature function	270	820[1]	830[1]	840[1]	SB2[1] SB3[1]	Migration towers
#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. The #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)
- XML Extenders

DB2 UDB for iSeries functions

These DB2 UDB for iSeries functions are available to enhance application performance:

- Multiple databases
- 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 for iSeries (5724-A18)

IBM WebSphere Commerce Professional or Business Edition for iSeries V5.4 provides several business-to-consumer and business-to-business functions and enables you to the back-end systems you already have in place.

WebSphere Commerce Suite requires the following products:

- OS/400 V5R1 (5722-SS1), which includes:
  - DB2 UDB for iSeries V5R1
  - HTTP Server for iSeries V5R1 (5722-DG1)
  - Crypto Access Provider for iSeries V5R1 (5722-AC3)
  - Digital Certificate Manager (5722-SS1 Option 34)
  - Qshell Interpreter (5722-SS1 Option 30)
  - iSeries Development Kit for Java V5R1 (5722-JV1)
  - iSeries Toolbox for Java (5722-JC1)
  - TCP/IP Connectivity Utilities for iSeries V5R1 (5722-TC1)
- Lotus Domino for iSeries (5733-LD6) is required to use Domino e-mail and the discussion database from WebSphere Commerce
- You should have the latest PTFs for these products applied on your system, as indicated on the WebSphere Commerce Suite Web site at:

  `http://publib.boulder.ibm.com/iseries/v5r2/ic2924/index.htm`

  You can obtain the latest PTFs either by applying the latest cumulative package, fixpak, or group PTF, or by ordering the PTFs directly from your iSeries service representative.
- Response time in an Internet environment depends on a variety of network and telecommunication factors, such as line speeds, local network constraints, and available processing capacity on the iSeries server.
- To shop in a store created with WebSphere Commerce, shoppers can use any browser that supports SSL, Java and JavaScript, tables and frames, and cookies.
- Programming skills are necessary for customization work.
- WebSphere Commerce Studios requires Microsoft Windows NT Workstation, Version 4.0, or Windows 2000 Professional Edition.

- WebSphere Collaborative Profiles, Commerce Edition has no additional requirements.

Other recommendations include:

- iSeries Access Family (5722-XW1)
- WebSphere Payment Manager V3.1 (included with WebSphere Commerce Suite)
- WebSphere Application Server (5733-WA4) (included with WebSphere Commerce Suite)
- Programming skills are necessary for customizing work.

IBM WebSphere Commerce Suite is shipped on CD-ROM media and includes:

- WebSphere Commerce Quick Beginnings Guide, V5.4
- WebSphere Commerce, V5.4 (WebSphere Commerce Professional Edition - two CDs, WebSphere Commerce Business Edition - three CDs)
- WebSphere Application Server for iSeries, Advanced Edition, V4.0
- WebSphere Application Server for Windows NT and Windows 2000, Advanced Edition, V4.0 CD
- WebSphere Payment Manager (WPM) (5733-PY3) V3.1 CD
- Segue SilkPreview CD
- WebSphere Commerce Recommendation Engine for Windows NT and Windows 2000, V5.4 CD
- WebSphere Commerce Analyzer Entry, V5.4 CD
- Brio Broadcast Server, V6.2 CD
- Sametime, V2.5 CD (Windows NT and Windows 2000)
- QuickPlace, V2.0 CD (Windows NT and Windows 2000): WCBE only
- WebSphere Commerce LI booklet, V5.4
- IPLA booklet
- IPLA pointer sheet
- Proof of Entitlement: Program number order only

WebSphere products

WebSphere Payment Manager V3.1.2 requires these software components on the iSeries server:

- OS/400 V5R1 or later (5769-SS1) including:

  - Option 30, Qshell Interpreter
  - Option 34, Digital Certificate Manager
- WebSphere Application Server for iSeries, Advanced Edition, V4.0
- IBM Cryptographic Access Provider
  - IBM Cryptographic Access Provider 128-bit for iSeries V5R1 and later (5722-AC3)
- AS/400 Application Developer Kit for Java, V5R1 (5722-JV1)
- IBM HTTP Server for AS/400, V5R1 (5722-DG1)

IBM Connect for iSeries prerequisites

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 (5733-LD6)
- 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 4.0 (5733-WA4)
- Lotus Domino Server (5733-LD6)
- Minimum recommended processor: 9406-270 #2250 or 9406-820 #2395 with 512 MB of memory

IBM WebSphere Personalization for AS/400 prerequisites

This section identifies the prerequisites for select WebSphere and related products.

There is a 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://www-912.ibm.com/servlet/EstimatorServlet`

- 1 GB of memory (minimum)

- *BASE (client application development software only) 500 MB during installation and 250 MB after installation
- Option 1 (includes *BASE and WebSphere Application Server environment) 600 MB during installation and 450 MB after installation
- Communications adapter that supports TCP/IP
- WebSphere Application Server V4 Advanced Edition for AS/400
- Latest Database Group PTF
- Java Development Kit 1.2.2 provided via the IBM Developer Kit for Java (5722-JV1)
- JOS/400 Host Servers (5722-SS1 Option 12) for remote installation from the CD-ROM of another workstation
- OS/400 Qshell Interpreter (5722-SS1 Option 30) for local installation from the CD-ROM
- AS/400 TCP/IP Connectivity Utilities/400 (5722-TC1) for remote installation from the CD-ROM of another workstation
- DB2 Universal Database (UDB) for iSeries

For WebSphere Personalization V3.5 for iSeries 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 Secure Sockets Layer are:

- IBM Developer Kit for Java (5722-JV1), Version 1.2 (Option 3)
- IBM HTTP Server for iSeries
- IBM DB2 Universal Database (UDB) for iSeries
- DB2 Query Manager and SQL Development Kit for AS/400 (5722-ST1) (optional)
- 500 MB 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
- iSeries Developer Kit for Java (5722-JV1), Version 1.2 (Option 3)

Options included in OS/400 V5R2

- * 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 - S/36 and S/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 Compiler Support
- Option 11 OS/400 - S/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 - Ultimated System Facilities
- Option 21 OS/400 - Extended NLS Support
- Option 22 OS/400 - OptiConnect
- Option 25 OS/400 - NetWare Enhanced Integration
- * Option 30 OS/400 - Qshell
- * Option 31 OS/400 - Domain Name System
- * Option 33 OS/400 - Portable Application Solutions Environment
- * Option 34 OS/400 - Digital Certificate Manager
- Option 35 OS/400 - CCA Crypto Service Provider
- Option 39 OS/400 - International Components for Unicode
- Option 43 OS/400 - Additional Fonts

The following are included with all OS/400 shipments.

- * V5R2 HTTP Server
- * V5R2 Toolbox for Java
- * V5R2 Developer Kit for Java
  - Option 3 Java Developer Kit 1.2
  - Option 4 Java Developer Kit 1.1.8
  - * Option 5 Java Developer Kit 1.3
  - Option 6 Java Developer Kit 1.4
- * V3R7 Tivoli Management Agent
- * V5R2 Electronic Service Agent
- * V5R2 TCP/IP Utilities
- * V5R2 Integration for Windows Server
- * V5R2 iSeries Access for Windows
- V5R2 iSeries Access for Wireless

All of the above listed software are included in the software order. Those product and product options identified with an asterisk (*) are preloaded on all new system orders.

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 Stamped 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
  - Option 41 OS/400 HA Switchable Resources
- **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-IP1:** Infoprint Server for iSeries
- **5722-DE1:** DB2 Universal Database Extender for iSeries
- **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-XW1:** iSeries Client Access Family

V5R2 keyed products

- **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
  - Option 41 High Availability Switchable Resources #
  - Option 42 High Availability Journal Performance @#
- **5722-AF1** AFP Utilities for iSeries #
- **5722-AP1** Advanced DBCS Printer Support for iSeries#**
  - Option 1 Advanced DBCS Printer Support - IPDS
- **5722-BR1** Backup Recovery and Media Services for iSeries #
  - Option 1 - Network #
  - Option 2 - Advance #
- **5722-CM1** Communication Utilities for iSeries #

- **5722-DE1** DB2 Universal Databases Extenders for iSeries V7.2 #
- **5722-DP4** DB2 DataPropagator for iSeries V8.1 @#
- **5722-IP1** Infoprint Server for iSeries #
- **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 for iSeries #
- **5722-WDS** WebSphere Development Studio +#
- **5722-XW1** iSeries Access *#
  - Option 1 - iSeries Access Enablement Support

Products and features no longer marketed by IBM

As products and features are withdrawn from marketing, they are removed from the published edition of the Handbook. The tables in this section identify such products.

In some cases, the product to replace the given product is listed with the description. Replacement features are suggestions only, and there may be an alternative solution more suitable to your environment. Furthermore, the suggested replacement may have hardware and software pre-requisites which your current iSeries model does not support.

Hardware no longer marketed by IBM

The hardware products and features shown in the following table are now *withdrawn from marketing*, or will be in the near future.

Product or feature	Description	Withdrawal date	Recommended replacement
2422	½-inch Reel Tape Drive		#3580, #3570
2440	Magnetic Tape Subsystem (½-inch Reel Tape Drive)	20 January 1992	#3580, #3570
2480	Wireless LAN Access Point (2480-RS0)	13 January 1999	N/A

Product or feature	Description	Withdrawal date	Recommended replacement
2480	Wireless LAN Access Point (2480-E00, -EB0, -TR0, -TB0)	24 May 1999	N/A
2482	AS/400 Wireless Portable Transaction Computer (PTC)	24 May 1999	N/A
2483	Integrated Laser PTC for AS/400 Wireless Network	24 May 1999	N/A
2484	Industrial PTC for AS/400 Wireless Network	24 May 1999	N/A
2486	IBM PTC	24 May 1999	N/A
3430	Magnetic Tape Subsystem (½-in. Reel Tape Drive)	19 December 1989	#3580, #3570
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.	02 March 2001	N/A
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.	02 March 2001	N/A
3490E Models F00 F01,F11,F1A,FC0	Magnetic Tape	28 June 2002	3580, 3590
3494 - L10, D10	Automated Tape Library	27 December 2002	3494L12,D12,D14
3995 Models A43, 043 143, 042, 142	Optical library	06 December 1996	3995 C40, C42, C44, C48
3995 Models C20, C22,C24,C26, C28	Optical Library, LAN attached	31 January 2002	N/A
4330 - 4IZ	Printer	31 October 2000	4230-4i3
5308	ASCII to 5250 Connection	21 December 1999	N/A
5494	Remote Control Unit	21 December 1999	N/A
5500	Express IP Control Unit	21 December 1999	N/A
6299	Midrange Hub	01 September 1999	N/A
7133	IBM 7133 SSA Disk Subsystem Model 010	05 May 1997	N/A
7133	IBM 7133 SSA Disk Subsystem Model 020	16 June 1999	N/A
7852-40Z	AS/400 Data/Fax Modem V.34	12 March 2002	7852-400
8361 -100	Network Station series 100 Ethernet	10/14/1999	Neoware Eon Thin Client

Product or feature	Description	Withdrawal date	Recommended replacement
8361 - 200	Network Station series 100 Token-Ring	14 October 1999	Neoware Eon Thin Client
8361 - 210	Network Station series 300 Token-Ring	31 December 1999	Neoware Eon Thin Client
8361 - 341	Network Station series 300 Twinax	31 December 1999	Neoware Eon Thin Client
9309	1.6m Rack Rack Enclosure feature #9171 is still available. Feature #9171 and all remaining features	27 February 2001 10/01/2002	iSeries Tower
9331- 001 and 002	Diskette drive	25 October 1995	N/A
9331- 011 and 011	Diskette drive	15 September 1998	N/A
9347	Tape drive	31 October 2000	3570, 3580
9348	Magnetic tape unit	26 February 1999	3570, 3580
9401 Model 150	System and features	31 October 2000	9406 250
9401 Model 150	V4R1 and V4R2 9401-150 packages	31 December 1999	V5 PPS software
9402 Model 236	Model upgrades from Model 236 to Model 436	25 February 2000	N/A
9402 Model 436	Processor upgrades within the Model 436	25 February 2000	N/A
9406 Model 170	V4R2 processor features on new systems: #2160, #2164, #2176, and #2183	25 February 2000	N/A
9406 Model 170	All models	31 May 2002	9406 250 2396, 270
9406 Model 170	All processor upgrades	28 December 2001	9406 250, 270
9406 Model 4xx	Model upgrades from 4xx to 7xx	30 June 2000	N/A
9406 Model 5xx	Model upgrades from 5xx to 7xx	30 June 2000	N/A
9406 Model 6xx	9406 600, 620, 640, and 650	31 May 1999	9406 270, 820, 830, 840, 890
9406 Model 6xx	Model upgrades from 6xx to 6xx and processor feature conversions within 6xx	31 May 2000	N/A
9406 Model 6xx/Sxx	Model upgrades from 6xx/Sxx to 7xx/8xx	28 September 2001	N/A
9406 Model 7xx	All models, new model sales	28 December 2001	9406 820, 830, 840, 890
9406 Model 7xx	7xx model to 7xx model upgrades	28 December 2001	N/A

Product or feature	Description	Withdrawal date	Recommended replacement
9406 Model 7xx	Processor and interactive feature upgrades within models	02 July 2002	N/A
9406 Model SB1	System	29 December 2000	9406-SB2, 9406-SB3
9406 Model Sxx	9406 S10, S20, S30, S40	31 May 1999	9406 - 820, 830, 840
9406 Model Sxx	Model upgrades from Sxx to Sxx and processor feature conversions within Sxx	31 May 2000	N/A
9406 Model Sxx	Model upgrades from Sxx to 7xx/8xx	28 September 2001	N/A
#0001	MES Bulk Order	02 July 2002	N/A
#0018	2440-xxx Local Source Rack Mount	30 June 2000	N/A
#0029	9347-xx Lcl Src Rack Mount	31 October 2000	N/A
#0034	Red Covers	31 October 2000	N/A
#0046	OptiConnect system	28 December 2001	N/A
#0059	Transition Data Link	30 June 2000	N/A
#0059	9401 model 150 Transition Data Link	31 May 2000	N/A
#0086	Optimize 3590 Performance	31 May 1999	N/A
#0088	OptiConnect Cluster Specify	28 December 2001	N/A
#0117	436 Custom Configuration	02 July 2002	N/A
#0185	Performance Enhancement Model 150	31 October 2000	N/A
#0200	Replacing the Release	31 May 1999	N/A
#0201	Unload/Reload	31 May 1999	N/A
#0202	Staged Upgrade Offering	31 May 1999	N/A
#0203	Side-by-Side Install	02 July 2002	N/A
#0204	Staged Side-by-Side Upgrade	31 May 1999	N/A
#0220	Token Ring on IPCS		#0223
#0221	Ethernet on IPCS		#0224, #0225
#0295	Performance Enhancement/28WS	31 October 2000	N/A
#0328	Operations Console Cable		0367
#0329	V.24/EIA232 80-ft. Cable		0365

Product or feature	Description	Withdrawal date	Recommended replacement
#0330	V.24/EIA232 20-ft. Cable	02 July 2002	0348
#0331	V.24/EIA232 50-ft. Cable	02 July 2002	0349
#0335	V.36/EIA449 20-ft. Cable	02 July 2002	0356
#0336	V.36/EIA449 50-ft. Cable	30 June 2000	N/A
#0337	V.36/EIA449 150-ft. Cable	30 June 2000	N/A
#0338	V.35 20-ft. Cable	02 July 2002	#0353
#0339	V.35 50-ft. Cable	02 July 2002	#0354
#0340	V.35 80-ft. Cable	30 June 2000	N/A
#0341	X.21 20-ft. Cable	02 July 2002	#0359
#0342	X.21 50-ft. Cable	02 July 2002	#0360
#0349	V.24/EIA232 50-ft Cable	03 December 2002	#0348
#0354	V.35 50-ft PCI Cable	03 December 2002	#0353
#0355	V.35 80-ft. PCI Cable	30 June 2000	N/A
#0358	V.36 150-ft. PCI Cable	30 June 2000	N/A
#0360	X.21 50-ft PCI Cable	03 December 2002	#0359
#0362	20-ft. Comm Console Cable	31 January 2001	#0367
#0365	V.24/EIA232 80-ft PCI Cable	03 December 2002	#0364
#0366	Optical Bus Cable 20m	28 December 2001	N/A
#0380	Remote Control Panel Cable	02 July 2002	Virtual Control Panel, see Info APAR II13117
#0381	Remote Control Panel Cable	02 July 2002	Virtual Control Panel, see Info APAR II13117
#0382	Remote Control Panel Cable	02 July 2002	Virtual Control Panel, see Info APAR II13117
#0398	Operations Console Package	02 July 2002	#9771
#0399	4 Port Twinaxial Expansion	30 June 2000	N/A
#0399	9401 Model 150 4 port Twinaxial Expansion	31 May 2000	N/A
#0591	Entry Twinaxial Package V4R4 (type 9401)	31 October 2000	9406 250 2395 V5

Product or feature	Description	Withdrawal date	Recommended replacement
#0592	Growth Twinaxial Package V4R4 (type 9401)	31 October 2000	9406 250 2396 V5
#0593	Entry Server Package V4R4 (type 9401)	31 October 2000	9406 250 2395 V5
#0594	Growth Server Package V4R4 (type 9401)	31 October 2000	9406 250 2396 V5
#0605	Linux Dir Attach-4748 New orders withdrawn Feature conversions available	02 July 2002	#0606
#1312	1-Byte 1.03 GB Disk Unit Kit	31 October 2000	N/A
#1313	1-Byte 1.96 GB Disk Unit Kit	31 October 2000	N/A
#1322	2-Byte 1.03 GB Disk Unit Kit	31 October 2000	N/A
#1323	2-Byte 1.96 GB Disk Unit Kit	31 October 2000	N/A
#1325	2-Byte 1.03 GB Disk Unit Kit	31 October 2000	N/A
#1326	2-Byte 1.96 GB Disk Unit Kit	31 October 2000	N/A
#1327	2-Byte 4.19 GB Disk Unit Kit	31 October 2000	N/A
#1333	2-Byte 8.58 GB Disk Unit Kit	31 October 2000	N/A
#1334	2-Byte 17.54 GB Disk Unit Kit	31 October 2000	N/A
#1336	2-Byte 1.96 GB Disk Unit Kit	31 October 2000	N/A
#1337	2-Byte 4.19 GB Disk Unit Kit	31 October 2000	N/A
#1349	1.2 GB ¼-Inch Tape Kit	31 October 2000	#4582
#1350	2.5 GB ¼-Inch Tape Kit	31 October 2000	#4582
#1355	13.0 GB ¼-Inch Tape Kit	31 October 2000	#2583
#1360	7.0 GB 8mm Cartridge Tape Kit	31 October 2000	7208-342 20GB
#1490 to 1496	Interactive Capacity Specify	02 July 2002	N/A
#1500 to #1514	Interactive Capacity Cards	02 July 2002	N/A
#2061	Model 720 Processor	28 December 2001	820 - #2395, #2396, #2397, #2398, #2435, #2536
#2062	Model 720 Processor	02 July 2002	820 - #2396, #2397, #2398, #2435, #2536
#2063	Model 720 2-Way Processor	02 July 2002	820 - #2397

Product or feature	Description	Withdrawal date	Recommended replacement
#2064	Model 720 4-Way Processor	02 July 2002	820 - #2398
#2065	Model 730 Processor	28 December 2001	830 - #2400, #2402, #2403 840 - #2418, #2420
#2066	Model 730 2-Way Processor	02 July 2002	830 - #2400, #2402, #2403 840 - #2418, #2420
#2067	Model 730 4-Way Processor	02 July 2002	830 - #2402, #2403 840 - #2352, #2352, #2418, #2420
#2068	Model 730 8-Way Processor	02 July 2002	830 - #2402, #2403 840 - #2352, #2353, #2354, #2418 #2420, #2461
#2069	Model 740 Processor	28 December 2001	830 - #2403 840 - #2352, #2353, #2354, #2418, #2420, #2461 890 - #2487
#2070	Model 740 12-Way Processor	02 July 2002	840 - #2352, #2353, #2354, #2418, #2420, #2461 890 - #2487
#2159	9406 170 Processor	02/2000	270 #2248
#2250	Model 270 Processor	03 December 2002	270 #2431
#2252	Model 270 Processor	03 December 2002	270 #2432
#2253	Model 270 2-way Processor	03 December 2002	270 #2434
#2289	9406 170 Processor	31 May 2002	270 #2248
#2295	Model 250 Processor	02 July 2002	270 #2248
#2296	Model 250 Processor	02 July 2002	270 #2248
#2310	Model SB1 8-Way Processor	25 July 2000	9406 SB2 2315

Product or feature	Description	Withdrawal date	Recommended replacement
#2311	Model SB1 12-Way Processor	25 July 2000	9406 SB3 2316
#2312	Model SB1 8-Way Processor	25 July 2000	9406 SB2 2315
#2313	Model SB1 12-Way Processor	25 July 2000	9406 SB3 2316
#2315	Model SB2 8-Way Processor	03 December 2002	830 #0153
#2316	Model SB3 12-Way Processor	03 December 2002	840 #0158
#2318	Model SB3 24-Way Processor	03 December 2002	840 #0159
#2396	Model 820 Processor	03 December 2002	820 #2436
#2397	Model 820 2-Way Processor	03 December 2002	820 #2437
#2398	Model 820 4-Way Processor	03 December 2002	820 #2438
#2402	Model 830 4-Way Processor	03 December 2002	830 #2349
#2403	Model 830 8-way Processor	03 December 2002	830 #2349
#2407	9406 170 Dedicated Domino Processor	31 May 2002	270 #2422
#2416	Model 840 8/12-Way POD	03 December 2002	270 #2352
#2417	Model 840 12/18-Way POD	03 December 2002	840 #2353
#2418	Model 840 12-Way Processor	03 December 2002	840 #2353
#2419	Model 840 18/24-Way Processor	03 December 2002	840 #2354
#2420	Model 840 24-Way Processor	03 December 2002	840 #2354
#2422	Dedicated Domino Processor	03 December 2002	270 #2452
#2423	Dedicated Domino Processor	03 December 2002	270 #2452
#2424	Dedicated Domino 2-Way Processor	03 December 2002	270 #2454
#2425	Dedicated Domino Processor	03 December 2002	820 #2456
#2426	Dedicated Domino 2-Way Processor	03 December 2002	820 #2457
#2427	Dedicated Domino 4-Way Processor	03 December 2002	820 #2458
#2461	Model 840 24-Way Processor	03 December 2002	840 #2354
#2605	ISDN Basic Rate Adapter	31 December 1999	#2751
#2609	EIA 232/V.24 Two-Line Adapter	31 March 1999	#4745
#2610	X.21 Two-Line Adapter	31 March 1999	#4745
#2612	EIA 232/V.24 One-Line Adapter	31 March 1999	#4745

Product or feature	Description	Withdrawal date	Recommended replacement
#2613	V.35 One-Line Adapter	31 March 1999	#4745
#2614	X.21 One-Line Adapter	31 March 1999	#4745
#2617	Ethernet/IEEE 802.3 CMSA/CD Adapter	31 March 1999	#4838
#2618	Fiber Distributed Data Adapter	31 August 1998	#2743, #2744, #2760, or #4838
#2619	16/4 Mbps Token-Ring Adapter/HP	31 March 1999	#2744
#2620	Cryptographic processor	31 December 1999	#4801/#4802
#2621	Removable media device attach	30 June 2000	#2749
#2623	Six line communications controller	31 December 1999	#4745
#2624	Storage device controller	28 December 2001	#4778
#2626	16/4 Mbps token-ring adapter	01 July 1997	#2744
#2628	Limited cryptographic processor	31 December 1999	#4801
#2629	LAN/WAN/workstation IOP	31 May 2002	#2824, #2842, #2843
#2644	34xx magnetic tape attachment	31 March 1999	N/A
#2654	EIA 232/V.24 20E	31 August 1998	#4745
#2655	EIA 232/V.24 20	31 August 1998	#4745
#2656	X.21 Two line 20	31 August 1998	#4745
#2657	EIA 232/V.24 50E	31 August 1998	#4745
#2658	EIA 232/V.24 50	31 August 1998	#4745
#2659	X.21 Two line 50	31 August 1998	#4745
#2664	Integrated Fax adapter	31 December 1999	#2772, #2773, #2805, #2806
#2665	Copper distributed data interface	31 August 1998	#2743, #2744, #2760, or #4838
#2666	Frame relay adapter		#2745
#2668	Wireless LAN adapter	31 August 1998	N/A
#2669	Shared bus interface card	28 December 2001	N/A
#2673	Optical bus adapter	30 June 2000	N/A
#2674	Optical bus adapter	30 June 2000	N/A

Product or feature	Description	Withdrawal date	Recommended replacement
#2680	Optical bus receiver - 266 Mbps	28 December 2001	N/A
#2683	266 Mbps OptiConnect receiver	28 December 2001	N/A
#2685	1063 Mbps OptiConnect receiver	28 December 2001	N/A
#2686	Optical link processor	28 December 2001	N/A
#2699	Two-Line WAN IOA	28 December 2001	#4745
#2718	PCI magnetic media ctlr	02 July 2002	#2768
#2720	PCI WAN/twinaxial IOA	02 July 2002	#4746 and #4745
#2721	PCI two-line WAN IOA	31 October 2000	#4745
#2722	PCI twinaxial workstation IOA	31 July 2001	#4746
#2723	PCI Ethernet IOA	28 December 2001	#2743 or #4838
#2724	PCI 16/4 Mbps Token Ring IOA	31 July 2001	#2744
#2726	PCI RAID disk unit controller	30 June 2000	#4778
#2729	PCI magnetic media controller	02 July 2002	#2749
#2740	PCI RAID disk unit controller	31 May 2002	#4778
#2741	PCI RAID disk unit controller	31 May 2002	#4778
#2748	PCI RAID disk unit controller	02 July 2002	#4778
#2761	PCI integrated analog modem	02 July 2002	#2772, #2773, #2805, or #2806
#2790	PCI Integrated Netfinity Server	31 May 2002	#2791, #2792, or #2799
#2791	PCI Integrated xSeries Server	03 December 2002	#2799
#2809	PCI LAN/WAN/workstation IOP	31 May 2002	#2842, #2843
#2810	LAN/WAN IOP	31 May 2002	#2842, #2843
#2811	PCI 25 Mbps UTP ATM IOA	31 May 1999	N/A
#2812	PCI 45 Mbps Coax T3/DS3 ATM IOA	31 May 1999	N/A
#2815	PCI 155 Mbps UTP ATM IOA	31 May 2002	#2817
#2816	PCI 155 Mbps MMF IOA	28 December 2001	#2817
#2817	PCI 155Mbps MMF ATM	03 December 2002	N/A
#2818	PCI 155 Mbps SMF ATM IOA	31 May 2002	#2817

Product or feature	Description	Withdrawal date	Recommended replacement
#2819	PCI 34 Mbps Coax E3 ATM IOA	31 May 1999	N/A
#2824	PCI LAN/WAN Workstation IOP	29 December 2001	#2842, #2843
#2830	Main Storage Expansion	03 December 2002	
#2850	Integrated PC Server 32 MB	31 March 1999	#2790 or #2799
#2851	Integrated PC Server	31 March 1999	#2790 or #2799
#2852	PCI Integrated PC Server	30 June 2000	#2790 or #2799
#2854	PCI Integrated PC Server	31 May 1999	#2790 or #2799
#2857	PCI Integrated PC Server (Model 170 only)	31 May 1999	#2790 or #2799
#2858	FSIOA 128 MB memory, keyboard and mouse	30 June 2000	N/A
#2860	Integrated PC Server Memory	31 March 1999	N/A
#2861	32 MB IOP memory	28 December 2001	N/A
#2862	128 MB IOP memory	28 December 2001	N/A
#2865	PCI Integ Netfinity Server	02 July 2002	#2790 or #2799
#2866	PCI Integ Netfinity Server	02 July 2002	#2790 or #2799
#2867	256 MB IOP memory	02 July 2002	N/A
#2868	PCI Integrated Netfinity Server (type 9401)	31 October 2000	#2790 or #2799
#2890	PCI Integrated Netfinity Server	31 May 2002	#2790 or #2799
#2891	PCI Integrated xSeries Server	03 December 2002	#2899
#3001	32 MB main storage	31 May 2002	N/A
#3003	256MB Main Storage	03 December 2002	N/A
#3005	512 MB Main storage	03 December 2002	#3006
#3025	512 MB Main Storage	03 December 2002	#3026
#3065	512 MB Main Storage	03 December 2002	N/A
#3103	32 MB main storage	31 March 1999	N/A
#3104	64 MB main storage	31 March 1999	N/A
#3110	64 MB main storage	30 March 2001	N/A
#3117	8 MB main storage	31 March 1999	N/A
#3118	16 MB main storage	31 March 1999	N/A

Product or feature	Description	Withdrawal date	Recommended replacement
#3120	8 MB main storage	31 March 1999	N/A
#3121	8 MB main storage	31 March 1999	N/A
#3122	32 MB main storage	31 March 1999	N/A
#3133	64 MB main storage	31 March 1999	N/A
#3134	128 MB main storage	31 March 1999	N/A
#3135	256 MB main storage	31 March 1999	N/A
#3136	256 MB main storage	31 March 1999	N/A
#3138	64 MB main storage	31 March 1999	N/A
#3144	8 MB main storage	31 March 1999	N/A
#3145	16 MB main storage	31 March 1999	N/A
#3146	32 MB main storage	31 March 1999	N/A
#3147	32 MB main storage	31 March 1999	N/A
#3149	128 MB main storage	31 March 1999	
#3172	32 MB main storage (2 SIMMS)	31 March 1999	N/A
#3179	256MB main storage	03 December 2002	N/A
#3180	512 MB main storage	03 December 2002	N/A
#3182	32 MB main storage	31 May 2002	N/A
#3189	128 MB main storage	03 December 2002	N/A
#3190	256 MB main storage	03 December 2002	N/A
#3191	512 MB main storage	03 December 2002	N/A
#3192	1024 MB main storage	03 December 2002	N/A
#3193	2048 MB main storage	03 December 2002	N/A
#3195	4096 MB main storage	03 December 2002	#3614
#3197	1024 MB main storage	03 December 2002	#3612
#3198	2048 MB main storage	03 December 2002	#3613
#4308	4.19 GB disk unit	29 December 2000	#4317
#4314	8.58 GB disk unit	23 October 2000	#4317

Product or feature	Description	Withdrawal date	Recommended replacement
#4317	8.58 GB 10k RPM Disk Unit New orders withdrawn Feature conversions still available	03 December 2002	#4318
#4324	17.54 GB Disk Unit	23 October 2000	#4318
#4483	16 GB ¼-inch cartridge tape	03 December 2002	#4684
#4486	25 GB ¼-inch cartridge tape	03 December 2002	#4684
#4583	16 GB ¼-inch cartridge tape	03 December 2002	#4584
#4586	25 GB ¼-inch cartridge tape	03 December 2002	#4584
#4723	PCI 10 Mbps Ethernet IOA	28 December 2001	#4838
#4748	PCI RAID Disk Unit Ctlr New orders withdrawn Feature conversions available	02 July 2002	#4778
#4761	PCI integrated analog modem	02 July 2002	#2772, #2773, #2805, or #2806
#4800	PCI Crypto Coprocessor	29 December 2000	#4801
#4815	PCI 155 Mbps UTP ATM IOA	28 December 2001	#2817
#4816	PCI 155 Mbps MMF ATM IOA	28 December 2001	#2817
#4818	PCI 155 Mbps SMF ATM IOA	28 December 2001	#2817
#5043	Convert primary rack to secondary rack	31 March 1999	N/A
#5044	System unit expansion rack	31 March 1999	#5074, #5079
#5051	Eight disk unit expansion	30 June 2000	#5101, #7127
#5052	Storage expansion unit	31 May 2002	#5101, #7127
#5055	Storage expansion unit	31 May 2002	#5101, #7127
#5057	Storage Expansion Unit New orders withdrawn Feature conversions available	02 July 2002	#5101, #7127
#5058	Storage expansion unit	31 May 2002	#5101, #7127
#5062	OptiConnect in tower	28 December 2001	N/A
#5063	OptiConnect in system unit tower	28 December 2001	N/A
#5064	System unit expansion	28 December 2001	N/A
#5070	266 Mbps System Unit Expansion Tower	30 June 2000	N/A

Product or feature	Description	Withdrawal date	Recommended replacement
#5071	266 Mbps System Unit Expansion Tower	02 July 2002	N/A
#5073	1063 Mbps System Unit Expansion Tower	28 December 2001	N/A
#5080	266 Mbps System Unit Expansion Tower	30 June 2000	N/A
#5081	266 Mbps Storage Expansion Tower	02 July 2002	N/A
#5082	1063 Mbps Storage Expansion Tower	30 June 2000	N/A
#5083	1063 Mbps Storage Expansion Tower	28 December 2001	N/A
#5135	Feature power supply	30 June 2000	N/A
#5143	Feature power supply (400W)	02 July 2002	N/A
#5150	Battery backup (external) (Models 840 and SB3 only)	20 November 2001	N/A
	Battery backup (external)	02 July 2002	N/A
#5151	Power supply (650 watts)	02 July 2002	N/A
#5153	Redundant Power Supplies	02 July 2002	N/A
#5518	Alt IPL Spec 13 GB Tape	31 October 2000	N/A
#5543	Sys Console on comm	29 December 2000	N/A
#5601	OptiConnect in Rack	28 December 2001	N/A
#6050	Twinaxial workstation IOP	31 May 2002	#4746
#6140	Twinaxial workstation IOP	27 March 1998	#4746
#6141	ASCII workstation controller	31 March 1999	N/A
#6142	ASCII 12-Port Expansion	31 March 1999	N/A
#6148	Eight-Port Twinaxial Expansion	30 June 2000	N/A
#6149	16/4 Mbps Token Ring IOA	31 May 2002	#2744
#6151	X.21 One-line adapter	31 August 998	#4745
#6152	EIA 232/V.24 adapter	31 October 1996	#4745
#6153	V.35 One-line adapter	31 August 1998	#4745
#6173	V.35 One-line adapter 50 foot	31 August 1998	#4745
#6180	Twinaxial workstation IOA	31 July 2001	#4746
#6181	Ethernet IOA	31 July 2001	#4838

Product or feature	Description	Withdrawal date	Recommended replacement
#6325	CD-ROM New orders withdrawn Feature conversions available	02 July 2002	#4525
#6380	2.5 GB ¼-inch cartridge tape	30 June 2000	#4582
#6381	2.5 GB ¼-inch cartridge tape	29 December 2000	#4582
#6382	4GB ¼-inch cartridge tape	03 December 2002	#6384
#6383	16GB ¼-inch cartridge tape	03 December 2002	#6384
#6385	13 GB ¼-inch cartridge tape	31 May 2000	#4583
#6386	25 GB ¼-inch cartridge tape	03 December 2002	#6384
#6425	CD-ROM	02 July 2002	#4524
#6480	2.5 GB ¼-inch cartridge tape	02 July 2002	#4582
#6481	2.5 GB ¼-inch cartridge tape	29 December 2000	#4582
#6482	4GB ¼-inch cartridge tape	03 December 2002	#6484
#6483	16GB ¼-inch cartridge tape	03 December 2002	#6484
#6485	13 GB ¼-inch cartridge tape	31 May 2000	#4583
#6486	25 GB ¼-inch cartridge tape	03 December 2002	#6484
#6501	Tape/disk device controller	31 July 2001	#2749 for Tape #2766 for External Disk
#6502	Disk device controller	02 November 1997	#2778
#6512	Disk unit controller for RAID	30 June 2000	#4778
#6513	Internal tape controller device SPD	01 October 1999	#2749
#6522	Disk unit controller for RAID	30 June 2000	#4778
#6523	Storage device controller	30 June 2000	#4778
#6530	DASD controller	31 March 1999	#4778
#6532	RAID disk unit controller	30 June 2000	#4778
#6533	RAID disk unit controller	31 May 2002	$4778
#6534	Magnetic media controller	31 May 2002	#2749
#6607	4.19 GB Disk Unit	29 December 2000	
#6616	Integrated PC Server	31 March 1999	#2791 or #2799

Product or feature	Description	Withdrawal date	Recommended replacement
#6617	Integrated PC Server	31 May 1999	#2791 or #2799
#6618	Integrated PC Server	28 December 2001	#2791 or #2799
#6713	8.58 GB Disk Unit: New orders withdrawn Feature conversions withdrawn	 23 October 2000 02 July 2002	#4317
#6714	17.54 GB disk unit	23 October 2000	#4318
#6717	8.58 GB 10k RPM disk unit New orders withdrawn Feature conversions still available	03 December 2002	#4318
#6718	17.54 GB Disk Unit	03 December 2002	
#6807	4.19 GB disk unit	29 December 2000	#4317
#6813	8.58 GB disk unit	23 October 2000	#4317
#6817	8.58 GB 10k RPM disk unit	12/03/2002	#4317
#6824	17.54 GB disk unit	23 October 2000	#4318
#6907	4.19 GB disk unit	29 December 2000	#4318
#7000	Panel Keylock	30 June 2000	N/A
#7101	System unit expansion	31 May 2002	N/A
#7102	System unit expansion	02 July 2002	N/A
#7108	Expansion gate	30 June 2000	N/A
#7117	Integrated expansion unit	30 June 2000	N/A
#7130	Expansion unit tape/cage	02 July 2002	N/A
#7174	Ethernet IEEE 802.3 Adapter	08/31/1998	#2838
#7175	16/4 Mbps token-ring adapter	08/31/1998	#2744
#7500	Qty 150 of #4314	23 October 2000	N/A
#7501	Quantity 150 of #4317	03 December 2002	N/A
#7503	Qty 150 of #4324	23 October 2000	N/A
#8180	Opt. Base 512 MB main storage	28 December 2001	N/A
#8191	Opt. Base 512 MB main storage	28 December 2001	N/A
#8192	Opt. Base 1024 MB main storage	28 December 2001	N/A
#8193	Opt. Base 2048 MB main storage	28 December 2001	N/A

Product or feature	Description	Withdrawal date	Recommended replacement
#8617	Opt. Base 8.58 Gb 10k RPM Disk Unit	28 December 2001	#4317
#8618	Opt. Base 17.54 Gb 10k RPM Disk Unit	28 December 2001	#4318
#8713	Opt Base 8.58 GB Disk Unit New orders withdrawn Feature conversions withdrawn	 31 January 2001 02 July 2002	#4317
#8714	Opt Base 17.54 GB Disk Unit (7200 RPM) New orders withdrawn Features conversions withdrawn	 31 January 2001 02 July 2002	#4318
#8809	EIA 232/V.24 Two line adapter		#4745
#8813	Opt Base 8.58 GB Disk Unit	23 October 2000	#4317
#8813	Opt Base 8.58 GB Disk Unit (7200 RPM)	31 January 2001	#4317
#8817	Opt. Base 8.58 Gb 10k RPM Disk Unit	28 December 2001	#4318
#8818	Opt. Base 17.54 Gb 10k RPM Disk Unit	28 December 2001	#4318
#8824	Opt Base 17.54 GB Disk Unit	23 October 2000	#4318
#8824	Opt Base 17.54 GB Disk Unit (7200 RPM)	31 January 2001	#4318
#8863	EIA 232/V.24 Two line adapter		#2745
#8866	EIA 232/V.24 Two line adapter (50-foot)		#2745
#8917	Opt Base 8.58 GB 10k rpm Disk	02 July 2002	#4317
#8918	Opt Base 17GB 10k rpm Disk	02 July 2002	#4318
#8924	Opt Base 17.54 GB Disk Unit	23 October 2000	#4318
#8924	Opt Base 17.54 GB Disk Unit (7200 RPM)	31 January 2001	#4318
#9052	Std Strg Expn Unt (16 disk)	02 July 2002	#5101
#9080	Watertight Line Cord	02 July 2002	#1455, #1456
#9082	120/240V 14-ft. Line Cord	02 July 2002	#1303, #1406
#9083	Locking Line Cord Plug	02 July 2002	N/A
#9116	High Performance CD Enable	02 July 2002	N/A
#9119	Migrated DASD	02 July 2002	N/A
#9174	Ethernet/IEEE 802.3 Adapter		#4838
#9175	16/4 Mbps Token-Ring Adapter		#2744
#9179	Base 256 MB main storage	02 July 2002	N/A

Product or feature	Description	Withdrawal date	Recommended replacement
#9180	Line Cord Specify	02 July 2002	N/A
#9182	14-ft. Line Cord Specify	02 July 2002	N/A
#9183	Locking Line Cord Plug	02 July 2002	N/A
#9190	Base 256 MB main storage	31 May 2002	N/A
#9240	Base 400 W Power Supply	30 June 2000	N/A
#9243	400 W Power Supply	30 June 2000	N/A
#9244	Expansion Unit 320 W Power Supply	30 June 2000	N/A
#9245	Base Battery Backup	30 June 2000	N/A
#9249	Base 16/4 Mbps Token Ring IOA	31 May 2002	#2744
#9251	Base I/O Tower	02 July 2002	
#9280	Base Twinaxial Workstation Controller	28 December 2001	#4746
#9313	Base 8.58 Disk Unit	23 October 2000	#4317, #4318
#9313	Base 8.58 GB Disk Unit (7200 RPM)	31 January 2001	#4317, #4318
#9329	Base PCI Integrated Expansion Unit	31 May 2002	N/A
#9330	Base PCI Integrated Exp Unit New orders withdrawn Feature conversions available	02 July 2002	N/A
#9331	Base expansion unit for SPD cards	28 December 2001	N/A
#9347	Local Source Rack Mount	31 October 2000	N/A
#9364	Base System Unit Expansion	28 December 2001	N/A
#9381	Base Ethernet IOA	28 December 2001	#4838
#9699	Base Two-Line WAN IOA	28 December 2001	#4745
#9707	Base 4.19 GB Disk Unit	29 December 2000	#4317, #4318
#9720	Base PCI WAN/Twinaxial IOA	02 July 2002	#4746 and #4745
#9721	Base PCI Two-Line WAN IOA	31 October 2000	#4745
#9723	Base Ethernet IOA	02 July 2002	#4838
#9724	Base 16/4Mbps Token-Ring IOA	02 July 2002	#2744
#9728	Base PCI Disk Unit Ctlr	02 July 2002	#4778
#9738	Base PCI 100/10Mbps Ethernet	02 July 2002	#4838

Product or feature	Description	Withdrawal date	Recommended replacement
#9740	Base PCI RAID Disk Unit CTLR	02 July 2002	#4778
#9745	Base PCI Two-Line WAN IOA	02 July 2002	#4745
#9748	Base PCI Disk Unit Controller	28 December 2001	#4778
#9748	Base PCI Disk Unit Ctlr	02 July 2002	#4778
#9751	Base MFIOP with RAID (Models 640, 650, S30, S40, SB1)	31 May 1999	N/A
#9754	Base MFIOP with RAID	28 December 2001	N/A
#9853	20.0 Meter Optical Bus Cbl	31 October 2000	N/A
#9902	Do not integrate	02 July 2002	N/A
#9907	Base 4.19 GB Disk Unit	29 December 2000	#4317, #4318

Software no longer marketed by IBM

The software products shown in the following table are now *withdrawn from marketing*, or will be in the near future.

Product or feature	Description	Withdrawal date	Recommended replacement
5716-SSP	Advanced 36 Release 7.5 programs	28 April 2000	N/A
5769-FW1	5769-FW1 Firewall: All releases	29 December 2000	N/A
5769-XY1	Client Access Family 5769-XY1: All releases	25 February 2000	N/A
9401 Model 150	V4R1 and V4R2 9401-150 packages	31 December 1999	V5 PPS Software
#0100	Nonpackage Specify	02 July 2002	N/A
#0422	Preload JDE	31 January 2001	N/A
#0429	Preload Datatex (TIM)	23 October 2000	N/A
#0430	Preload SSA	23 October 2000	N/A
#0435	Preload Infinium	23 October 2000	N/A
#0439	Preload Lawson	23 October 2000	N/A
#0440	Preload JBA	23 October 2000	N/A
#0445	Preload Acacia	23 October 2000	N/A

Product or feature	Description	Withdrawal date	Recommended replacement
#0449	Preload Vormittag	31 January 2001	N/A
#0451	RRR Preload (Test Server)	31 May 1999	N/A
#0460	Preload Intentia	23 October 2000	N/A
#0465	Preload Lilly	23 October 2000	N/A
#0470	Preload IBS	23 October 2000	N/A
#0475	Preload E3	31 January 2001	N/A
#0480	Preload MAPICS	31 January 2001	N/A
#0485	Preload Manhattan Associates	23 October 2000	N/A
#0490	Preload Baan	23 October 2000	N/A
#5006	Backup Tape - Preload software	31 May 2002	
#5023	OS/400 V4R1	31 May 1999	#5029
#5024	OS/400 V4R2 and its associated 5769-xxx programs	25 February 2000	#5028, #5029
#5025	OS/400 V4R3 and its associated 5769-xxx programs	29 December 2000	#5028, #5029
#5026	OS/400 V4R4 and its associated 5769-xxx programs	31 May 2002	#5028, #5029
#5027	OS/400 V4R5 and its associated 5769-xxx programs	02 July 2002	#5028, #5029

Abbreviations

Abbreviations

Abbreviations and acronyms

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
AUI	Attachment Interface Unit
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

NTAP Windows NT Application Processors

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 Application 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

RPO Record Purpose Only

RPQ Request for Price Quotation

RPR Relative Performance Rating

RSP relative system performance

SAA Systems Application Architecture

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 Online 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

Related Publications

Related Publications

Related publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this redbook.

IBM Redbooks

For information on ordering these publications, see “How to get IBM Redbooks” on page 935.

- *IBM @server iSeries System Handbook*, GA19-5486

  Periodically, the content of this Handbook is revised to keep readers informed about changes between IBM printed hardcopy editions. Incremental editions are annotated as -22a, where “a” represents a level of update. They are orderable in hardcopy from a print-on-demand vendor through the IBM Redbooks site.

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  You can also access the Handbook directly at:

  `http://www.redbooks.ibm.com/pubs/pdfs/redbooks/ga195486.pdf`

- *IBM Web-to-Host Integration Solutions*, SG24-5237
- *Building Integration Objects With IBM SecureWay Host Publisher Version 2.1*, SG24-5385
- *Developing an e-business Application for the IBM WebSphere Application Server*, SG24-5423
- *WebSphere Application Servers: Standard and Advanced Editions*, SG24-5460
- *CCF Connectors and Database Connections Using WebSphere Advanced Edition Connecting Enterprise Information Systems to the Web*, SG24-5514
- *Web Enabling AS/400 Applications with IBM WebSphere Studio*, SG24-5634
- *iSeries e-business Handbook: A Technology and Product Reference*, SG24-5694
- *Design and Implement Servlets, JSPs, and EJBs for IBM WebSphere Application Server*, SG24-5754

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- *e-Commerce Patterns Using WebSphere Commerce Suite, Patterns for e-business Series*, SG24-6156
- *e-Marketplace Pattern using WebSphere Commerce Suite, MarketPlace Edition Patterns for e-business Series*, SG24-6158
- *WebSphere Personalization Solutions Guide*, SG24-6214
- *IBM @server iSeries in Storage Area Networks: A Guide to Implementing FC Disk and Tape with iSeries*, SG24-6220 (Redbook Draft, expected publish date: *December 2002*).
- *iSeries IP Networks: Dynamic!*, SG24-6718
- *IBM @server iSeries Pocket Handbook*, SG24-9406
- *OS/400 Maximum Capacities - V5R2,* REDP0204

Other resources

These publications are also relevant as further information sources:

- Soltis, Frank G. *Fortress Rochester: The Inside Story of the IBM @server iSeries.* 29th Street Press, July 2001. ISBN 1583040838.
- *IBM TotalStorage Enterprise Tape System 3590 Introduction and Planning Guide,* GA32-0329
- *iSeries 940x RISC-to-RISC Road Map,* SA41-5155
- *iSeries Performance Capabilities Reference*, SC41-0607
- *System/36 Migration Planning Guide,* SC41-4152
- *System/38 Migration Planning Guide*, SC41-4153
- *Tips and Tools for Securing Your iSeries*, SC41-5300
- *Backup and Recovery V5R2*, SC41-5304
- *Backup Recovery and Media Services for iSeries*, SC41-5345
- *IBM AS/400 Integration for Windows Server - Setup*, SC41-5439
- *iSeries Access for Windows–Setup, V5R2*, SC41-5507
- *Operations Console Setup*, SC41-5508
- *System API Reference*, SC41-5801
- *Using the Intelligent Miner for Data V6.1*, SH12-6394
- *Intelligent Miner for Data V6.1 API*, SH12-6395
- *Intelligent Miner for Data V6.1 Using the Associations Visualizer*, SH12-6396

- The following publications are available in soft copy only on the CD-ROM *AS/400 Information Center*, SK3T-2027:
  - *AS/400 Migration from System/36 Planning Guide*
  - *Migration from System/38 Planning Guide*
- *Physical Planning Quick Reference* on the Web at:

  `http://www.as400.ibm.com/tstudio/planning/index_rf.htm`

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The iSeries Information Center offers comprehensive access to iSeries technical information using the power of browsers and online technology. The Information Center gives fast, easy access to how-to information, example scenarios and program code, reference lookups, and conceptual information.

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Since the release of V5R1, you can access publications from the AS/400 Online Library via the Information Center, as well as links to related IBM Redbooks.

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`http://www.ibm.com/eserver/iseries/infocenter`
`http://publib.boulder.ibm.com/pubs/html/as400/v5r2/ic2924/index.htm`

Referenced Web sites

These Web sites are also relevant as further information sources:

- Redbooks home page

  http://www.redbooks.ibm.com/redbooks
  http://w3.itso.ibm.com

- Redbooks Portal for Technical Studio

  http://www.as400.ibm.com/tstudio

- iSeries Information Center

  http://www.ibm.com/eserver/iseries/infocenter
  http://publib.boulder.ibm.com/pubs/html/as400/v5r2/ic2924/index.htm

- iSeries Library home page

  http://www-1.ibm.com/servers/eserver/iseries/library/

- iSeries and AS/400 publications: “What’s new” by release

  http://publib.boulder.ibm.com/pubs/html/as400/online/chgfrm.htm

- IBM @server iSeries Resource Library

  http://www.ibm.com/eserver/iseries/library

- IBM @server iSeries Support: Software Knowledge Base

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

- Technical Articles and Whitepapers

  http://www.iseries.ibm.com/developer/comm/pidtechpapers.html?All

- *Physical Planning Quick Reference*:

  http://www.as400.ibm.com/tstudio/planning/index_rf.htm

- IBM Product Publications

  http://as400bks.rochester.ibm.com

- IBM Publications Center (intranet site)

  http://w3.ehone.ibm.com/public/applications/publications/cgibin/pbi.cgi

- iSeries Nation

  http://www-1.ibm.com/servers/eserver/audience/Homepage.wss?view=ination

- Parterworld for Developers - IBM @server iSeries

  http://www.iseries.ibm.com/developer/index.html

- IBM @server iSeries server site

  http://www-1.ibm.com/servers/eserver/iseries/

- iSeries Software

  http://www.ibm.com/eserver/iseries/software

- ibm.com/software site

  http://www.software.ibm.com

- iSeries Planning

  http://www.ibm.com/servers/eserver/iseries/support/planning

- IBM @server Solution Connection

  http://www.ibm.com/eserver/iseries/services

- Performance Center

  http://www.iseries.ibm.com/developer/performance/index.html
  http://www.iseries.ibm.com/developer/performance/dasdmenu.html

- IBM Workload Estimator for iSeries

  http://www-912.ibm.com/servlet/EstimatorServlet

- iSeries Technical Support Overview

  http://www.as400service.ibm.com/supporthome.nsf/document/20965550

- IBM @server iSeries Support

  http://www.ibm.com/iseries400/support

- BRMS application client performance

  http://www-1.ibm.com/servers/eserver/iseries/service/brms/adsmperf.htm

- CICS

  http://www-3.ibm.com/software/ts/cics/

- IBM Connect for iSeries

  http://www.ibm.com/eserver/iseries/btob/connect

- iSeries Navigator for Wireless site, which offers information and helpful links about Management Central-Pervasive

  http://www-1.ibm.com/servers/eserver/iseries/navigator/pervasive.html

- 5250 Emulation Products

  http://www.networking.ibm.com/525

- Capacity Upgrade on Demand

  http://www.ibm.com/eserver/iseries/ondemand

- OS/400 CPA Threads to Kernel Threads Road Map

  http://www.as400.ibm.com/developer/threads/cpa/roadmap.doc.html

- Integrated Netfinity Server for AS/400 Hardware

http://www.as400.ibm.com/windowsintegration/ntins.htm

- Windows Integration (with iSeries)

  http://www.iseries.ibm.com/windowsintegration

- Electronic Support Access

  http://www.iseries.ibm.com/tstudio/planning/esa/esa.htm

- Ultrium Linear Tape-Open benefits

  http://www.storage.ibm.com/hardsoft/tape/lto/prod_data/ultrium.html

- IBM NetVista

  http://www.pc.ibm.com/ww/netvista/index.html

- Application Factory - OS/400 PASE

  http://www.iseries.ibm.com/developer/factory/pase

- Linux for IBM @server iSeries

  http://www.ibm.com/eserver/iseries/linux

- The Apache Software Foundation

  http://www.apache.org

- Logical partitioning

  http://www.ibm.com/servers/eserver/iseries/lpar

- VisualAge Generator

  http://www-4.ibm.com/software/ad/visgen

- IBM Toolbox for Java

  http://www.ibm.com/servers/eserver/iseries/toolbox

- Thin Client

  http://www.pc.ibm.com/ww/netvista/thinclient/choose_country.html

- IBM Electronic Services for iSeries 400 and AS/400e

  http://www.ibm.com/services/electronic

- IBM Content Manager

  http://www-4.ibm.com/software/data/cm/cmgr

- Backup Recovery and Media Services

  http://www.ibm.com/servers/eserver/iseries/service/brms.htm

- Facsimile Support for iSeries

  http://www.ibm.com/servers/eserver/iseries/fax400

- Lotus SmartSuite

  http://www.lotus.com/smartsuite

- Lotus Domino

  http://www.lotus.com/domino
- Lotus Domino core technologies

  http://www.lotus.com/home.nsf/welcome/eizone
- Lotus Domino R5 Enterprise Server

  http://www.lotus.com/dominoenterpriseserver
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  http://www.ibm.com/servers/eserver/iseries/domino/support
- Lotus Messaging

  http://www.lotus.com/messaging
- Lotus Enterprise Integration

  http://www.edge.lotus.com
- The ATM Forum

  http://www.atmforum.com
- Baan home page

  http://www.baan.com
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