xSeries in iSeries enhancements

2001 Announcements
ITSO Technical Overview
May 2001

Objectives

The objectives of this presentation are to show the technical aspects of the V5R1 integration support for Windows Server software.

During this discussion we will cover the integrated and external xSeries servers that support this integrated software.

We will show the areas that the iSeries adds value to the consolidation proposition by the integration of Windows applications and servers.

Agenda

- What's new in V5R1
- Server consolidation
- Integrated servers
- External attached servers
- Considerations for xSeries in HSL loops
- xSeries in iSeries switched clusters
- xSeries in iSeries SAN
- Integration code enhancements
- Summary
- Sources of information

Notes

Note: The term "AS/400" is used throughout this presentation to include both AS/400 and iSeries systems running V5R1 unless otherwise noted.

During this presentation we will cover the following topics:

What's new in V5R1

- There are major new feature and enhancement for integrated PC servers wit V5R1.

- Server consolidation
  - Consolidation has always been a major area where integrated PC servers are popular. We will visit this value proposition.
- Integrated servers
  - In February 2001 IBM announced new 850MHz IIXS servers
- External attached servers
  - With this release you can now attach certain IBM xSeries servers via an HSL bus.
- Considerations for xSeries in HSL loops
  - The attachment method of external xSeries servers is via HSL There are a number of considerations for this support..
- xSeries in iSeries switched clusters
  - iSeries clusters offer power HA capabilities. The IXA/IXS are now part of these services.
- xSeries in iSeries SAN
  - The new iSeries has fibre channel disk and tape attachment features at V5R1. The integration code allows access to these features.
- Integration code enhancements
  - The Windows integration code has been freshed at V5R1 with significant enhancements.
- Summary
- Sources of information

What's new in V5R1

What is New in 2001

February 2001

- 850 MHz Integrated xSeries Server

April 2001

- Integrated xSeries Adapter to attach xSeries servers
- iSeries Storage Area Network Enhancements
  - Hot Addition of Disk
  - Increase disk capacity from 1 TB to 2 TB
  - Independent Auxiliary Storage Pools
  - DVD ROM Support
- Operations Navigator Enhancements
  - Management Central Pervasive Support
- 1 Gb Ethernet LAN
- New 5078 and 0578 Expansion Towers
- Doubled to 32 the number of Integrated xSeries Servers

Notes: What is New in 2001

February 2001

- On February 13, 2001 a new 850 MHz Integrated xSeries Server was announced. It is generally available on February 23, 2001.

April 2001 with V5R1

- Integrated xSeries Adapter to attach xSeries servers
- iSeries Storage Area Network Enhancements
  - Hot Addition of Disk - add disk to Windows 2000 Server while Windows 2000 Server continues to run
  - Increase disk capacity from 1 TB to 2 TB per IXS or IXA attached server
  - Independent Auxiliary Storage Pools - Windows server storage spaces can be located in IASPs and switched between iSeries servers
  - DVD ROM Support - Windows 2000 Server can read the new iSeries DVD device
- Operations Navigator Enhancements - significant enhancements to Operations Navigator include functions for the IXS/IXA. Specifically, support is now provided for the storage space and user management. Management Central Pervasive support has also been added.
- 1 Gb Ethernet LAN is now an option for the Integrated xSeries Server.
- New 0578 and 5078 Expansion Towers support two Integrated xSeries Servers. These towers, since they contain no room for disk drives, are a less expensive option for adding Integrated xSeries Servers.
- Doubled to 32 the number of Integrated xSeries Servers supported on the iSeries Model 840.

Offerings

Strategy:

- Flexible offerings supporting heterogeneous (OS/400 and Windows) applications, distributed servers with central management, and server consolidation

Integrated xSeries Server

- An Intel server running Windows 2000 Server or NT Server inside the iSeries
- 20% of new iSeries have an Integrated xSeries Server

Integrated xSeries Adapter

- Enables high speed attachment of xSeries server running Windows 2000 Server to iSeries

IBM e - - Integration of iSeries and xSeries

Notes: Offerings

To address the demand for iSeries and Windows server integration and consolidation, our strategy is to offer iSeries based solutions that provide for the management of Windows servers. These solutions are targeted for the branch office environment, where OS/400 and Windows applications are served from one system, while management can be accomplished in a central location. In addition, the solutions target server consolidation environments, where iSeries can provide management for a number of Windows servers.

The first offering is the Integrated xSeries Server. This product has been in the marketplace for a number of years. The IXS is a Windows server on a card that is installed inside the iSeries server. The IXS supports NT Server or Windows 2000 Server. Approximately 20% of iSeries shipments include an Integrated xSeries Server.

The second offering is the Integrated xSeries Adapter. This is a new product for 2001 and is part of the V5R1 announcement. The IXA provides for the high speed direct attachment of selected xSeries servers to iSeries. The IXA is a card that is installed in the xSeries server that enables a direct connection to iSeries. The IXA supports Windows 2000 Server and Windows 2000 Advanced Server running on the xSeries server.

Both of these offerings demonstrate the advantage of IBM eServer. The best of iSeries and xSeries servers are brought together via the IXS and IXA offerings.

iSeries Windows Server Integration Benefits

Manage multiple applications and services in a single server

- Run both OS/400 business applications and Windows complementary applications

Lower the cost of user administration

- Create users once, synchronize user profiles and passwords

Provide flexible Storage Area Network management for Windows Servers

- OS/400 storage management, disk reliability with RAID 5 & mirroring

Reduce operations and skills costs

- OS/400 operator can manage Windows server operations and backup

Improve Windows server uptime and stability

- Update iSeries device drivers automatically from iSeries

Reduce total cost of ownership

- iSeries warranty and maintenance cover Integrated xSeries Servers

Notes: Integration Benefits

Multiple servers: The IXS and IXA for iSeries are designed for local consolidation of PC servers and storage, plus remote management of PC servers in distributed offices. They improve central control and remote operations by providing a consolidated server for OS/400 applications and Windows 2000 and NT services. And they lets you consolidate multiple servers. Up to three IXSs are supported in a single iSeries Model 270, and up to 32 Windows servers in an iSeries Model 840. Up to 2 direct attach xSeries servers are supported on a 270, up to 16 on an 840. This allows you to keep your Intel-based servers separate, but manage them in a single system with consolidated storage of up to 2 Terabyte of disk per Windows server.

User Administration: Cut LAN administration and PC Server operations costs: By synchronizing user profiles and passwords between OS/400 and Windows 2000 and NT, you can cut the high cost of client administration.

Storage Management: Manage iSeries **storage area network** for multiple Windows servers, Allocate 1 MB - 64 GB per Windows drive, 32 drives per server, Create Windows disks in OS/400 system or user auxiliary storage pools, Protect Windows disks with iSeries RAID-5 or mirroring, distribute Windows disk images to remote servers. Full OS/400 system backup provides disaster recovery for Windows, OS/400 managed backup saves daily incremental Windows file changes, and Windows backup saves daily Windows files changes direct to iSeries tape

Server Management: OS/400 operators in a central location can view Windows 2000 and NT messages, restart and add disk to remote Windows servers. Management Central operator can: Remotely monitor, reboot and add or distribute disk to Windows server , Distribute packages and commands to groups of Windows servers, and Submit Windows commands from OS/400. With Message Logging O/400 operator can monitor Windows operations and filter and send Windows messages to OS/400 operator: System, security and application messages

Flexible server replacement: If your server fails, quickly switch to a hot spare server without reinstalling Windows 2000 or NT, or use hot-plug to replace a failed server without restarting the iSeries.

Enhances reliability: iSeries disk drives with RAID-5 and mirroring options can improve uptime and consolidate storage. Increase business recovery protection with backup of the combined OS/400 and Windows Servers.

Improve Windows server uptime and stability: Update device drivers automatically from OS/400. Windows device drivers are from a single supplier, single configuration, integrated testing/support. Fixes to device drivers deployed via OS/400 PTFs Simple to manage distribution across entire network

Reduce total cost of ownership: iSeries warranty and maintenance cover Integrated xSeries Servers

Opportunities

Branch Office

- Central management of distributed iSeries server supporting OS/400 and Windows applications

Large Consolidation

- iSeries is the Storage Area Network for Windows servers

Windows Server

- File/Print, Exchange, SQL Server ....

Citrix Metaframe

- Run heavy Windows client application on server, send user interface to client

Complementary Application Support

- Application requires OS/400 and Windows servers

Notes: Opportunities

The Opportunities to sell the Integrated xSeries Server and Integrated xSeries Adapter include:

- Branch Office: The IXS is a great solution for a branch office environment where a small number of users need access to OS/400 and Windows applications. One iSeries server (e.g., 270) with an IXS can support these users. This environment can be managed centrally with tools like Operations Navigator, Management Central, and Windows 2000 Server Terminal Services.
- Large Consolidation: Consolidate multiple Windows servers with the IXS and IXA. iSeries provides storage area network services, server management, and user management for the attached Windows servers.
- Windows Server: The IXS is a Microsoft logo'd Windows NT and 2000 server. The xSeries servers that support the IXA are Microsoft logo'd for Windows 2000 Server. As a result both of these offering support the various Windows server applications including File/Print, IIS, Exchange, and SQL Server.
- Citrix Metaframe: This Citrix product supports running the heavy Windows client application on server (IXS or direct attach with IXA) and sending the user interface to client. In this environment a new Windows application can be used by older, smaller, and even non-Windows clients.
- Complementary Application Support: Application requires OS/400 and Windows servers. The next chart has examples.

Complementary Applications

ISVs are leveraging the multiple servers to deliver solutions

- Siebel - database on OS/400, e-business applications on Windows
- Baan - BaanERP applications and data on OS/400, BaanSCS (Supply Chain Series) on Windows
- Logility - core applications and data on OS/400, complementary applications (e.g., Voyager) on Windows
- JD Edwards - One World and World applications and data on OS/400, Deployment Server and Advanced Planning Solution on Windows
- .... more to come

ISVs are partnering with other solution providers to deliver integrated offerings

- Yojna and Fiserv / GG Pulley
- Citrix Metaframe
- Checkpoint Firewall

IBM is using Windows NT/2000 to deliver complementary applications

- Domino: Learning Space
- B2B: MQSeries Integrator

Notes: Complementary Applications

ISVs are currently leveraging the multiple servers to deliver solutions. These applications are called complementary application. For example:

- Siebel - database on OS/400, e-business applications on Windows
- Baan - BaanERP applications and data on OS/400, BaanSCS (Supply Chain Series) on Windows
- Logility - core applications and data on OS/400, complementary applications (e.g., Voyager) on Windows
- JD Edwards - One World and World applications and data on OS/400, Deployment Server and Advanced Planning Solution on Windows
- Additional solutions are planned for 2001.

In addition some ISVs are partnering with other solution providers to deliver integrated offerings. For example:

- Yojna is an Windows Internet banking application that works with OS/400 backend banking applications from Fiserv and GG Pulley.
- Citrix Metaframe works with numerous ISVs to run the Windows client portion of the application on a Windows server
- Checkpoint Firewall is a popular product used to provide secure Internet connections.

IBM is also using Windows NT/2000 to deliver complementary applications. For example,

- The next release of Domino Learning Space will be a Windows application
- The next release of MQSeries Integrator will be a Windows application

We are using the xSeries ServerProven program to highlight these complementary applications. The ServerProven program tests and validates solutions, middleware and hardware on specific server configurations

ServerProven platforms include: Integrated xSeries Server, 7100 and 7600 Netfinity servers, and 250 and 350 xSeries servers. For more information see http://www.pc.ibm.com/ww/eserver/xseries/serverproven/index.html

ServerProven Adapters include: Integrated xSeries Adapter. For more information see http://www.pc.ibm.com/us/compat/index.html

ServerProven Solutions -for a current list see
http://www8.software.ibm.com/solutions/isv/igssg.nsf/SearchGUI2?OpenForm

ServerProven

"Make sure everything you would typically use along with IBM xSeries servers is thoroughly validated"

- Solutions, Middleware, Hardware

IBM makes no representations or warranties, expressed or implied, regarding non-IBM ServerProven products and services

Steps Required for ServerProven Application

- ISV Loads and Tests application on Integrated xSeries Server
  - Four Solution Porting Centers (Hursley, Stuttgart, Sydney, San Mateo)
  - ISV Location
  - iSeries PartnerWorld in Rochester
- ISV submits form to be a member of the Global Solutions Catalog via web
- ISV submits ServerProven form for a given configuration via web
- IBM approves application

Benefits to ISV

- Application listed on xSeries Web Site:
  - http://www.pc.ibm.com/ww/eserver/xseries/serverproven/
- ISV can use the ServerProven logo

Benefits to Customer

- ServerProven solutions reduce their risk

IBM Server Proven™

Notes: ServerProven

Now, the Integrated xSeries Server participates in the xSeries ServerProven program. The ServerProven program highlights applications that have been validated to run on IBM xSeries servers including the Integrated xSeries Server for iSeries. Customers know they can purchase ServerProven applications with confidence.

Application providers are already busy validating their solutions on the Integrated xSeries Server.

How to get your application ServerProven:

1. Contact wurgler@us.ibm.com
2. Join PartnerWorld for Developers
   If you're not a member, join PartnerWorld for Developers as a commercial member. If you're already a member developing on another platform, update your registration to include the Netfinity interest area.
3. Test Windows NT and Windows 2000 applications in the way that's most convenient for you

Do one of the following:

- ServerProven testing is available in person at IBM Solution Partnership Centers around the world, where you'll find the latest Integrated xSeries Servers and top notch technical support.
- Test at your own location using your own Integrated xSeries Servers
- Use the IBM Solution Partnership Centers' Integrated xSeries Servers by remote access from your location.

For additional information about the ServerProven program, see
http://www.pc.ibm.com/ww/eserver/xseries/serverproven/

Success Stories

Les Schwab Tire Centers - US

- 1 Integrated Netfinity Server in each of 315 store
- OS/400 Business application with Network Stations
- Application: Citrix Metaframe

Infiniti Division of Nissan - US

- 2 Integrated Netfinity Servers in each of 150 dealerships
- Allows headquarters to re-image remote PCs which become damaged
- Application: LAN Client Control Manager

Swiss Reinsurance - Australia

- 5 Integrated Netfinity Servers installed on a 720
- Purchased AS/400 purely as a Windows NT server consolidation platform
- Application: Terminal Server/MetaFrame

Chase Manhattan Bank - Spain

- 5 Integrated Netfinity Servers installed on a 720
- Replaced 10 Compaq with native Domino and INS
- AS/400 is the storage consolidation solution
- Application: SQL Server applications

Notes: Success Stories

Les Schwab Tire Centers - US
- 1 Integrated Netfinity Server in each of 315 tire centers
- OS/400 Business application with Network Stations
- Application: Citrix Metaframe

Infiniti Division of Nissan - US
- 2 Integrated Netfinity Servers in each of 150 dealerships
- Allows headquarters to re-image remote PCs which become damaged
- Application: LAN Client Control Manager

Swiss Reinsurance - Australia
- 5 Integrated Netfinity Servers installed on a 720
- Purchased AS/400 purely as a Windows NT server consolidation platform
- Application: Terminal Server/MetaFrame

Chase Manhattan Bank - Spain
- 5 Integrated Netfinity Servers installed on a 720
- Replaced 10 Compaq with native Domino and INS
- AS/400 is the storage consolidation solution
- Application: Use INS to run the other SQL Server applications

For more information see www.iseries.ibm.com/windowsintegration

Integrated xSeries Server vs PC Server

iSeries

Integrated xSeries Server	Price
850 MHz Pentium III	$2,800
256 KB L2 Cache	included
512 MB Memory	1,610
8 GB 10K Disk (on iSeries)	1,400
LAN Card	840
CD ROM (Uses iSeries)	0
Tape (Uses iSeries)	0
Cables, Keyboard, Mouse	200
Hardware Maintenance (7X24, on-site, same day)	0
Integration Software	0
Total	$6,850

Other costs

- Monitor
- Windows Server software

Compaq

ProLiant ML 370	Price
933 MHz Pentium III 128 MB memory and 9 GB Disk	$2,897
256 KB L2 Cache	included
512 MB Memory (upgrade from 128 MB)	941
9 GB 10K Disk (upgrade from standard 7200 RPM)	137
LAN Card	included
CD ROM	included
Tape - DAT	852
Cables, Keyboard, Mouse	included
Hardware Maintenance (Upgrade to 7X24, on-site, same day service for three years)	1,450
Hardware Installation	350
Total	$6,627

Other costs

- Monitor
- Windows Server software
- Hardware Maintenance Year 4,5...

Source: IBM US List Prices 2/01, http://www.directplus.compaq.com/ on 1/22/01

Server consolidation

iSeries Consolidated Server Strategy

iSeries applications from core business to e-business

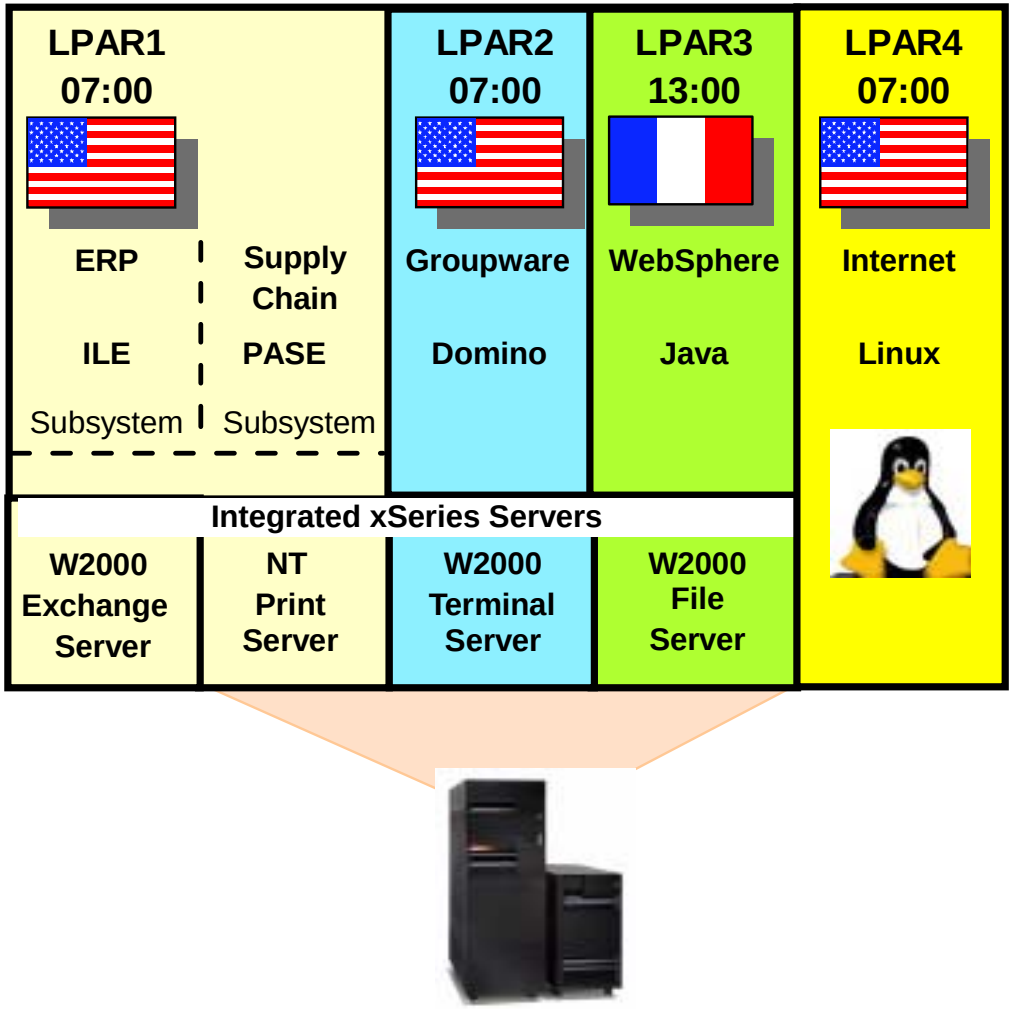
Single server, multiple applications

- Microsoft® Windows® 2000 Server
- Domino
- OS/400 Portable Applications Solution Environment (OS/400 PASE)
- Integrated File System (IFS)
- WebSphere and Java™
- Linux

Workload management

- Subsystems
- Logical Partitioning

Incorporates pSeries, zSeries, and xSeries technology



Notes: iSeries Consolidated Server Strategy

As companies rationalize their IS infrastructure, they require servers to have the flexibility to manage multiple applications, from a variety of platforms and operating systems. A consolidated server stands as an alternative to the single application per server model that is prevalent in today's UNIX and WinTel markets. In addition, a consolidated server must also offer robust workload management services and outstanding availability characteristics.

Today, iSeries stands out as a leading example of a consolidated server: combining multiple application workloads, offering robust workload management services such as partitioning application and users by subsystems, or through implementing logical partitioning to maintain independent workloads, yet have the flexibility to share hardware resources.

In this example, you can see how the iSeries extends from its core strengths of ERP applications, to incorporate groupware, supply chain and e-commerce applications, all fully integrated on a single server. Applications can run together in a single system, or they can be divided into logical partitions (LPAR) to isolate applications with specific performance, language or time zone requirements.

The iSeries ability to assimilate applications from other platforms has increased dramatically as a result of iSeries investments in Domino, WebSphere, and Java. Also, two new services now provide iSeries runtime capability for NT and UNIX applications.

The first is the Integrated xSeries Server: a PC under the covers of the iSeries, logo'd by Microsoft to run standard Windows NT Server and Windows 2000 Server. Today, over 20% of iSeries shipped include an Integrated xSeries Server to run complementary Windows applications.

Now, OS/400 PASE provides a UNIX application runtime on the iSeries, enabling the rapid porting and deployment of applications, resulting in better integration of supply chain and ERP suites in a single, multifunction server. OS/400 PASE exploits the PowerPC processor's ability to switch between OS/400 and UNIX runtime modes, while retaining full integration with OS/400's file systems, security and database.

IBM has also issued a Product Preview stating that Linux will be supported on the iSeries in a secondary partition.

IBM is uniquely positioned to provide a consolidated, flexible server. iSeries success relies on access to IBM broad base of enterprise server technologies: logical partitions from the S/390, Intel server design leadership from Netfinity, UNIX runtime capability from RS/6000 and AIX.

The iSeries with its industry-leading, 64-bit scalability, is a robust, multipurpose commercial application server. Key to its success has been its ability - with subsystems and with logical partitions - to provide a reliable and scalable platform for integrating multiple applications within a single, while hiding the complexities from the users.

Integrated servers

Integrated xSeries Server for iSeries

February 2001

Integrated xSeries Server Intel 850 MHz Pentium III (#2891,#27981)

- Up to 2 TB of disk storage*
- Up to 32 per iSeries*
- New device drivers to share iSeries DVD*
- Up to 3 LAN adapters (all hot plug PCI)
- 2 Universal Serial Bus (USB) ports
- Device drivers to share iSeries disk, tape, and CD-ROM
- Supported on iSeries models 270, 820, 830, 840
- Supported with OS/400 V4R5 and V5R1
- Hot plug PCI on selected iSeries servers
- Up to 4 GB memory

xSeries ServerProven platform

Microsoft Windows 2000 Server

- Logo'd by Microsoft

Microsoft Windows NT Server 4.0

- Logo'd by Microsoft

* V5R1 Enhancement

Notes: Integrated xSeries Server for iSeries

The Integrated xSeries Server has an Intel Pentium III 850 MHz processor with 256K of L2 cache, a 100 MHz front side bus (FSB) and S3 Savage4 video adapter with 32 MB of video RAM. Up to 3 hot plug LAN adapters are supported with options for 4/16/100 Mbps token-ring, 10/100 Mbps Ethernet, and 1 Gb Ethernet. Two Universal Serial Bus (USB) ports are available for connection of various devices, including printers. The Integrated xSeries Server has four memory slots supporting 128 MB, 256 MB and 1 GB ECC SDRAM memory for up to 4 GB total memory.

The 850 MHz Integrated xSeries Server requires OS/400 V4R5 or V5R1 and is supported in iSeries Models 270, 820, 830 and 840. Up to 32 Integrated xSeries Servers can be installed in an 840.

Hot plug PCI provides concurrent maintenance for LAN adapters on all iSeries servers and for the Integrated xSeries Server board on selected iSeries servers as shown in the table below. An Integrated xSeries Server must be varied off to perform concurrent maintenance on either the server board or the LAN adapter.

The IXS is an IBM ServerProven platform. The ServerProven program highlights applications that have been validated to run on IBM xSeries servers including the Integrated xSeries Server for iSeries. Customers know they can purchase ServerProven applications with confidence.

The IXS has been logo's by Microsoft to support NT Server 4.0 and Windows 2000 Server.

The following hot-plug (only valid on hot-plug capable iSeries) PCI network adapters can be installed under the Integrated xSeries for iSeries:

- PCI 100/10 MBPS Ethernet IOA (#4838)
- PCI 100 MBPS Token-Ring IOA (#2744)
- PCI 1 GBPS Ethernet IOA #2743 (optical)
- PCI 1 GBPS Ethernet IOA#2760 (UTP)

iSeries Model	Server Hot Plug in System Unit	Server Hot Plug in # 5075 I/O Tower	Server Hot Plug in # 5074 I/O Tower	LAN Adapter Hot Plug
270	Y	Y	N/A	Y
820	Y	Y	N	Y
830	N	N/A	N	Y
840	N	N/A	N	Y

Integrated xSeries Server for iSeries

The #2791/#2891 PCI Integrated xSeries Server contains a 850MHz processor and 4 memory slots. The #2791 is supported in the CEC of models 820, 830, 840, SB2 and SB3, in the #5074 PCI Expansion Tower, in the #5079 1.8M I/O Tower, in the #5078 PCI Expansion Unit and in the #5075 PCI Expansion Tower when it is attached to the model 820. The #2891 is supported in the CEC of model 270 and in the #5075 PCI Expansion Tower when it is attached to the model 270. Each server memory slot can contain either a 128MB server memory card, a 256MB server memory card or a 1024MB server memory card providing a total server memory capacity ranging from 128MB to 4096MB (4GB). When the maximum memory is installed, only 3712MB will be addressable. The following memory features are available on the #2791/#2891 PCI Integrated xSeries Server:

- #2795 - 128MB Server Memory
- #2796 - 256MB Server Memory
- #2797 - 1GB Server Memory

700 MHz Integrated xSeries Server

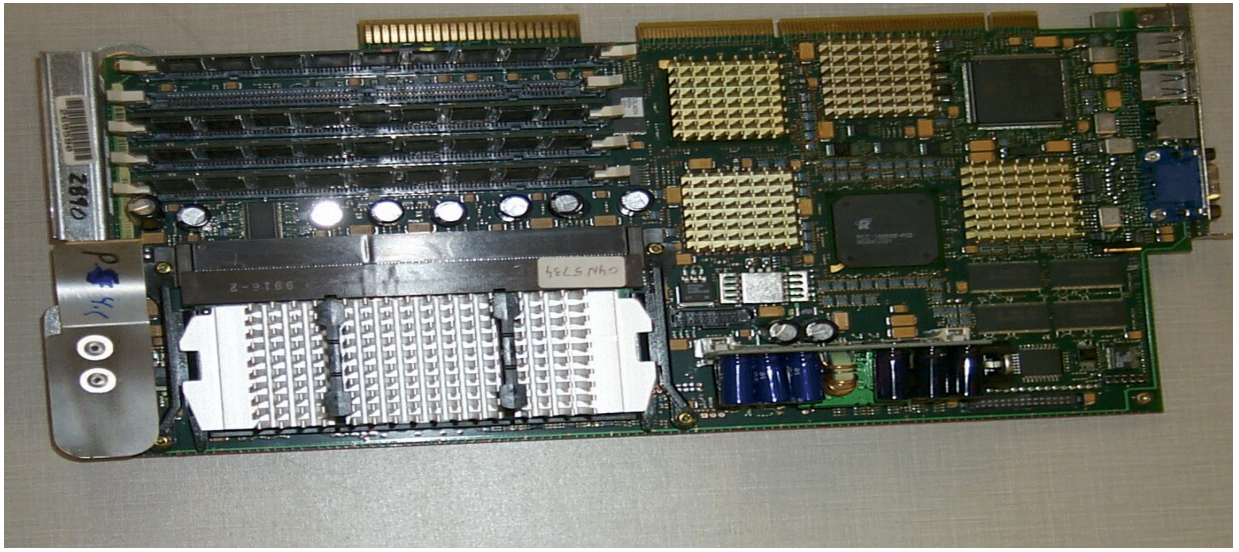
Supported with V4R5 and V5R1

Logo'd by Microsoft for NT Server and Windows 2000 Server

xSeries ServerProven Platform

Being Withdrawn from Marketing

- Processor is no longer available from Intel
- Announcement: 2/27/01
- Effective: 5/31/01



Notes: 700 MHz IXS

The 850 MHz Integrated xSeries Server replaces the 700 MHz IXS offering.

For customers that have purchased the 700 MHz product, it remains

- Supported with V4R5 and V5R1.
- Logo'd by Microsoft for NT Server and Windows 2000 Server
- xSeries ServerProven Platform

The 700 MHz Integrated xSeries Server was withdrawn from Marketing on February 27, 2001, effective May 31, 2001. The 700 MHz processor used in the IXS is no longer available from Intel.

Integrated Netfinity Server for AS/400

Integrated Netfinity Server Intel 333 MHz Pentium II

- Up to 1 GB memory
- Up to 16 per AS/400
- Supported on AS/400e server 150/250/170/7xx
- iSeries server 8xx support via migration tower
  - Migrate to 850 MHz server without reinstalling Windows server

xSeries ServerProven Platform

Microsoft Windows NT Server 4.0

- Logo'd by Microsoft

Microsoft Windows 2000 Server

- Logo'd by Microsoft
- Supported with OS/400 V4R5

Notes: Integrated Netfinity Server for AS/400

A PC-based server has an Intel processor and PC memory on a motherboard, combined with a LAN adapter, hard disk and CD-ROM drive. The Integrated Netfinity Server for AS/400 has an Intel processor and PC memory, but these are packaged on a motherboard to fit inside the AS/400. Once inside the AS/400, devices drivers are provided to share the AS/400 hard disks, CD-ROM and tape drives. LAN adapters cannot be shared between AS/400 and Windows: a separate LAN adapter and TCP/IP address are required for each system.

The Integrated Netfinity Server is designed to run Windows 2000 Server and Windows NT Server 4.0. The Integrated Netfinity Server can also run Citrix MetaFrame which is used with Windows NT Server 4.0, Terminal Server Edition to connect IBM Network Stations. It requires a monitor, keyboard and mouse to be attached as a Windows console.

The Integrated Netfinity Server has an Intel Pentium II 333 MHz processor with 512 KB of L2 cache, token-ring, 10 and 100 Mbps Ethernet options, a serial and parallel port, and four slots for between 32 MB up to 1 GB of ECC/EDO memory.

The 333 MHz Integrated Netfinity Server for AS/400 runs on OS/400 V4R2 with PTF CUM pack C8342420, V4R3 with PTF CUM pack C8349430 and will run on V4R4 and V4R5.

There are two versions of the 333 MHz Integrated Netfinity Server: one PCI based version for AS/400e series models; the 6618 SPD 'book package' version takes 3 slots in AS/400 Advanced Series models, or for SPD integrated expansion units attached to AS/400e series models. The PCI Integrated Netfinity Server does not require expansion feature slots as it uses specially reserved positions in the base system unit and PCI integrated expansion unit of AS/400e series models. The Integrated Netfinity Server is also supported on the Advanced Entry Model 150.

External attached servers

Why a Direct Attach Offering

Scalability

- Support larger workloads and more users

Availability of PCI Slots

- Flexibility to attach devices (e.g., modems, CD towers)

Performance Currency

- Offer latest xSeries server technology

Leverage xSeries Marketing, Channels, and Development

Notes: Why a Direct Attach Offering

We are offering the Integrated xSeries Adapter that supports the direct attachment of selected xSeries servers to offer enhanced:

- Scalability - the IXA will support xSeries servers with up to 4 processors. These servers are able to support larger workloads and more users than the 1 processor Integrated xSeries Server.
- Availability of PCI Slots - since the direct attach xSeries server is a standard xSeries server is has PCI slots available for the customer to use. Some customers use these slots to attach devices like CD-ROM towers and modem towers. The Integrated xSeries Server does not have PCI slots.
- Performance Currency - the IXA is installed in standard xSeries servers. As these servers offer faster processors (e.g., 550, to 700, to 900 MHz) the we will be able to connect these servers to iSeries with little to no development work. As IBM introduces new xSeries servers, Rochester will test them with the IXA and announce which models are supported. The iSeries web site at www.iseries.ibm.com/windowsintegration will include a list of the xSeries servers we have tested and support. The Integrated xSeries Server is a product that is specifically designed by Rochester to fit inside the iSeries server. It takes time and resources to develop a faster version of the IXS.
- Leverage xSeries Marketing, Channels, and Development - the xSeries servers are offered by the standard xSeries channels at normal prices. As a result the IXA offering leverages xSeries marketing, channels and development.

Direct Attach xSeries

Extends iSeries integration to n-way xSeries servers

- Run core applications on OS/400 with complementary applications on Windows
  - Siebel, Logility and BAAN complementary application
- For high performance requirements such as for Microsoft Exchange

Integrated xSeries Adapter

- PCI adapter to connect standard xSeries server to iSeries
- Attaches via High Speed Link (HSL) to iSeries 8xx and 270

Netfinity servers supported include the 7100, 7600, & 6000R (a future model)

- Other xSeries servers supported will be announced later
- Guide: mid-range server class, 1-4 Way
- Server has processor's, memory, ServerProven adapters but no disks

Not designed for OEM Intel servers

- Takes advantage of specific IBM xSeries service processor

Notes: Direct Attach xSeries

This product extends iSeries integration with Windows 2000 Server to IBM xSeries high performance Intel servers for companies with core applications running on the iSeries and complementary applications running on Windows 2000 Server such as Siebel, Logility, BAAN FOS and Microsoft Exchange.

A PCI-based Integrated xSeries Adapter is placed in the xSeries server to connect to the iSeries via the High-Speed Link. This provides the power control for the server and also links the server to disks in the iSeries.

The servers that are planned to attach to the iSeries include the Netfinity 4-way servers: 7100, 7600, and 6000R.

7100: Current models: 86661RY, 866611Y, 86662RY, 866621Y, 86663RY, 866631Y 86664RY, 866641Y,

7600: Current models: 86651RY, 86652RY, 86653RY, 86654RY, 86655RY

6000R: A new model that is planned for 2001 availability.

Considerations for customers looking to buy Netfinity servers now and attach them to the iSeries in 2001:

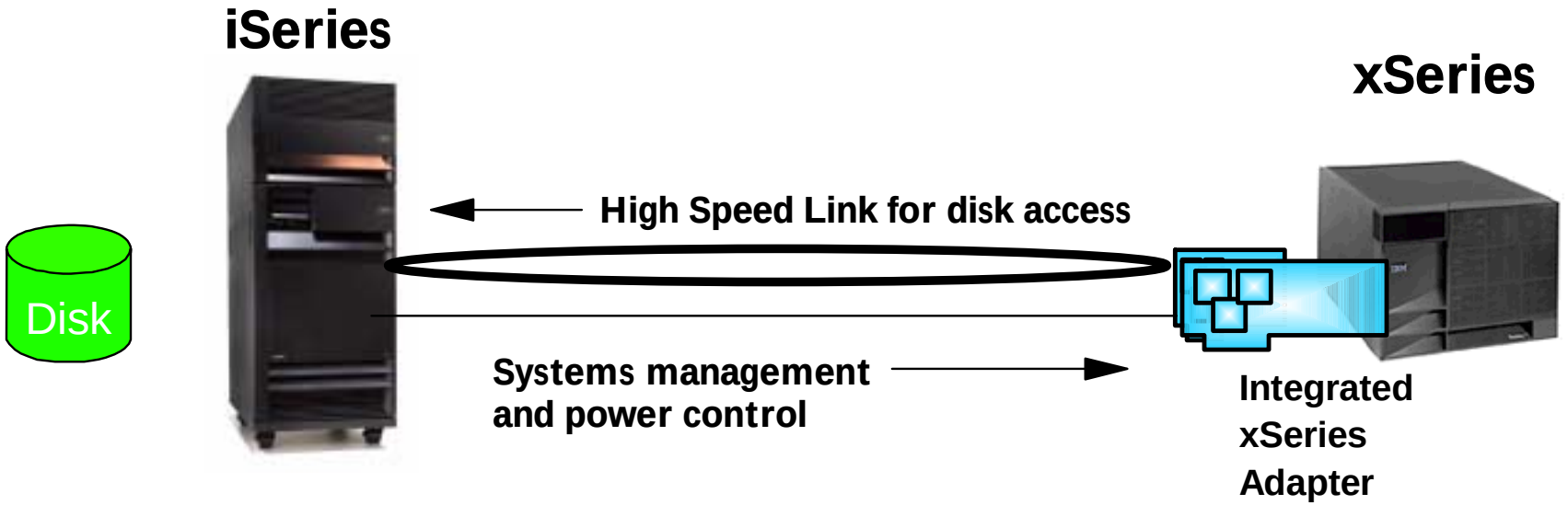
- The direct attach solution requires that the disk for the Windows 2000 server is located in the iSeries. If a customer buys a Netfinity server today and wants to utilize it, they will need to buy disk for the Netfinity server. Then in 2001, to direct attach the same Netfinity server to the iSeries, the disk in the Netfinity server will need to be removed and redeployed and the customer will need to purchase the required disk capacity on iSeries.
- Based on past history, the customer should assume that between now and when the direct attach solution is available, new models of the Netfinity servers with faster processors will be available.
- The Integrated xSeries Adapter, the card that goes in the Netfinity server that enables the HSL attachment to the iSeries, will require 2 slots in the Netfinity server.

Other xSeries servers will be specified at a later date. 1-4 way SMP options will be supported.

The xSeries server will be a standard model, containing processors, memory, and ServerProven adapters but no disks. All the disks for the xSeries server will be housed in the iSeries and managed in the same way as for the current Integrated xSeries Server models. All the current storage management and other integration features of the current Integrated xSeries Server will be maintained.

The Integrated xSeries Adapter connection interfaces directly with xSeries's service processor. The integration provided between iSeries and direct attach xSeries servers is an IBM technology initiative and is not designed to support OEM Intel servers.

Integrated xSeries Adapter



IXA attaches n-way IBM xSeries servers to iSeries 8xx and 270

- Supports 4-way servers - xSeries 350 and 250 - - 7100 and 7600

Retains features and value of Integrated xSeries Server

- Uses OS/400 storage consolidation and systems management
- xSeries Server has processors, memory, ServerProven adapters but no disks

Complementary Application Support

Server Consolidation

Notes: Integrated xSeries Adapter

The Integrated xSeries Server extends iSeries integration with Windows 2000 Server to IBM xSeries high performance Intel servers for companies with core applications running on the iSeries and complementary applications running on Windows 2000 Server and for companies looking to consolidate their Windows servers.

A PCI-based Integrated xSeries Adapter is placed in the xSeries server to connect to the iSeries via the High-Speed Link. The IXA provides the power control for the server and also links the xSeries server to disks in the iSeries.

The xSeries server will be a standard model, containing processors, memory, and ServerProven adapters but no disks. All the disks for the xSeries server will be housed in the iSeries and managed in the same way as for the current Integrated xSeries Server models. All the current storage management and other integration features of the current Integrated xSeries Server will be maintained.

The Integrated xSeries Adapter connection interfaces directly with xSeries's service processor. The integration provided between iSeries and direct attach xSeries servers is an IBM technology initiative and is not designed to support OEM Intel servers.

Key opportunities for the IXA include:

- Complementary Application Support: Application requires OS/400 and Windows servers.
- Server Consolidation: consolidating multiple Windows 2000 Servers with iSeries storage, server, and user management.

xSeries Product Line

xSeries 200

1 Processor

xSeries 340

xSeries 330

xSeries 220

xSeries 230

xSeries 240

1 - 2 Processors

xSeries 350

xSeries 250

1 - 4 Processors

xSeries 370

1 - 8 Processors

IBM eserver. For the next generation of e-business.

Notes: xSeries Product Line

This chart shows the current xSeries product line, from the one way servers to the 8-way server. The Integrated xSeries Adapter works with the 1-4 way xSeries servers Model 350 and 250. Specific modifications have been made to these servers to support the IXA. In addition, the IXA interfaces with the service processors on the 350 and 250 for power management. Specific hardware connections and software have been developed with the IXA to interface with this service processor. With this support the iSeries can start and stop the xSeries server. Other xSeries servers have different service processors.

The IXA is supported with 1, 2, or 4 processors in the server.

The IXA is not supported with other xSeries servers.

The IXA is supported with specific Netfinity models 7100 and 7600. The 7100 and 7600 were replaced by the xSeries 250.

The IXA is not supported with the 6000R. The 6000R was replaced by the xSeries 350.

xSeries 4-way Servers

New servers announced in March 2001

Replacement products for 6000R, 7100, and 7600

xSeries 350

- 1/2/4 Way Server
- 700 and 900 MHz Pentium III Xeon Processors
- 1 or 2 MB Cache
- 4 U Rack
- 16 GB Memory
- SCSI Controller
- 10/100 Ethernet
- 6 PCI Slots
- Hot Plug PCI
- No Disk Drives

xSeries 250

- 1/2/4 Way Server
- 700 and 900 MHz Pentium III Xeon Processors
- 1 or 2 MB Cache
- Tower or 8 U Rack
- 16 GB Memory
- SCSI Controller
- 10/100 Ethernet
- 6 PCI Slots
- Hot Plug PCI
- No Disk Drives

Notes: xSeries 4-way Servers

The xSeries 350 and 250 where announced in March of 2001 to replace the 6000R, 7100, and 7600. The 350 and 250 offer faster processors (700 and 900 MHz) than the models they replaced (550 and 700 MHz).

The specifications for the servers are listed on the chart. The servers offer similar features. The 350 offers fewer disk bays and is smaller at 4U. The 250 offers more disk bays at 8U. Since disk is not supported in the xSeries servers that are directly attached to iSeries, these additional bays provided with the 250 will not be used. The 350 will be the popular choice for the iSeries connection.

xSeries 4-way Servers - Previous Models

7100

- 1/2/4 Way Server
- 550 and 700 MHz Pentium III Xeon Processors
- 1 or 2 MB Cache
- Tower or 8 U Rack
- 16 GB Memory
- SCSI Controller
- 10/100 Ethernet
- 6 PCI Slots
- No Disk Drives

http://www.pc.ibm.com/ us/netfinity/7100.html

7600

- 1/2/4 Way Server
- 550 and 700 MHz Pentium III Xeon Processors
- 1 or 2 MB Cache
- Tower or 8 U Rack
- 16 GB Memory
- RAID Adapter
- SCSI Controller
- 10/100 Ethernet
- 6 PCI Slots
- Hot Plug PCI
- No Disk Drives

http://www.pc.ibm.com/ us/netfinity/7600.html

Notes: xSeries 4-way Servers - Previous Models

In addition to the current xSeries 350 and 250 Models, the IXA is also supported with the Netfinity 7100 and 7600. These servers offer 550 and 700 MHz processors.

The 7100 and 7600 provide similar features. The 7600 offers hot plug PCI adapters. In addition, the 7600 includes a RAID adapter. This RAID adapter is not used with the IXA offering.

Integrated xSeries Adapter

PCI Card

- xSeries Server Proven Adapter
- 2 Slots
- 1 64 bit 66 MHz connection
- Slot location depends on model

Two HSL Connectors

- Uses same data interface as iSeries I/O tower

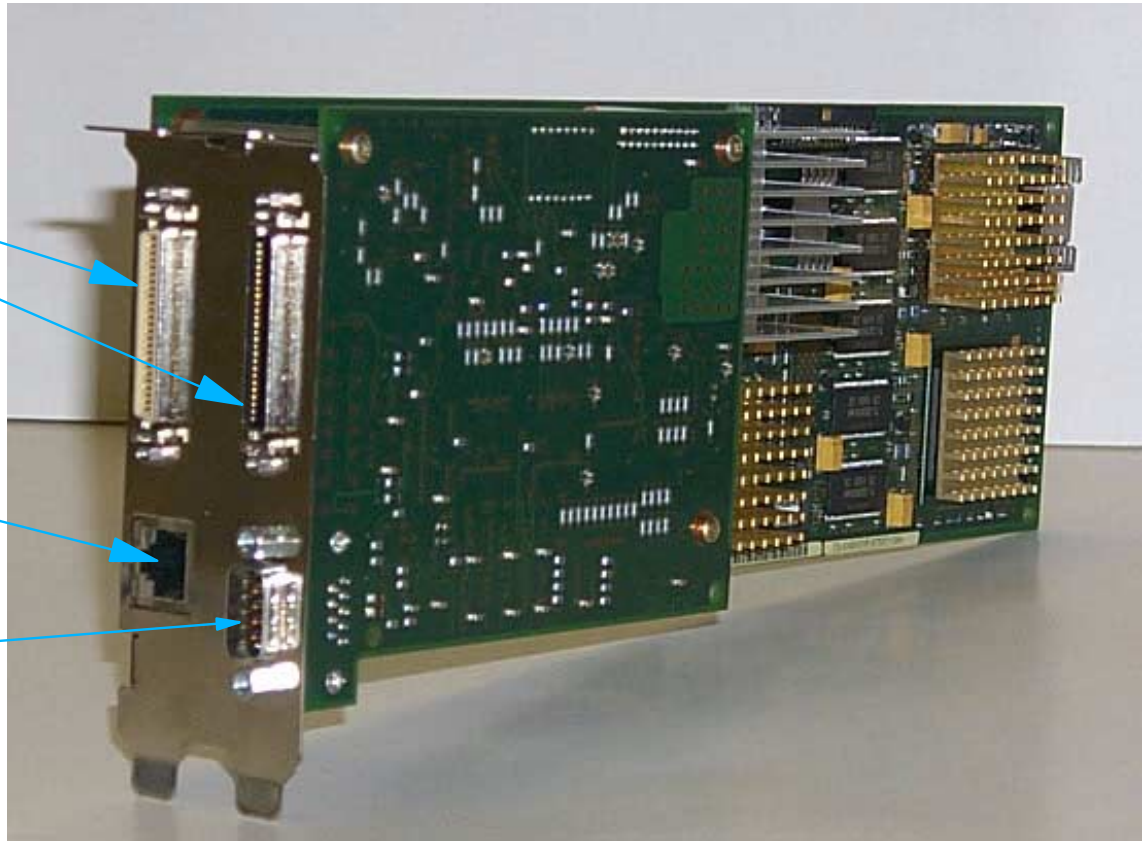
RS485 Connector

- Interface to xSeries Service Processor

SPCN Connector

- Uses same system power and control interface as iSeries I/O tower

Integrated xSeries Adapter Installed in xSeries



Notes: IXA Card

This is a picture of the Integrated xSeries Adapter.

The IXA is a PCI card. It requires 2 slots in the xSeries server. The IXA has one connection. This connection is plugged into a 64 bit 66 MHz slot. The specific slot location depends on the xSeries model. The location is specified in the installation documentation that is included with the IXA.

The IXA is an xSeries Server Proven Adapter. It has been tested in the xSeries 350 and 250 as well as the Netfinity 7100 and 7600. Like other xSeries ServerProven adapters, customers can purchase the IXA with the confidence that is has been tested in the supported configuration. IBM recommends that customers purchase xSeries ServerProven adapters for their xSeries servers.

The IXA has two HSL connectors. HSL is the same data interface used with iSeries I/O towers. The two HSL connectors are used to from a loop. One HSL cable comes into the xSeries server, while the second connects to the next component on the HSL loop.

There is an RS485 Connector on the IXA as well. This connector is used to interface to xSeries Service Processor . A cable is provided that connects the IXA to the xSeries service processor.

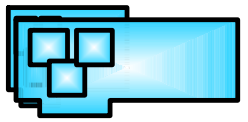
The IXA also includes an SPCN (System Power Control Network) Connector. This connection is the system power and control interface. A SPCN cable is used to connect the xSeries to the iSeries. SPCN connections are also used to control the power of iSeries I/O towers.

What to Buy From Whom

iSeries Channel

- iSeries 8xx or 270
- iSeries Disk Drives for Windows storage
  - Up to 2 TB
- Integrated xSeries Adapter for iSeries
- HSL and SPCN cables
- OS/400 V5R1
- iSeries Integration for Windows Server
  - No Charge LPP, Preloaded - (5722-WSV)

Integrated xSeries Adapter



xSeries Channel

- xSeries Server Model 7100, 7600, x250, or x350
  - 1/2/4 Processors and Memory
  - Ethernet LAN (on system board)
- Keyboard/Mouse
- Display
- ServerProven Adapters (optional)

Microsoft Channel

- Windows 2000 Server - 4 processors, 4 GB Memory
- Windows 2000 Advanced Server - 8 GB Memory

Notes: What to Buy From Whom

Components of the direct attach xSeries solution are purchased from different channels. Most iSeries channels also sell xSeries servers. This solution will often times be integrated in the channel.

iSeries Channel

- iSeries 8xx or 270
- iSeries Disk Drives for Windows storage ... Up to 2 TB per server
- Integrated xSeries Adapter for iSeries
- HSL and SPCN cables
- OS/400 V5R1
- iSeries Integration for Windows Server ... No Charge LPP, Preloaded - (5722-WSV)
  - IBM provides a set of integration programs for Windows as a no-charge licensed program 5722-WSV. This software includes the hardware devices drivers, as well as the software integration facilities.

xSeries Channel

- xSeries Server Model 7100, 7600, x250, or x350
  - 1/2/4 Processors and Memory
  - Ethernet LAN (on system board)
- Keyboard/Mouse
- Display
- ServerProven Adapters (optional)

Microsoft Channel

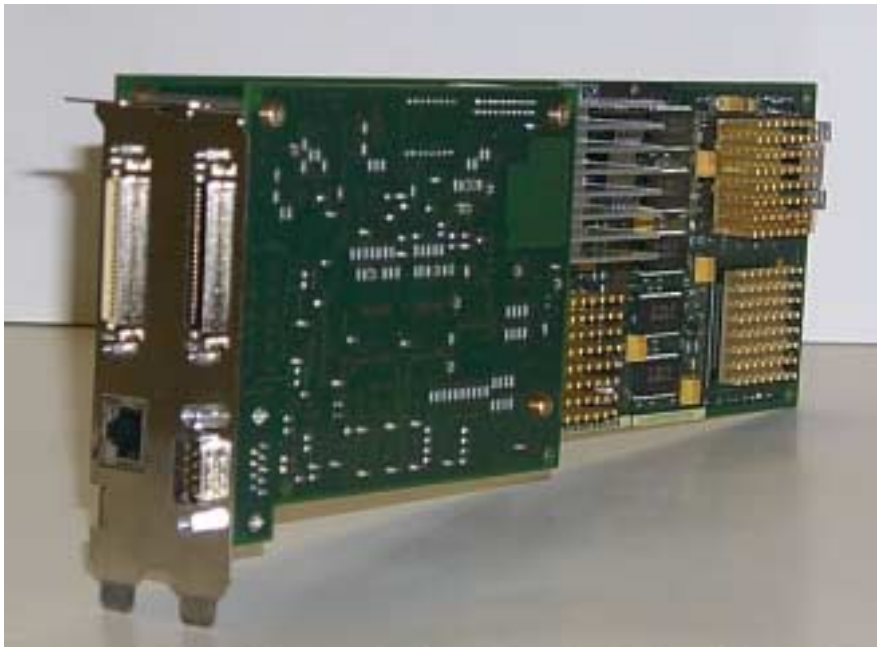
- Windows 2000 Server - supports up to 4 processors and 4 GB Memory
- Windows 2000 Advanced Server - supports up to 8 GB Memory
- NT Server 4.0 is not supported

Ordering, Warranty, and Service

Integrated xSeries Adapter

Ordering

- Machine type: 1519 Model 100,
- iSeries Configurator:
  1. **Specify code 0092 on iSeries**
  2. **Feature codes for HSL cables**
  3. **Feature codes for SPCN cable**
- Shipped with iSeries order or MES



Installation

- Customer Installable Feature
- Not a hot plug adapter in xSeries

Warranty

- 3 years (consistent with xSeries adapters)
- 24 x 7 on site service

Service and Supportline

- iSeries for IXA, Windows Integration software
- Warm transfer to xSeries for other questions

Notes: IXA Ordering

Ordering

- Machine type: 1519 Model 100,
- iSeries Configurator:
  - Specify code 0092 on iSeries
    - ✓ IXA 1519 Model 100
    - ✓ RS485 Cable for connection between IXA and xSeries service processor
    - ✓ SPCN Doubler Cable - provides 2 SPCN connections. Used when multiple components are on one loop
    - ✓ Installation Instructions
    - ✓ xSeries ordering information
  - Feature codes for HSL cables (1 or 2) -3, 6, or 15 meters
  - Feature codes for SPCN cable - 2, 6, 15, or 30 meters
- Shipped with iSeries order or MES

Installation

- Customer Installable Feature
- Not a hot plug adapter in xSeries

Warranty - best of both worlds

- 3 years (consistent with xSeries adapters)
- 24 x 7 on site service (consistent with iSeries)

Service and Supportline

- iSeries for IXA, Windows Integration software
- Warm transfer to xSeries for other questions

Ordering, Warranty, and Service

xSeries

Ordering

- xSeries Server, processors, memory, LAN
- Standard xSeries channels and pricing
- Recommend ServerProven adapters
- No Disk Drives

Warranty

- 3 year warranty, 5 x 8 hardware service
- Recommend purchase of 7 x 24 service for consistency with iSeries

Service and Supportline

- xSeries

Sample Configurations

7100
2 700 MHz Processors
2 GB Memory
Monitor
3 YR 7x24 Warranty

$17,534

7100
4 700 MHz Processors
4 GB Memory
Monitor
3 YR 7x24 Warranty

$34,600

* xSeries prices from www.pc.ibm.com/us/eserver/xseries/ on 12/4/00

Notes: xSeries Ordering

Ordering

- xSeries Server
  - specify 1, 2, or 4 processors, and memory
  - 10/100 Ethernet LAN adapter is included
  - Includes IBM Director for server management
  - Includes Server Guide for operating system installation - support with IXA adapter not currently available
  - Domino License, one user is included
- Standard xSeries channels and pricing
- Recommend ServerProven adapters if additional I/O is needed
- No Disk Drives are supported in the xSeries server, the disk is in the iSeries

Warranty

- 3 year warranty, 5 x 8 hardware service is standard
- Recommend purchase of 7 x 24 service for consistency with iSeries

Service and Supportline

- standard xSeries support

Two sample xSeries server configuration prices are also included, one with two processors, another with 4 processors.

IXA Price Comparison

Integrated xSeries Adapter

- $2500 US List Price

RAID Adapters

- xSeries*
  - $1,435 for 2 Channel 64 MB Cache
  - $2,439 for 4 Channel 128 MB Cache
- Compaq**
  - $1,799 for 2 Channel 64 MB Cache
    attaches 28 drives x 18 GB drives = 500 GB
  - $2,499 for 4 Channel 128 MB Cache
    attaches 56 drives x 18 GB drives = 1 TB

Fibre Channel Solutions

- xSeries*
  - $9,999 for FAStT200 Storage Server (no disk drives)
  - $1,485 for FAStT Host Adapter
- Compaq**
  - $6,852 4100 RAID Array (no disk drives)
  - $1,590 Fibre Channel Host Adapter

Notes:
* xSeries prices from www.pc.ibm.com/us/eserver/xseries/ on 12/4/00
** Compaq prices from www.directplus.compaq.com on 12/13/00
Does not include prices for cabling or disk drives

Notes: IXA Price Comparison

The price of an Integrated xSeries Adapter is similar to the price of other high function PCI adapters used in PC Servers.

For example the price of RAID Adapters from xSeries and Compaq are

- xSeries*
  - $1,435 for 2 Channel 64 MB Cache
  - $2,439 for 4 Channel 128 MB Cache
- Compaq**
  - $1,799 for 2 Channel 64 MB Cache
    - ✓ attaches 28 drives x 18 GB drives = 500 GB of storage
  - $2,499 for 4 Channel 128 MB Cache
    - ✓ attaches 56 drives x 18 GB drives = 1 TB of storage
    - ✓

The IXA supports up to 2 TBs of storage for the direct attach xSeries server.

Another price comparison is to look at what Fibre Channel Storage solutions cost. Fibre channel connects disk to servers at a rated speed of 100 MBs per second

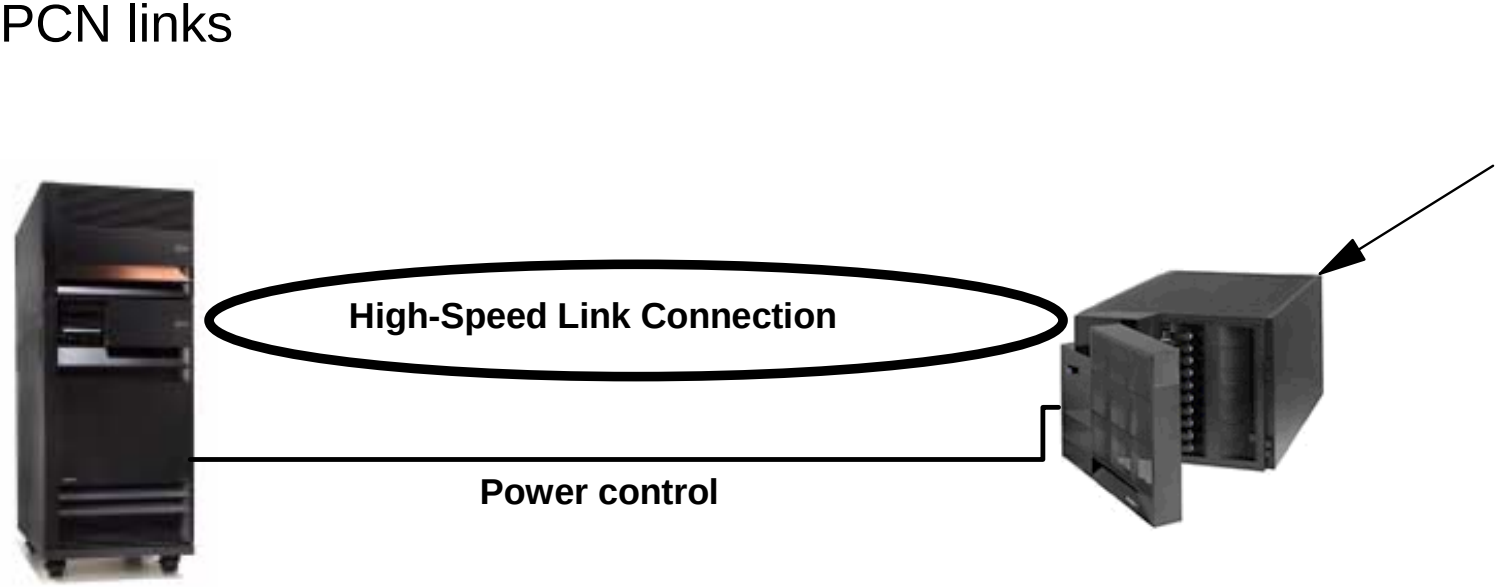
- xSeries*
  - $9,999 for FAStT200 Storage Server (a storage tower with a RAID adapter, no disk drives)
  - $1,485 for FAStT Host Adapter (adapter goes in xSeries server)
- Compaq**
- $6,852 4100 RAID Array (a storage tower with a RAID adapter, no disk drives)
- $1,590 Fibre Channel Host Adapter (adapter goes in Compaq server)

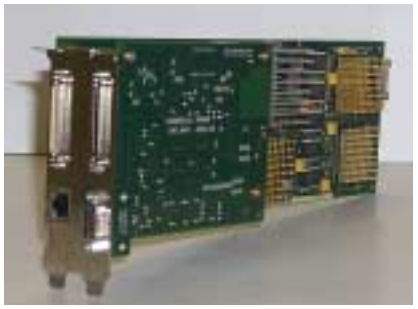
The IXA uses HSL for connections between the disk drives and the xSeries server. HSL has a rated speed of 1 GB per second, 10 times faster than Fibre.

HSL Design considerations

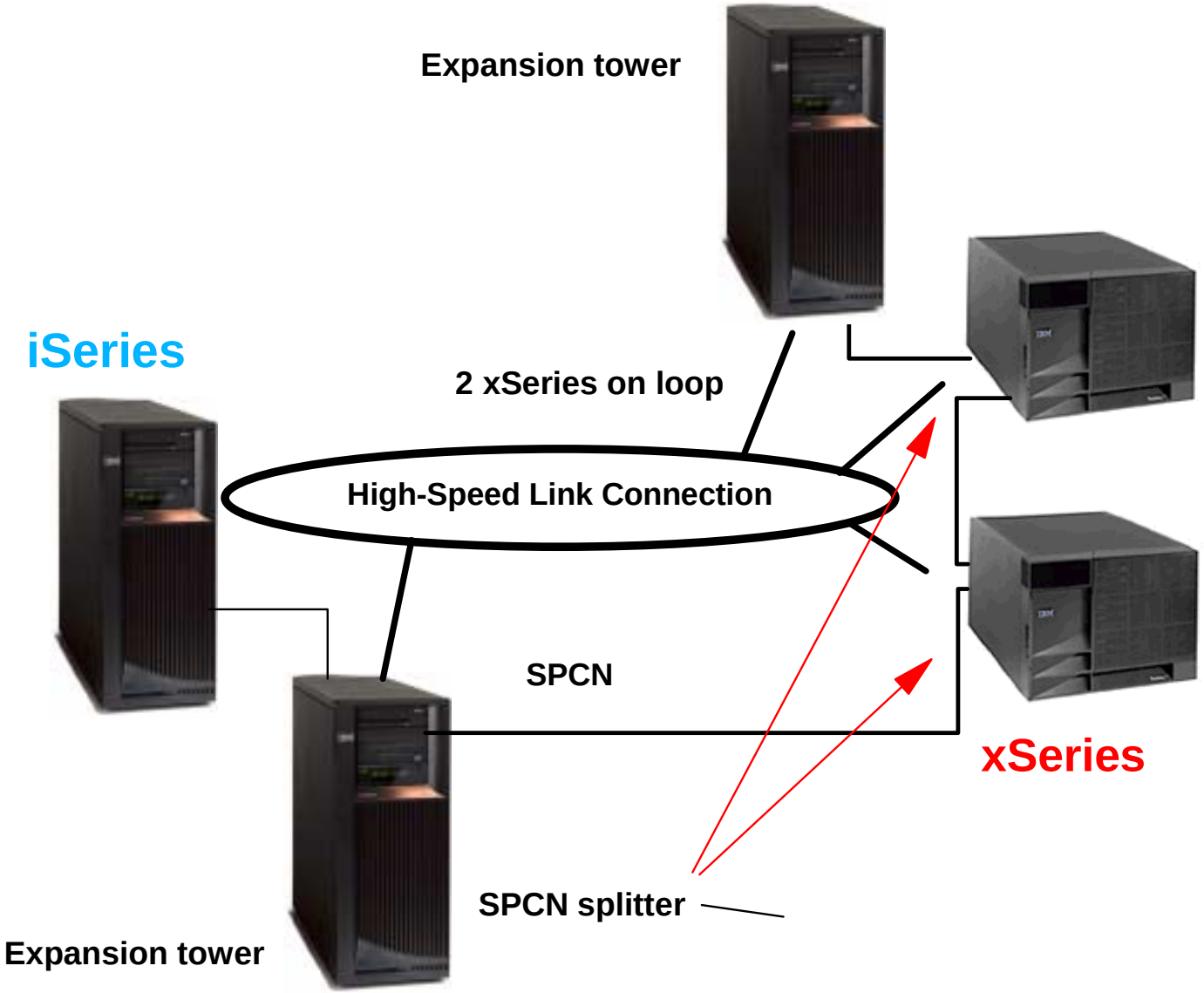
General HSL design

- Must plan your xSeries integration
- Try to avoid towers on same loop (larger iSeries)
- Careful with migration towers
- Location in switched loops
- Does not need new HSL adapters (unless switched tower loop)
- xSeries and tower mixing does not count to loop totals
- SPCN links





HSL design Model 270



HSL design Model 820

iSeries

High-Speed Link Connections

5 xSeries towers on loop

3 xSeries on loop

xSeries

This looks simple but is not

Notes: Configuration Example

This is an example of how Integrated xSeries Adapters can be used to directly attach xSeries servers to iSeries.

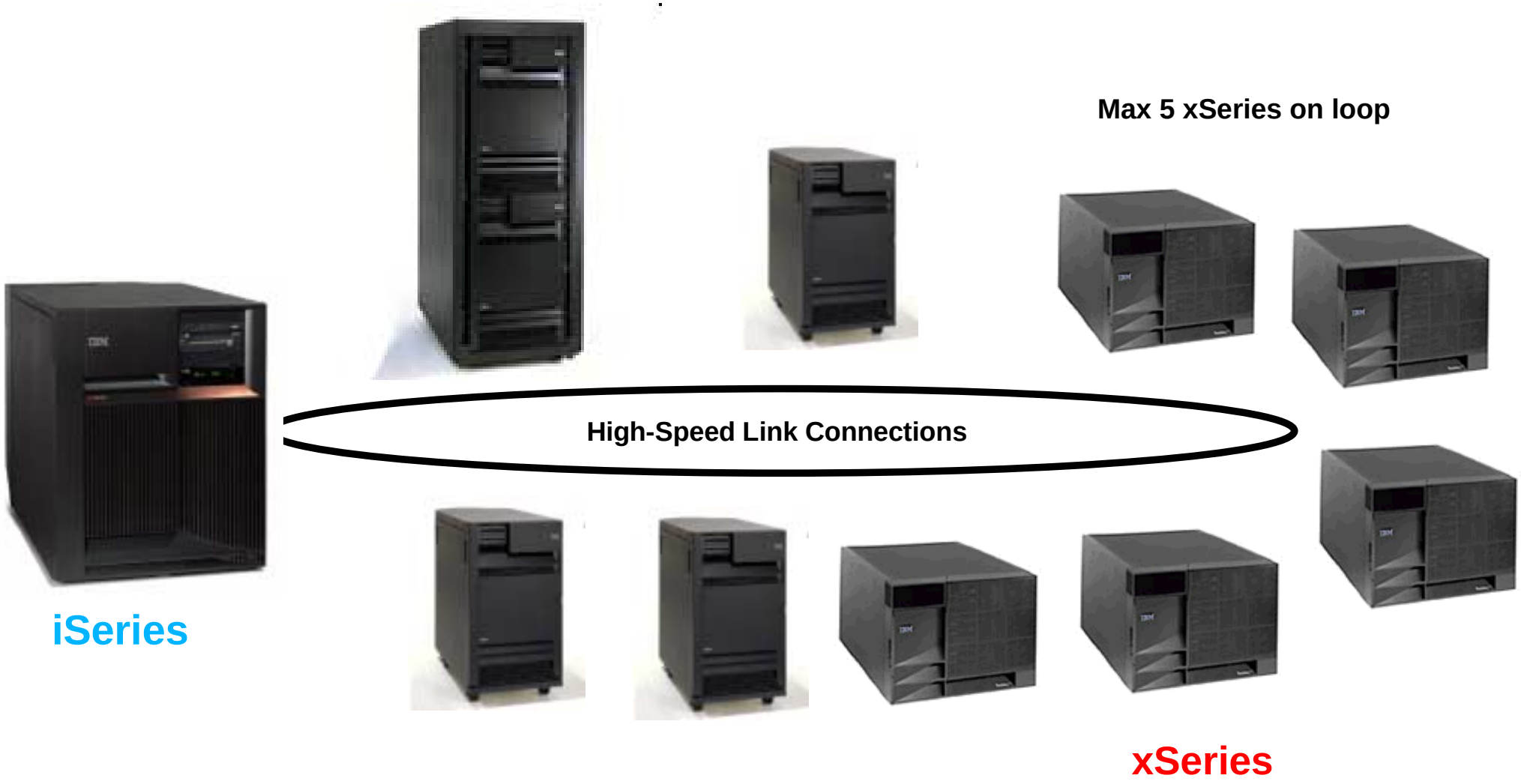
The iSeries is a Model 820. The 820 has one HSL loop, so any disk towers and xSeries servers in the configuration will be installed on the same loop. The recommendation is to install the xSeries servers behind the disk towers, giving the disk towers higher priority on the loop.

From the 820, an HSL cable is used to connect I/O tower number 1, from the I/O tower another HSL cable is used to connect to an IXA in an xSeries server, from this server another HSL cable is used to connect another IXA in an xSeries server, from this server another HSL cable is used to connect to a second I/O tower, and from the I/O tower another HSL cable is used to connect to iSeries.

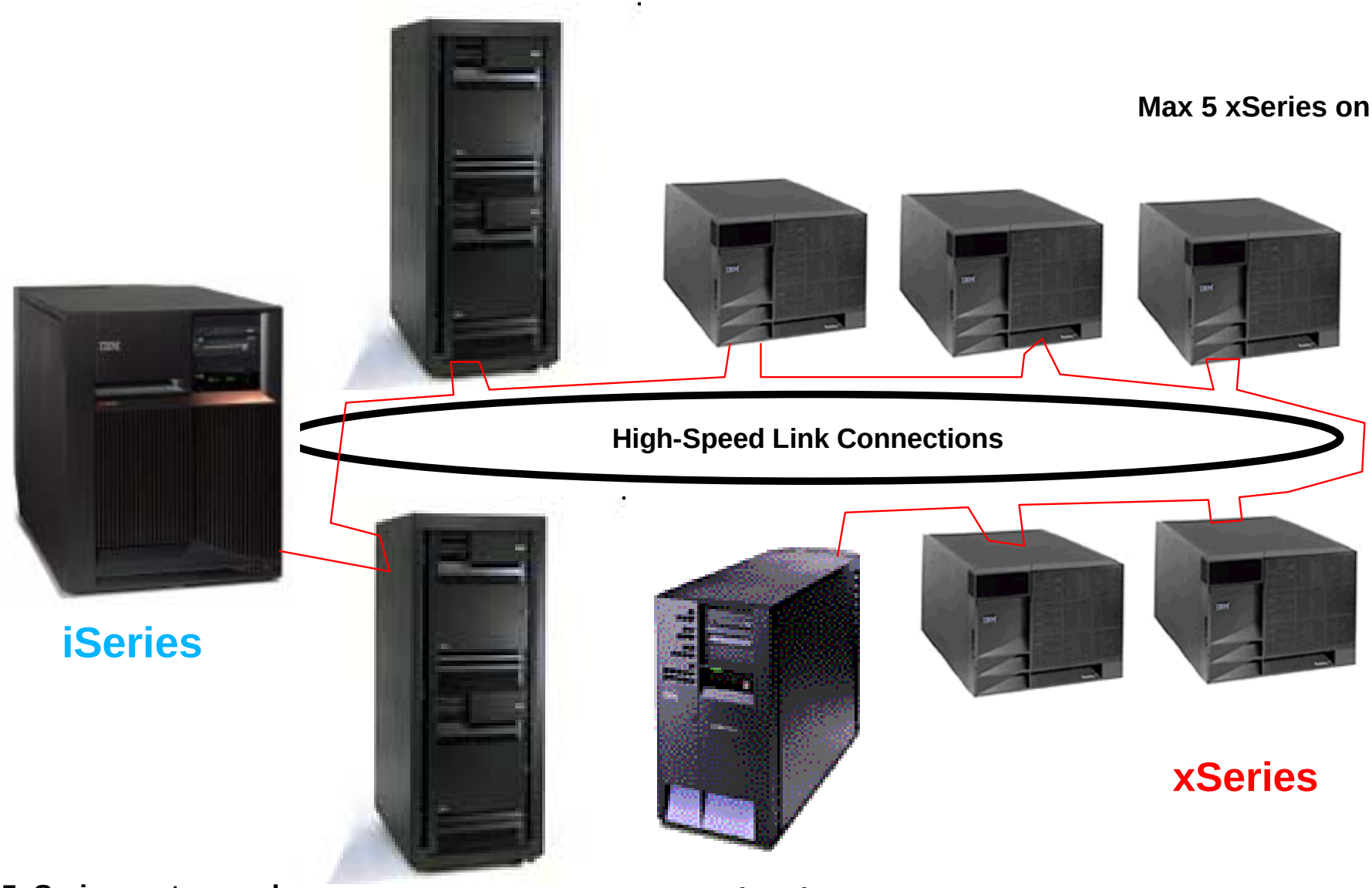
iSeries can access any component going out either HSL connection. The HSL loop provides for redundancy. If any of the HSL cables fail, the iSeries can still access all of the components. Multiple requests can be processed over the HSL loop at a given time.

The SPCN (System Power Control Network) cables are also connected to every component. SPCN is not a loop. The IXA only has one SPCN connector. To support a SPCN connection into and out of an IXA in an xSeries server, an SPCN doubler cable is provided with every IXA. This box on the end of the cable provides two SPCN connections (in and out). The other end of this doubler cable is plugged into the IXA. SPCN providers for the power control and management of the components on the HSL loop.

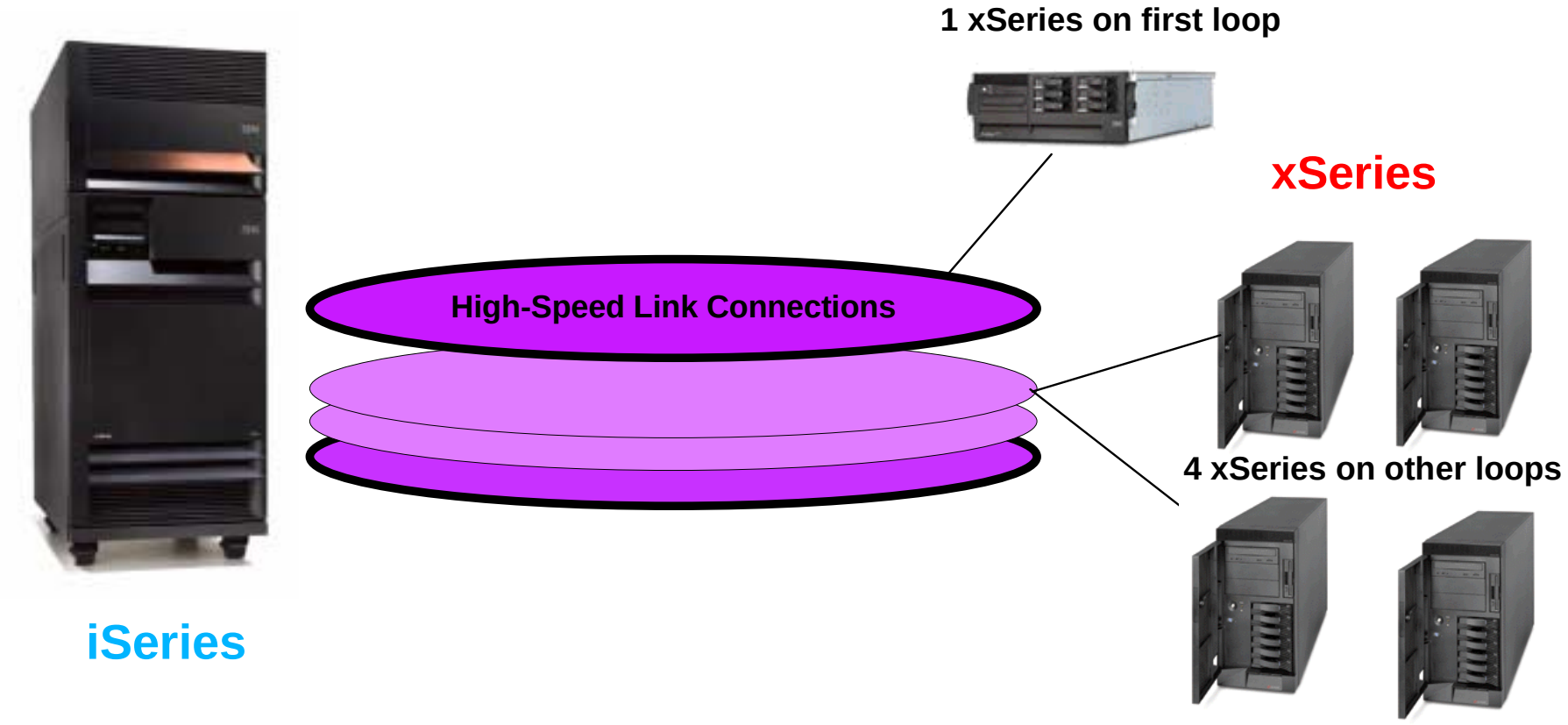
HSL design Model 820 plus other towers



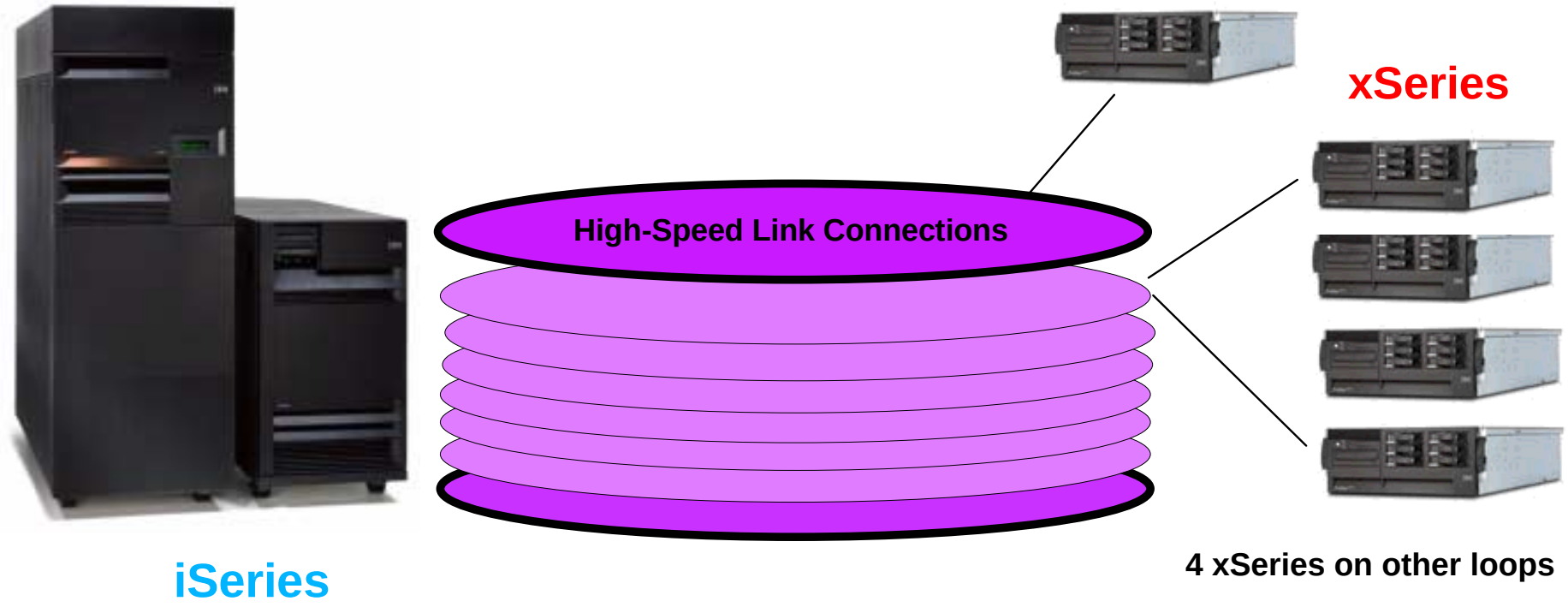
HSL design Model 820 plus Migration



HSL design Model 830



HSL design Model 840



Direct Attached xSeries Servers ...

The maximum of Direct Attach xSeries Servers by model (these maximums are in addition to the maximum number of I/O towers that can attach to these models):

- Model 270 - system max is 2
- Model 820 - system max is 5
- Model 830 - system max is 13
- Model 840 - system max is 16

The maximum Direct Attach xSeries Servers per HSL loop by model (these maximums are in addition to the maximum number of I/O towers that can attach per HSL loop to these models):

- Model 270 - max per loop is 2
- Model 820 - max per loop is 5
- Model 830 - max per loop is 4 (limit on 1st loop is 1)
- Model 840 - max per loop is 4 (limit on 1st loop is 2)

For performance reasons, the Direct Attach xSeries Servers should be placed in the middle of an HSL loop (end of the HSL strings attached to each HSL port), ie. no I/O tower should communicate with the system by having it's data flow through an External xSeries Server. The 'end of loop' concept can be explained as follows: the iSeries server identifies the towers on a loop alternately form the loop ports. The user must make sure that the HSL attached xSeries servers are identified by the iSeries Server after the iSeries Server has identified the other (DASD or PCI) towers in the HSL loop. This topology will avoid that the iSeries CEC communicates with one of other towers through the HSL adapter in the attached xSeries Server.

Ordering Information:

The specify #0092 used in the iSeries configurator in order to assure the correct type and number of cables are on the order. The HSL adapter for the xSeries can be ordered as Machine Type 1519 Model 100 and is supported as a peripheral in the iSeries e-Config configurator tool.

The supported Netfinity or xSeries Servers must be ordered through the xSeries marketing channel.

IXA planning considerations

Planning Considerations 1

Maximum Number Supported

iSeries Model	# of Direct Attach xSeries Servers	# of IXA per HSL loop
270	2	2
820	4	5
830	8	1 and 4
840	16	1 and 4

Actual Number Depends on

- Load on iSeries server
- Number of components on an HSL loop
- Number and speed of the xSeries processors
- I/O rate to iSeries disk subsystem

Planning considerations will be made available on www.iseries.ibm.com/windowsintegration and in IBM Redbook

Notes: Planning Considerations

The maximum number of xSeries servers that can be directly attached to iSeries depends on the Model of the iSeries server. On the 270, up to 2 servers can be attached, on the 820 up to 4, on the 830 up to 8 and on the 840 up to 16 xSeries servers can be attached.

The actual number of xSeries servers that can be attached to iSeries and offer a good performing environment depends on many factors, including

- How busy the iSeries server is
- The speed and quantity of the xSeries servers
- What type of applications will run on the xSeries server
- How many I/Os per second will the xSeries server drive into the iSeries disk subsystem
- How many other components are on the HSL loop and the workload they are driving on the loop

Planning considerations for the amount of CPW used by a directly attached xSeries server, the impact to the disk subsystem, and the impact to the HSL loop will be published on the iSeries Windows integration web site: www.iseries.ibm.com/windowsintegration

Planning Considerations- 2

Windows 2000 Planning

- Must use vary on/vary off from OS/400 or OPS Nav
- DO NOT use Windows shutdown

Cluster planning

- Cluster enabled systems
- Private vs Switched towers
- Plan for additional hardware
- Order OS/400 optional features
- Plan for NWSD changes after switch

HSL Connection

- xSeries servers do not impact the number of I/O towers supported on an HSL loop
- Recommend installing xSeries server on separate HSL loop
- HSL adapters must be cluster enabled
- Position on loop needs to be considered

Notes: Planning Considerations

Windows 2000 Planning

- When operating Windows 2000 server or Advanced server be careful not to use the Windows shutdown command. Only use the vary on/vary off from OS/400 or OPS Nav. If windows shutdown is used the HSL loop will be broken. This makes the position of the IXA driven xSeries important.

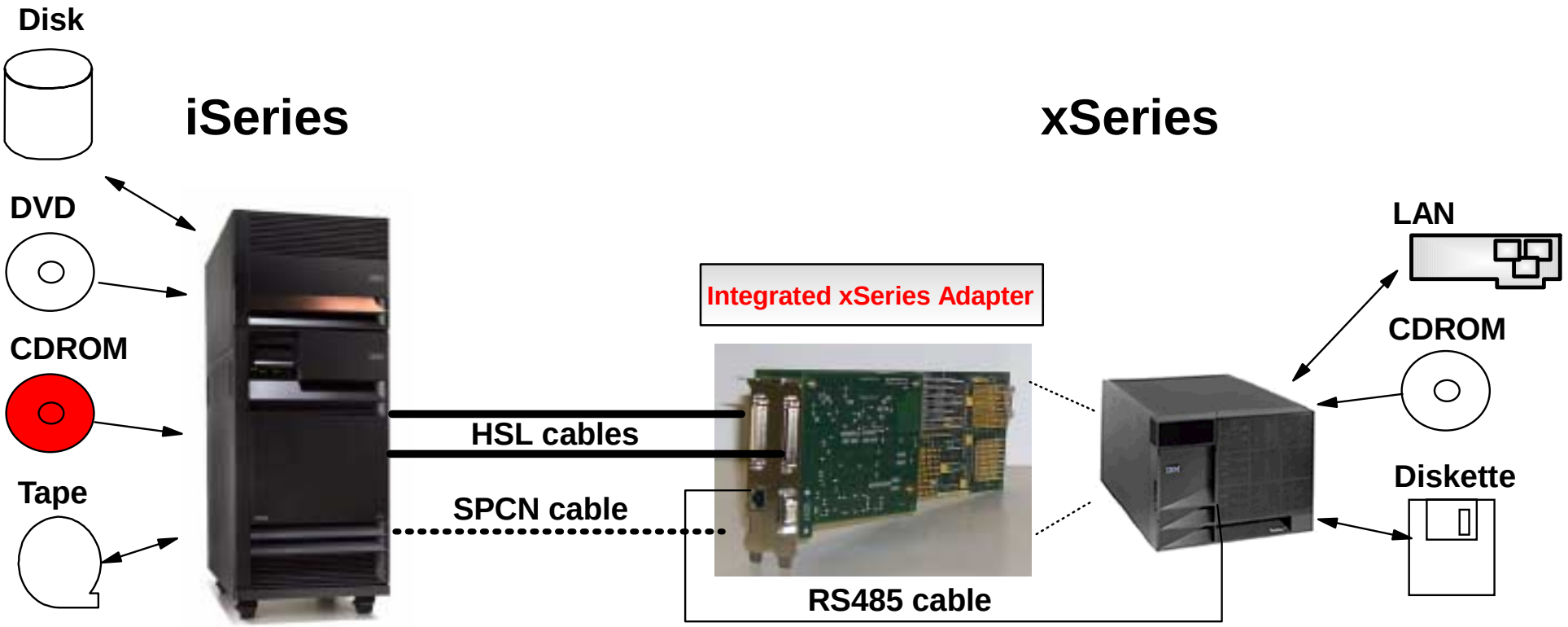
Cluster planning

- The newly announced processors all have HSL adapters that support the V5R1 cluster functions. Any existing 270/8xx systems will need to be upgraded before cluster functions will work. The exception to this is in an LPAR environment, where switching occurs at an IOP level.
- The correct software features need to be ordered and loaded. HSL OptiConnect - option 23 and HA switchable resources - option 41.
- After a switch the network server description on the backup machine will need to be altered to reflect the switched hardware.

HSL Connection

- xSeries servers do not impact the number of I/O towers supported on an HSL loop
- Recommend installing xSeries server on separate HSL loop if one is available. If not, install xSeries server in the middle (behind I/O towers) if possible on HSL loops
- At V5R1 new HSL adapters are available that support the new cluster functions. On the 830/840 these are simple MES upgrades. On the 270/820 you must upgrade to a new model to get the integrated HSL adapters that support cluster functions.
- With HSL OptiConnect and Independent ASPs, the switchable tower must be adjacent to a tower owned by the alternate CEC

Installation



Software

- Windows 2000 Server CD in iSeries
- Run INSWNTSVR Command to start installation

Hardware

- Assemble xSeries server
- Adjust xSeries jumpers
- Install Integrated xSeries Adapter (CIF)
- Connect HSL, SPCN, RS485 cables

Notes: Installation

The steps to install a direct attach xSeries server with an Integrated xSeries Adapter include:

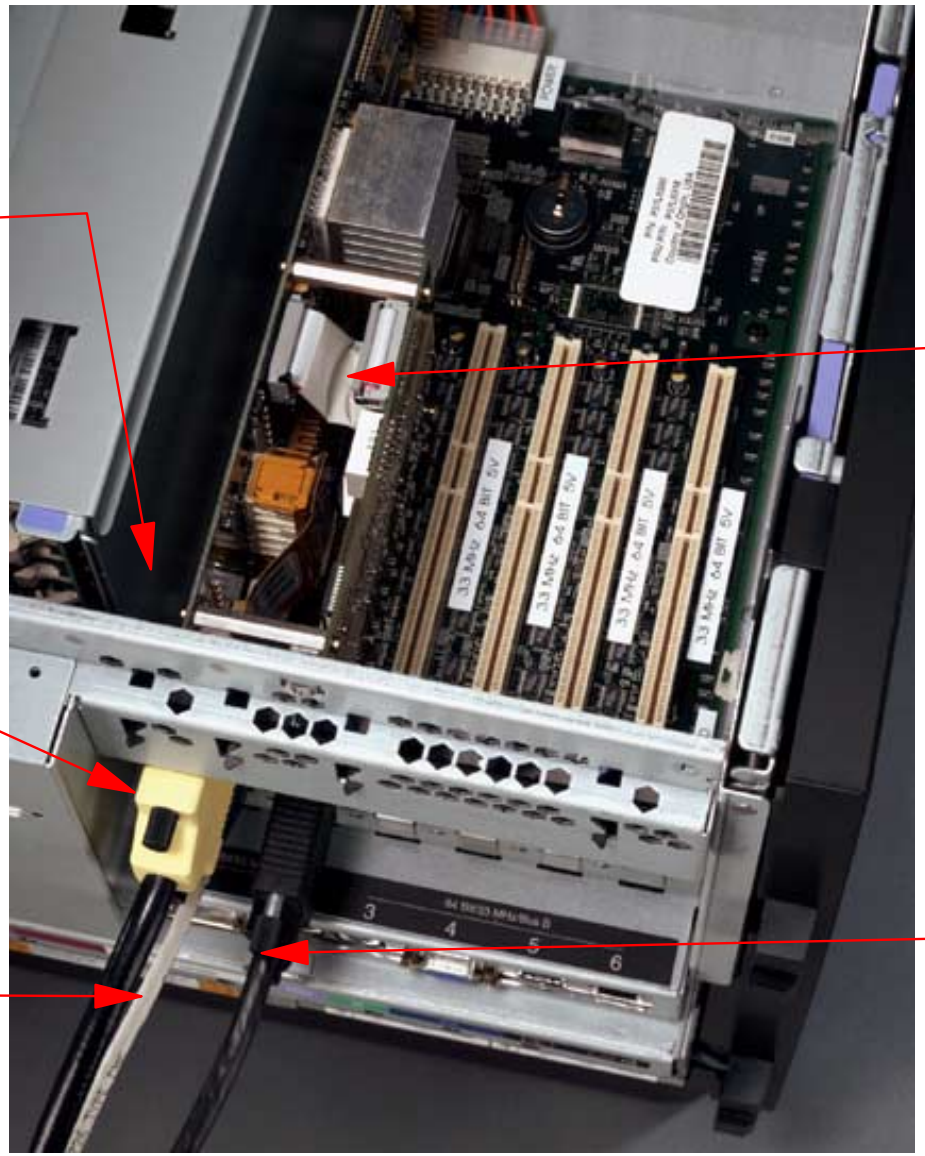
Hardware

- Assemble the xSeries server with its processors, memory, and adapters
- Install the Integrated xSeries Adapter in the xSeries server. The IXA is a customer installable feature. It is not a hot plug adapter. The xSeries power cord needs to be removed from the power outlet before the IXA is inserted in the server.
- Connect the 2 HSL cables - one from the iSeries to the IXA, and one from the IXA to the iSeries. This creates an HSL loop. If one the cables fails, the other path can be used by both servers.
- Connect the SPCN cable - one from iSeries to the IXA
- Connect the RS485 cable - one from the IXA to the xSeries service processor

Software

- Insert the Windows 2000 Server CD in iSeries CD-ROM drive
- Run INSWNTSVR Command to start installation
- Follow the prompts on the screen to enter company name, server name, license information, etc.

Inside the xSeries



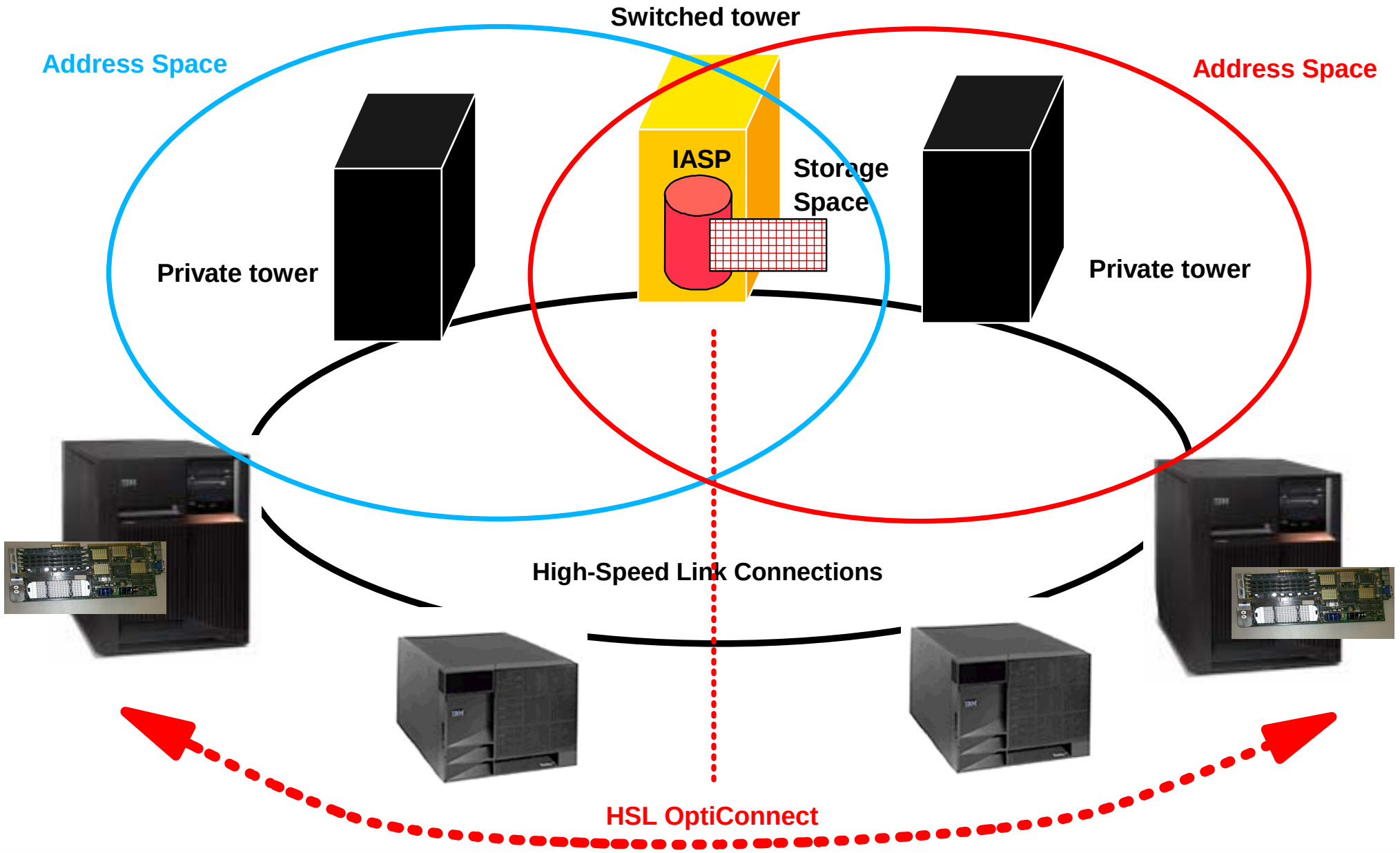
Direct Attached xSeries Servers ...

Easy to install

- Hardware
  - Unpack and install xSeries server
  - Install Integrated xSeries Adapter in xSeries server
  - Connect cables
- Software
  - 5722-WSV *BASE Integration for Windows Server and 5722-WSV Option 2 Integration for Windows 2000 must be installed on the iSeries server
  - Set up the Netserver on the iSeries
  - Windows 2000 Server CD in iSeries
  - Run INSWNTSVR Command to start installation
  - Configuration and user enrollment tasks

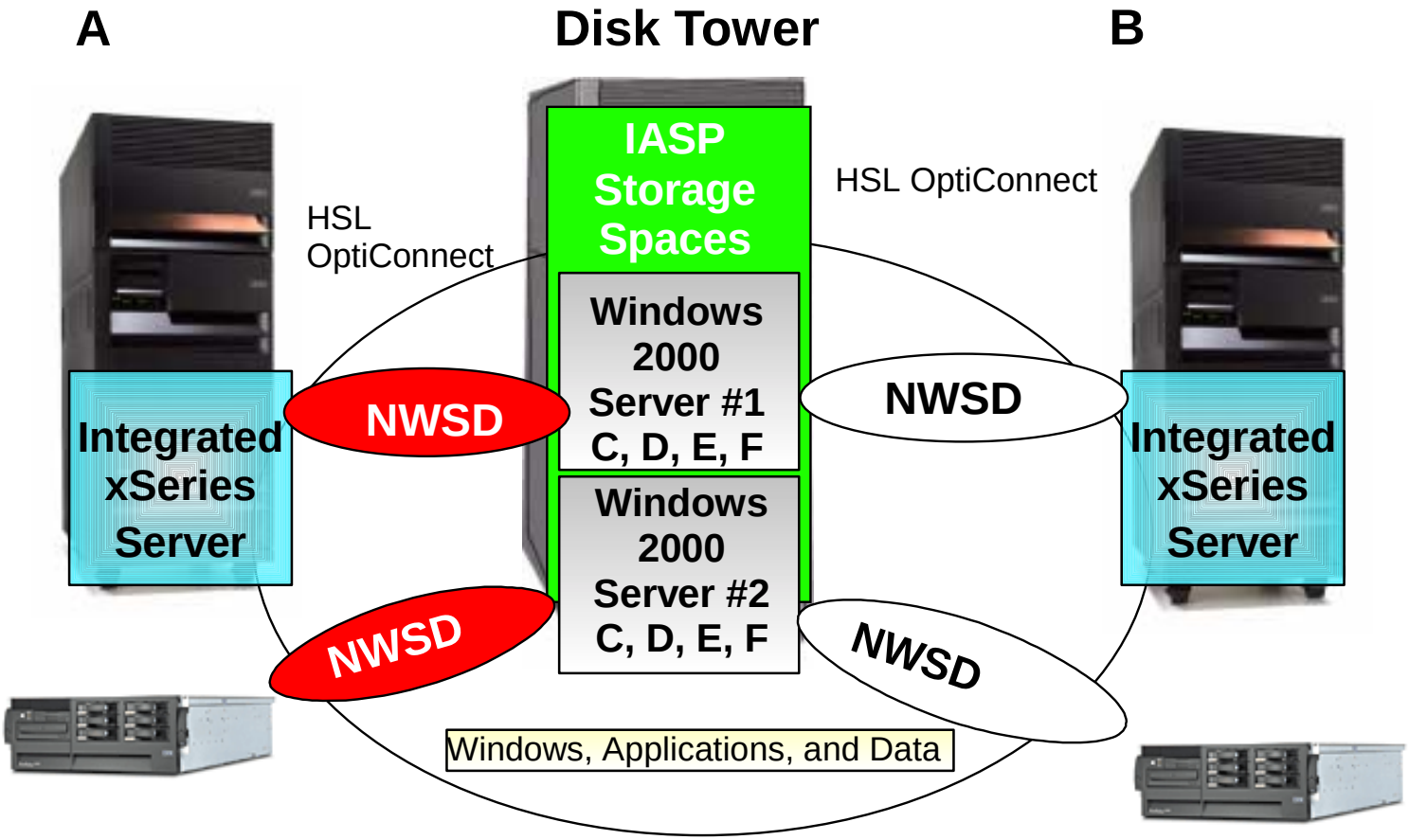
xSeries in iSeries switched clusters

Server storage in IASPs



Independent Auxiliary Storage Pool

Solution for planned and unplanned iSeries server outages



Support for Windows disks in Independent ASP

- xSeries servers need to have the same configuration

NWSD = Network Server Description

Notes: IASP

Independent Auxiliary Storage Pools can offer protection for planned and unplanned iSeries outages. The Windows server environment (Windows itself, applications, and data) can be stored in a IASP and switched to another iSeries server.

In this example, iSeries A has one Integrated xSeries Server and one directly attached xSeries server. The IASP storage spaces for these Windows environments are stored in an I/O tower. iSeries A is connected to iSeries B and the I/O tower via HSL OptiConnect.

Server A is running with IXS A and Windows 2000 Server storage space #1 and direct attached xSeries server A with Windows 2000 Server storage space #2. The red circles indicate the NWSDs that are started.

At some point there is a planned or unplanned outage on iSeries server A. The iSeries HSL OptiConnect facilities detect the outage and the I/O Tower is switched to iSeries B. At that time, an administrator can manually link NWSDs to B resource names and reboot the Windows servers. Windows servers are back online on iSeries B.

Currently an Integrated xSeries Server and a directly attached xSeries server are required for each iSeries server. These resources can not be switched via the OptiConnect facilities. The Integrated xSeries Servers need to have the same configuration and directly attached xSeries servers need to have the same configuration (e.g., same LAN Adapters) .

Creation of IASP for Windows servers

Steps

- Understand clusters
- HSL adapters must cluster enabled
- Plan/install Switched tower or LPAR resources
- Pan/install IXS/IXA resources
- Ensure software and options loaded
  - CA Express, OPS Nav,
  - For separate systems Option 23 - HSL OptiConnect is required
  - Option 41 - HA switchable resources is required
- Create cluster
  - nodes
  - device crg
- Create IASP
- Load Windows OS/Apps/data in IASP
- Start cluster

Management of IASP with Windows servers

Basic management operations

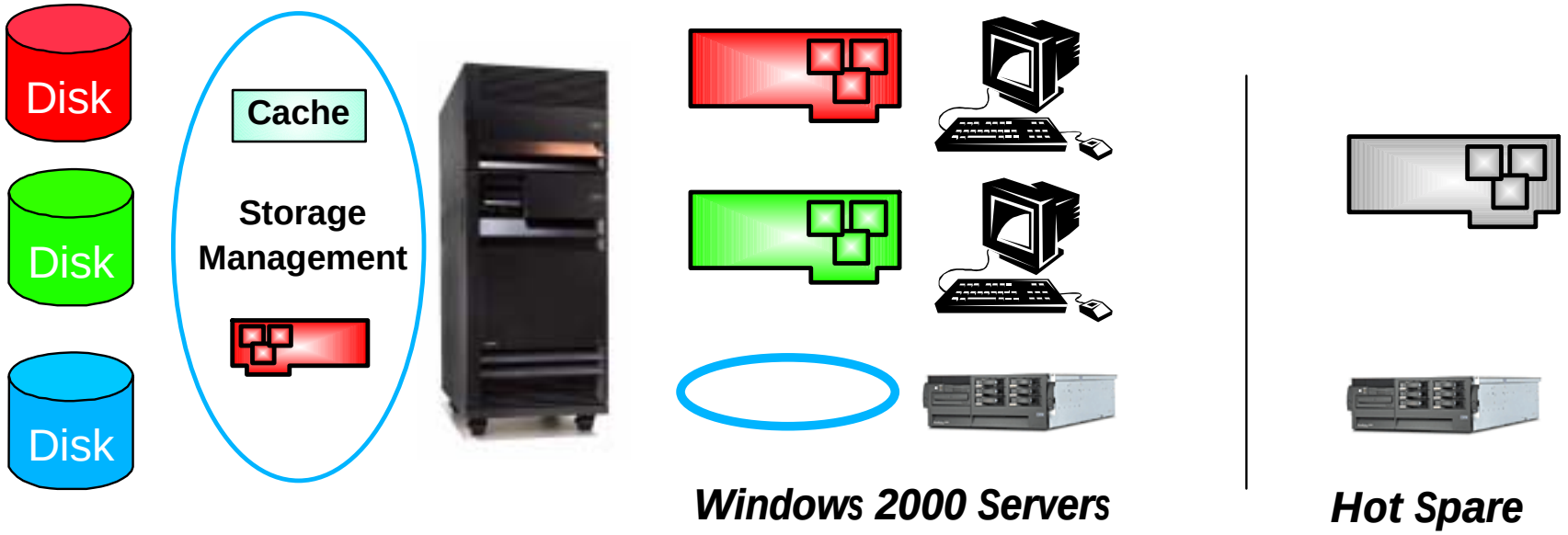
- start and stop cluster
- view cluster resources
- view IASP resources
- switch IASP to back
- switch back to primary
- failover switch
- recover from failover

Storage Area Network

Notes: Storage Area Network

This section provides information on the storage area network facilities provided to Windows servers. New enhancements in V5R1 are highlighted.

iSeries SAN for Windows Servers



iSeries storage area network for multiple Windows 2000 servers

- SAN: Storage, Fabric, and Management

Consolidation provides simplified management

Consistent hardware and device drivers can improve Windows stability

Unique hot spare facility provides simple, efficient high availability

Notes: iSeries SAN for Windows Servers

The iSeries is the only system in the world that has an automated storage management system. The iSeries customer does not employ storage specialists. Optimized arm utilization, caching, paging, data placement & RAS, are an implicit part of OS/400. Single Level store means that mainstore and disk are a logical continuum. Mainstore is literally the cache for the disk, and therefore from the beginning it has been the business of the storage management system to manage the retrieval and location of data between mainstore and disk in a manner that continual optimizes system performance on the fly.

Today, SAN vendors are selling such function as disk stripping for better arm utilization. This has always been an inherent part of the iSeries SM architecture. There is the expert cache which monitors logical to physical I/O and takes advantage of the ubiquitous logical address space activity in concert with the physical data access activity to dynamically optimize the retrieval and retention of data from disk an in mainstore based on current and future temporal and spatial data and address locality. Bottom line, the iSeries invented the automatic transmission of storage and has been optimizing it for over a decade.

The iSeries can be used to provide a flexible storage area network (SAN) to consolidate the disk requirements of multiple Windows NT and 2000 servers. While full Windows storage capability is maintained, the iSeries provides the value of its advanced storage management facilities and reliability.

iSeries disk storage is allocated to Windows by creating a storage space object or virtual disk space from the iSeries pool of disk resources. Up to 32 storage spaces can be created and linked to each Integrated xSeries Server or direct attached server via the IXA. Each storage space can be between 1 MB and 64 GB in size, for a maximum of up to 2 TB per server. Multiple storage spaces can be linked together using in a volume set using the Windows disk administrator utility. By using iSeries disks, Windows server files are protected by the iSeries RAID-5 and mirroring. Windows storage spaces can either be located in the iSeries system disk pool, or separated from iSeries applications and data on specific drives in a user auxiliary storage pool.

The iSeries disk provide the storage, the HSL and bus connections provide the fabric, and OS/400 provides the management for the iSeries storage are network. Operations Navigator provides one management environment to backup and restore OS/400 and Windows objects.

Consistent hardware device drivers for iSeries disk, tape, and LAN adapters can improve the stability of Windows servers. Stability is enhanced since IBM tests the combinations of these device drivers working with Windows and OS/400. With standard PC servers and the 100s of possible devices, it is impossible to test all the various combinations that a customer might implement.

Hot Spare can offer protection from planned and unplanned outages of the directly attached xSeries servers or the Integrated xSeries Servers.

Storage Area Network

SAN Features	Integrated xSeries Servers
✓ Storage for multiple servers	Yes
✓ Storage up to 2 TB per server	Yes
✓ Protection via RAID	Yes
✓ File level backup / restore	Yes
✓ Disaster level backup / restore	Yes
✓ Add storage space dynamically	Yes
✓ Move storage space between servers	Yes
✓ Switch storage space to another server	Yes
✓ Heterogeneous server support	Yes
✓ Share Tape, CD-ROM and DVD Resources	Yes

Notes: Storage Area Network

Storage Area Networks provide facilities to manage disk space for servers. iSeries provides similar storage management facilities for OS/400 and integrated or directly attached Windows servers.

Storage Area Network features include:

- Storage for multiple servers
- Storage (e.g., up to 2 TB per server)
- Protection via RAID
- File level backup / restore
- Disaster level backup / restore
- Add storage space dynamically
- Move storage space between servers
- Switch storage space to another server
- Heterogeneous server support
- Share Tape, CD-ROM and DVD Resources

iSeries storage management facilities provide these functions

Disk Price Comparison

iSeries

- 5074 I/O Tower
- Storage for OS/400, Windows, and Linux
- Disk is Protected via RAID-5

105 Useable GB Configuration

	Quantity	List Price
5074	1	$17,900
RAID Controller	1	6,000
17.5 GB 10K Disk	7	17,640
Total		$41,540

682 Useable GB Configuration

	Quantity	List Price
5074	1	$17,900
30 Exp. Pack	1	9,000
RAID Controller	3	18,000
17.5 GB 10K Disk	45	113,400
Total		$158,300

EMC

- Symmetrix 8430
- Storage for Mainframe, UNIX, Windows, OS/400
- Disk is Protected via Mirroring (No RAID-5)
- Software, services, support are extra

108 Useable GB Configuration

	Quantity	List Price
Base + 36 GB	1	$154,700
2048 MB Cache	1	51,000
Fibre Channel	1	26,700
Pairs of 18 GB Disk	5	33,500
Total		$265,900

EMC is 6X More

666 Useable GB Configuration

	Quantity	List Price
Base + 36 GB	1	$154,700
4096 MB Cache	1	75,200
Fibre Channel	2	53,400
Pairs of 36 GB Disk	18	219,600
Total		$502,900

EMC is 3X More

Source: iSeries prices from IBM e-config on 1/16/01. Sample EMC configuration. EMC prices from Ideas International on 1/18/01, EMC product information from www.emc.com on 1/18/01

EMC proposals usually include hardware, software, and services and price discounts

Notes: Disk Price Comparison

iSeries has similar functions to a Storage Area Network. What about the price comparison?

The chart shows the price for disk on iSeries vs a popular SAN solution from EMC. Two comparisons are made, one at 100 GB of useable space and one at 670 GB of useable space. Useable space is the space available to the servers that is protected via RAID 5 or mirroring.

For iSeries, the 5074 disk tower is priced. This disk tower can hold up to 45 disk drives. OS/400, Windows, and Linux objects can be stored on these drives. The configurations include RAID 5 protection.

For EMC, the new Symmetrix 8430 is priced. Symmetrix disk drives can provide storage for Mainframe, UNIX, Windows, and OS/400 servers. The configurations use mirroring for disk protection. RAID 5 is not support on Symmetrix. Mirroring is a common protection scheme for EMC. Only the hardware is priced in the EMC configuration. Additional charges for software, services, support may be required.

At the 100 GB useable comparison the EMC price is six times more than the iSeries price.

At the 670 GB comparison the EMC price three times more.

Integration code enhancements

Microsoft Windows NT or 2000 Server

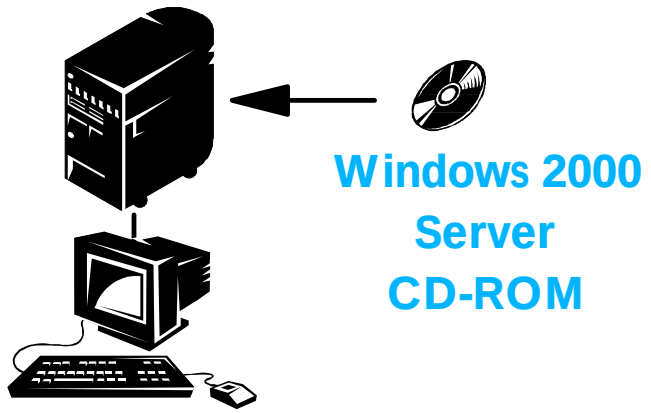
Windows 2000 Server or Windows 2000 Advanced Server

Windows NT Server 4.0

- Logo'd by Microsoft
- See www.microsoft.ibm.com/hwtest/hcl
- Standard versions used on any Intel server
- Purchase from Microsoft reseller
- IXS only

OS/400 Integration for Windows Server (5769-WSV)

- No charge OS/400 program providing:
- Drivers to share iSeries disk, tape, CD-ROM
- Integrated operations and user administration



Notes: Microsoft Windows NT or 2000 Server

The Integrated xSeries Server runs Microsoft Windows NT Server Version 4.0 and Windows 2000 Server, the standard CD-ROM versions that can be purchased from any Microsoft reseller. The Integrated xSeries Server has passed the Microsoft Compatibility Tests for Windows NT Server V4.0, and Windows 2000 Server signified by the logo display: Designed for Windows NT. For more information see the Microsoft Hardware Compatibility List (HCL) at www.microsoft.ibm.com/hwtest/hcl (Category: Misc., Manufacturer: IBM).

The Integrated xSeries Server can also run Citrix MetaFrame which is used with Windows NT Server and Windows 2000 Server to connect IBM Network Stations.

Windows NT or Windows 2000 Server is installed on the Integrated xSeries Server using an OS/400 command that runs an automated installation program. The operator just puts the Microsoft CD-ROM into the iSeries CD-ROM drive and answers a few simple prompts.

Microsoft Windows NT Server and 2000 Server have not been modified to run on the Integrated xSeries Server. IBM has designed device drivers to attach to the iSeries disk, tape and CD-ROM drives. The Integrated xSeries Server uses the standard Hardware Abstraction Layer (HAL) provided by Microsoft.

IBM provides a set of integration programs for Windows NT Server and Windows 2000 Server as a no-charge licensed program (5769-WSV), shipped with OS/400. The OS/400 Integration for Windows Server licensed program includes the hardware devices drivers, as well as the software integration programs that are used, for example, to provide integrated user administration.

The user administration and database integration options can take advantage of the Integrated xSeries Server's secure, internal communications link between the iSeries and Windows. This TCP/IP internal LAN connection provides a link with protection from LAN bottlenecks and hub failures.

Additional V5R1 Enhancements

Operations Navigator for Windows Integration

- User Enrollment
- Storage Management
- Management Central Pervasive
- Supports internal and direct attach offerings

1 Gb Ethernet Adapter for IXS

- Same adapter as iSeries
- Feature #s
  - #2743 (optical)
  - #2760 (copper)
  - Specify code #0225 to indicate that the adapter is associated with an IXS

Increased support for Integrated xSeries Servers

- Up to 32 on 840
- Up to 28 on 830

iSeries Model	# of IXS
270	3
820	12
830	28
840	32

New 5078 and 0578 Expansion Towers

- Support 2 Integrated xSeries Servers
- Same # of slots as 5074, no disk drives
- Tophat for 5074
- Included in HSL tower count

Notes: Additional V5R1 Enhancements

There are several enhancements in the V5R1 announcement for the Integrated xSeries Server.

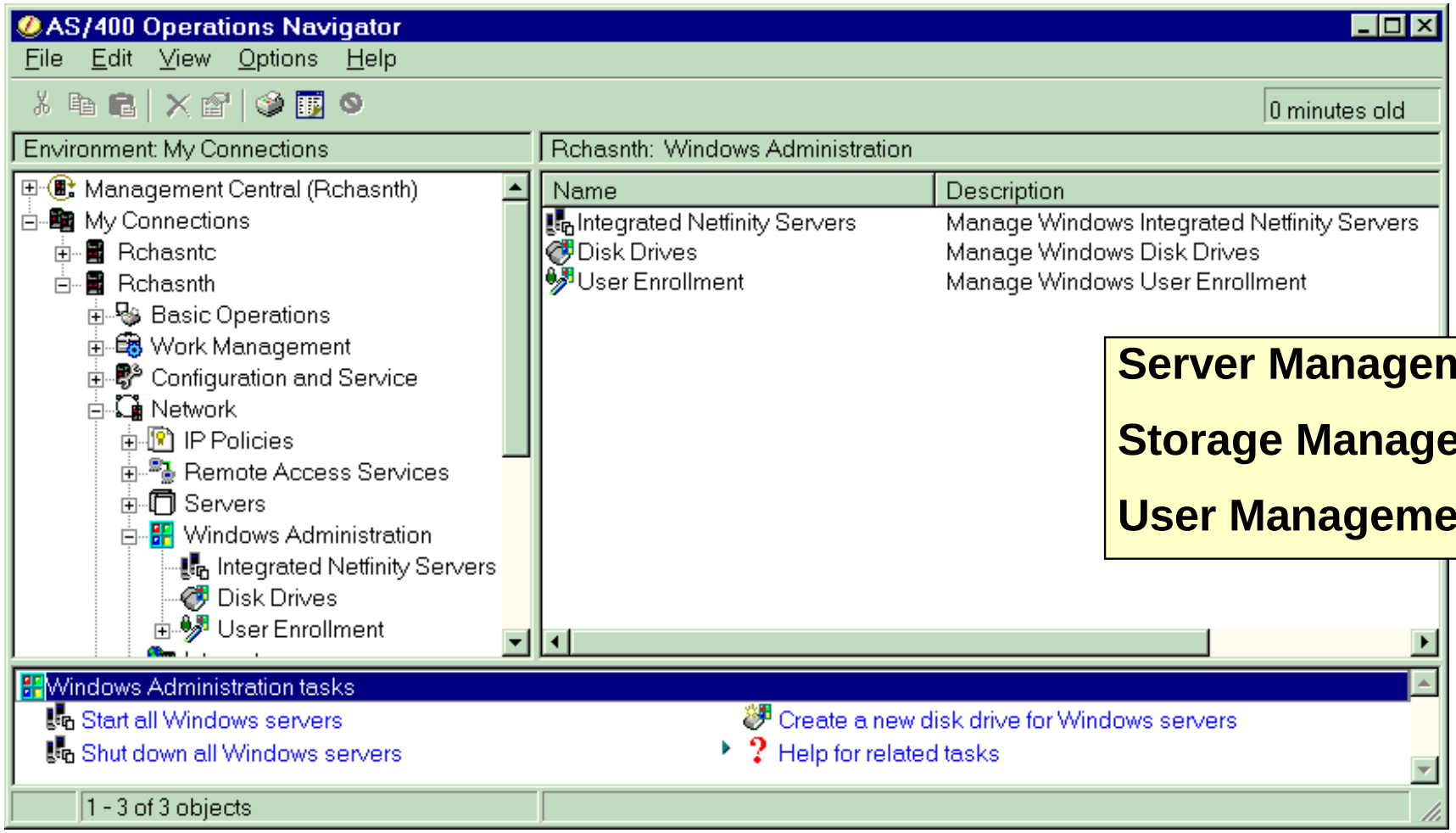
Operations Navigator provides a graphical administration environment for iSeries. Operations Navigator provides enhanced support for the iSeries Windows server integration offerings. In addition to the server management functions (e.g., start and stop Windows servers) that was introduced in V4R5, V5R1 includes support for user enrollment (enrolling an OS/400 user to a Windows server) and storage management (e.g., define a storage space for a Windows server). The Operations Navigator functions support the IXS and IXA direct attach offerings.

The iSeries 1 Gb Ethernet Adapter is now supported by the Integrated xSeries Server (700 and 850 MHz servers). It is the same adapter as iSeries. The feature numbers are #2743 (optical) and #2760 (copper). As with the other adapters there is a specify code (#0225) to indicate that the adapter is associated with an IXS

iSeries now supports more Integrated xSeries Servers. The maximum for the 840 is raised from 16 to 32. The maximum for the 830 is raised from 16 to 28. The maximums for the 270 and 820 were not changed.

A new 5078 (with covers for a tower installation) and 0578 (without covers for a rack installation) Expansion Towers provide additional options for Integrated xSeries Server deployments. They support 2 Integrated xSeries Servers. The 5078 and 0578 have the same # of slots as 5074, but no disk drives. They are installed on top of the 5074 disk tower. They are included in the HSL tower count. They offer a less expensive option to consolidate Windows servers with the IXS.

Operations Navigator



Server Management

Storage Management

User Management

Notes: Operations Navigator

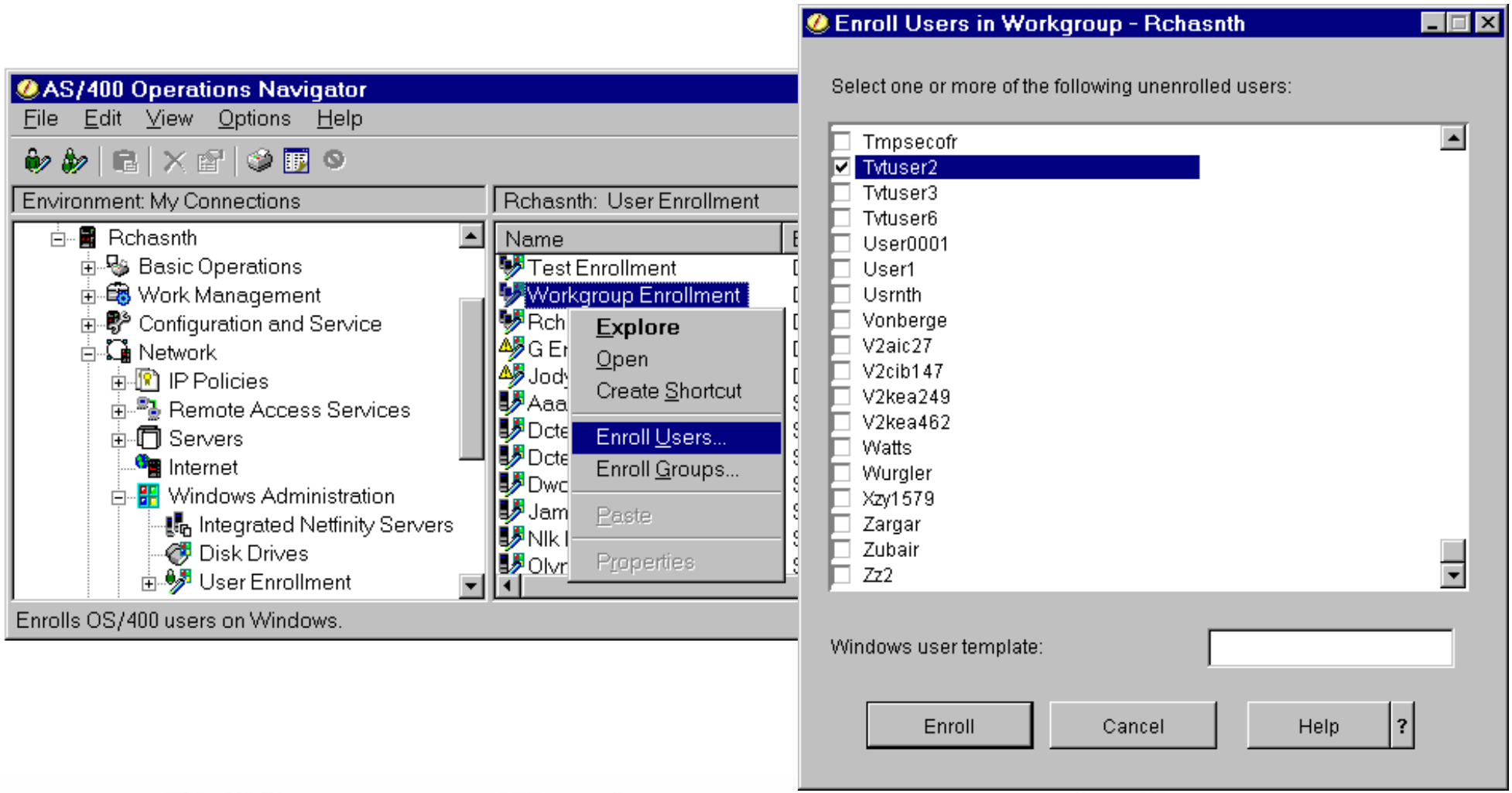
This screen shot shows the Operations Navigator tree opened to the Windows Administration area. On the right panel the major functions are listed: Integrated Netfinity Servers (plans are in place to update this name in the next release), Disk Drives, and User Enrollment. In addition, the task pad at the bottom of the page shows common tasks that can be done directly.

Additional screen shots included in this presentation provide more details of the functions available through Operations Navigator. In general everything can be done for the IXS/IXA offerings through Operations Navigator except for the installation of the Windows NT or 2000. The installation is done via a 5250 interface.

User Enrollment

Combined user administration

- OS/400 users or groups propagated to, then passwords synchronized on Windows 2000



Notes: User Enrollment

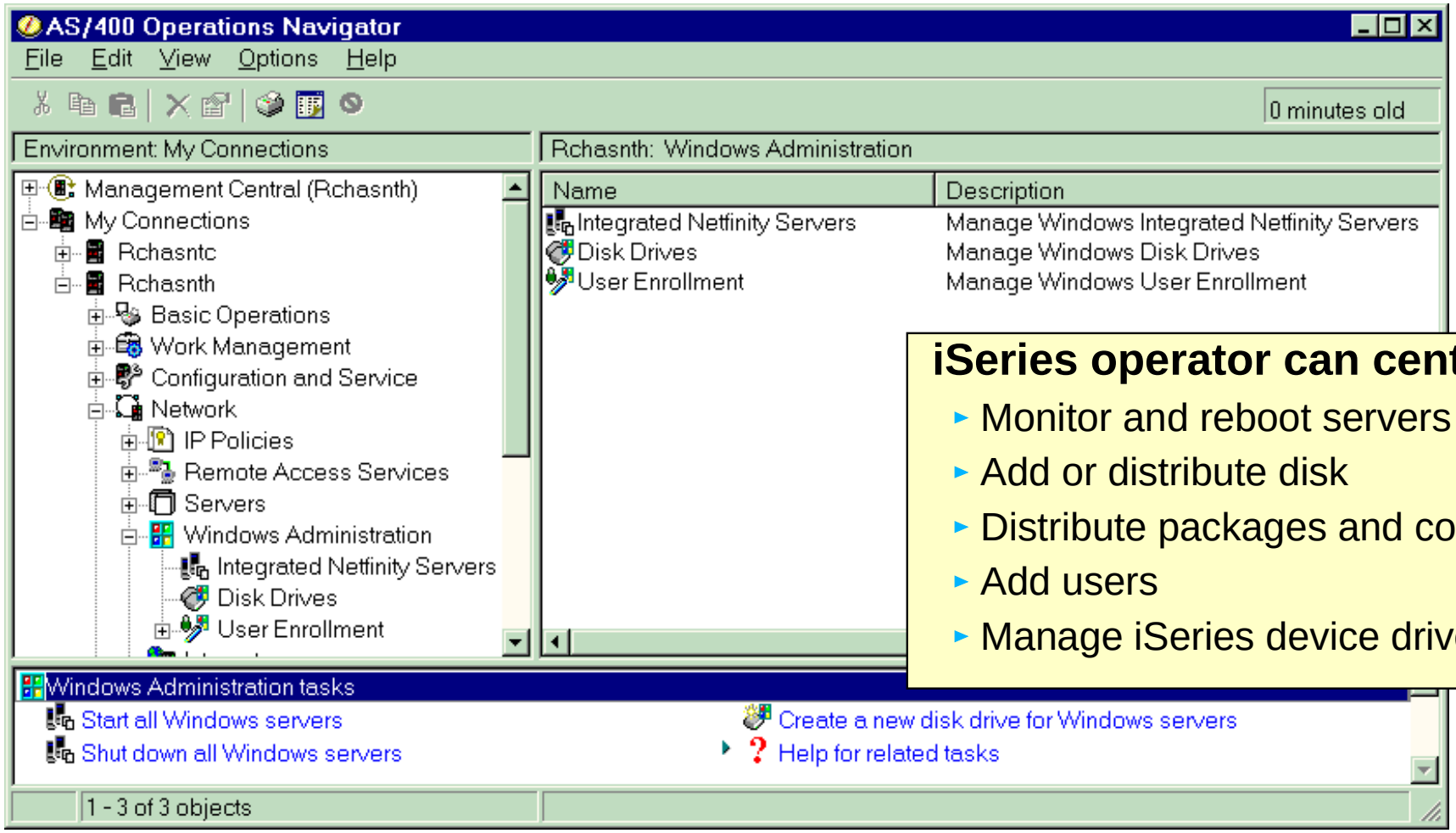
User administration integration enables OS/400 users and groups to be enrolled on an Windows server or a domain and for user passwords to be synchronized. This feature significantly reduces the overhead of maintaining two separate administration systems for OS/400 and Windows.

When you create an OS/400 user, you can add the user to a group that is predefined to propagate users to the Windows server. The user is then created on the Windows server using a predefined template, to allocate the correct security rights and user preferences. If the user leaves the company, deleting the OS/400 profile will also delete the Windows server profile.

Once OS/400 users are enrolled, their password changes are passed automatically from to the Windows server. If a password is changed through the Windows server interface, however, the change is not synchronized back to the OS/400 side.

With V5R1. Operations Navigator has been enhanced to support user enrollment. In this Operations Navigator screen shot, the iSeries administrator is selecting which OS/400 users they want to be added to a specific Windows server.

Managing Remote Servers



iSeries operator can centrally:

- Monitor and reboot servers
- Add or distribute disk
- Distribute packages and commands
- Add users
- Manage iSeries device drivers

Notes: Managing Remote Servers

Windows server operations are simplified when using the Integrated xSeries Server and Integrated xSeries Adapter, with a central OS/400 operator being able to perform key operations remotely through OS/400 Operations Navigator. With Operations Navigator, Windows servers can be started, stopped, or restarted. Windows users can also be added.

Installation and disk allocation is performed through OS/400. The OS/400 message queue is also used to collect hardware error messages from the Integrated xSeries Server.

Windows server system, security and application messages can be filtered and sent from the Windows event log up to a message queue or job log on OS/400. This allows the central OS/400 operator to monitor messages from distributed servers in the network. The OS/400 operator can use the submit network server command to send an Windows command from OS/400. This can be used to start an Windows application or service.

For companies with iSeries in a branch office network, new disks can be assigned to a remote Windows server remotely, using Operations Navigator. The Windows 2000 Server does not need to be shutdown during the operation, when a storage space is created on the iSeries and then linked to the Windows server. This is particularly useful when providing operations support for remote installations, where adding hard disk to a server often requires significant downtime.

Disk images can also be saved on the central iSeries and then transmitted as a save file, or sent on a tape to a remote site. This allows a complete disk image to be replaced with new information without a hardware change on the server. This might be used where a company wants to periodically update a catalogue of parts or sales information to its branches.

Many operations are performed directly on the Windows server console that is attached to the Integrated xSeries Server. This preserves the Windows operations interface for most Windows operations, including installing Windows applications.

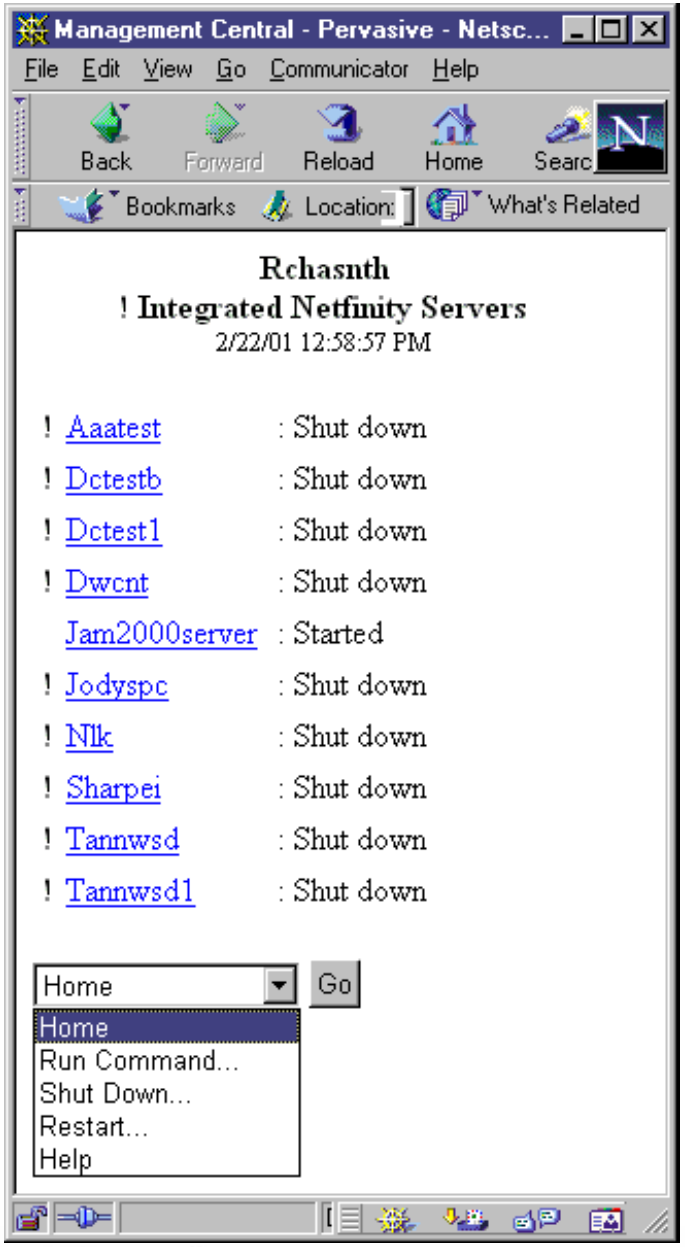
Windows 2000 Server with Terminal Server support provides additional flexibility in managing local or remote operations of the Windows 2000 Server such as the ability to take active or passive control over the Windows 2000 Server's console screen, keyboard and mouse. This gives the operator the ability, for example, to install a Windows 2000 service pack on the branch office server.

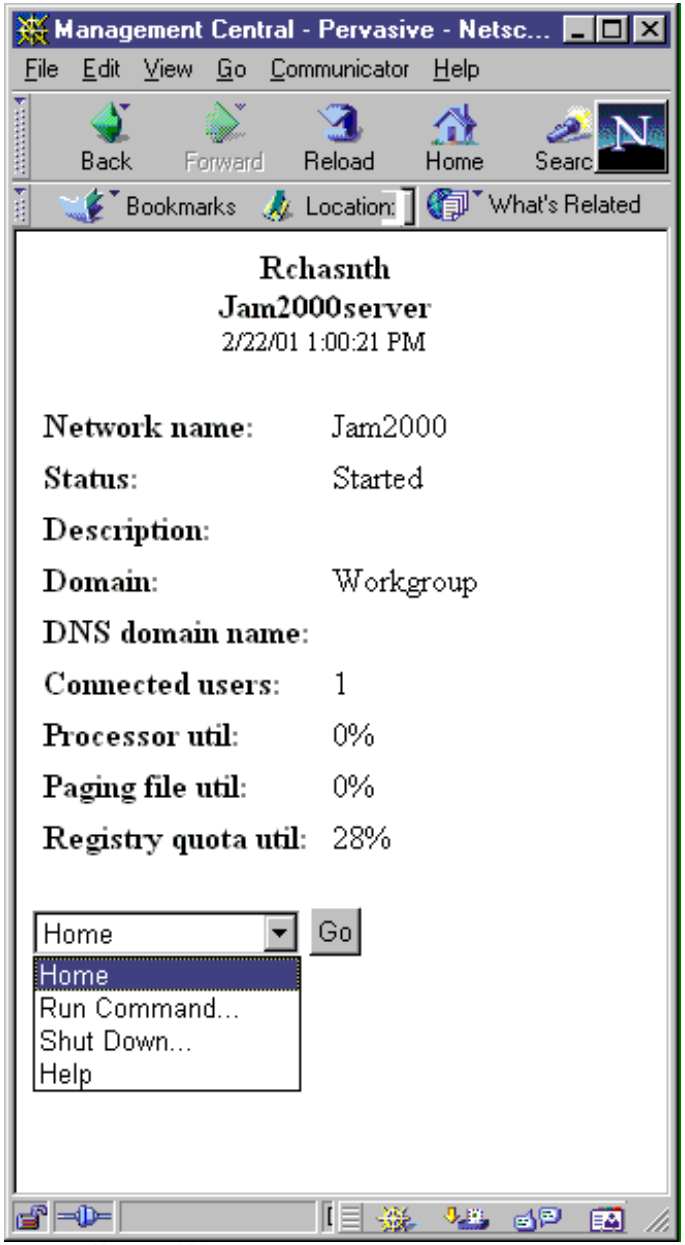
Microsoft Windows NT Server 4.0 and Windows 2000 Server are not modified to run on the IXS or with the IXA. IBM has designed new device drivers, running below Windows, to attach to the iSeries disk, tape DVD, and CD-ROM drives. The device drivers can be updated through OS/400 PTFs and downloaded to the Windows server via a level check routine that runs each time the server is started. Thus all servers on your iSeries are kept at a consistent driver level, and at the level that has been tested by IBM with each new Windows service pack.

Management Central Pervasive

Manage Windows Servers from a Cell Phone or Personal Digital Assistant.

- View status of servers
- Startup/Shutdown servers
- Run Windows commands
- Monitor events





Notes: Management Central Pervasive

Administrators now have more flexibility to access Management Central information and monitor the iSeries systems they support. Management Central - Pervasive lets you remotely monitor system performance and status using an Internet phone, a PDA with a wireless modem, or a traditional web browser on a workstation.

After you set up a web server on your central system, you simply enter the URL into your Internet phone, PDA, or browser to check the availability of your systems and any active Management Central monitors. For example, you can check to find out if one of your systems finished restarting, or you can check an active monitor to see if any thresholds for CPU, disk utilization, or other metrics were exceeded.

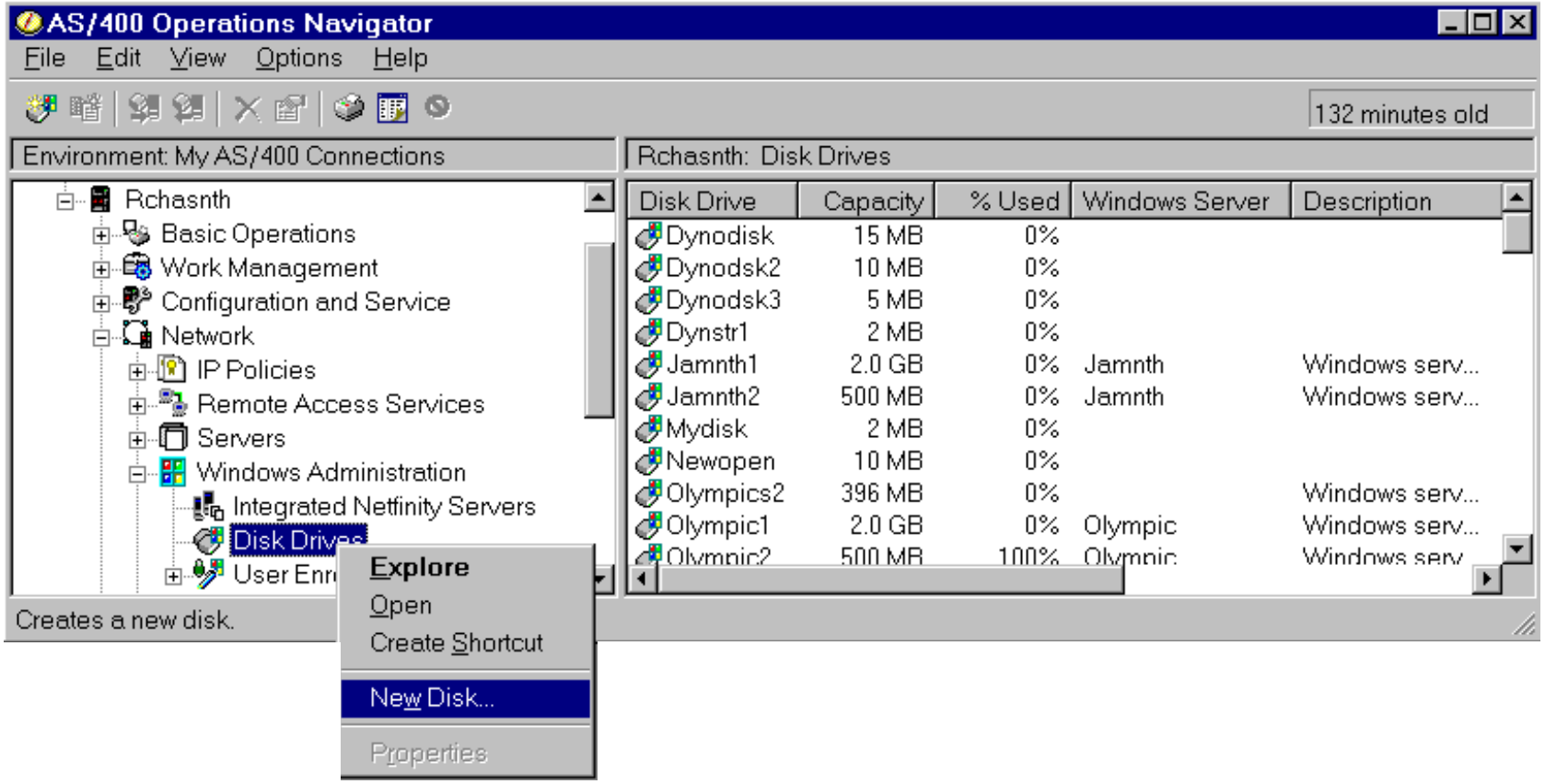
Functions added in V5R1 include management for the Integrated xSeries Server and the direct attach xSeries server. Functions supported include:

- View status of servers
- Startup/Shutdown servers
- Run NT commands
- Monitor events (routed to an iSeries message queue)

Windows Server Disks

Windows Disks are managed from OS/400

Disks are linked to Windows Server



Notes: Windows Server Disks

In V5R1, Operations Navigator has been enhanced to offer disk management facilities for the Integrated xSeries Servers and the directly attached xSeries servers.

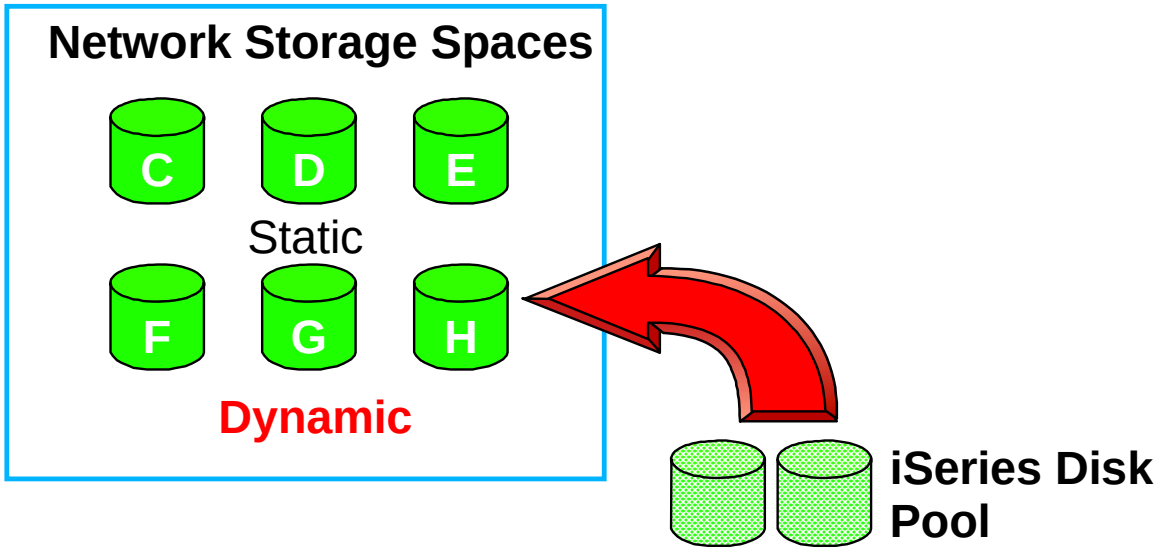
In the screen shot when Disk Drives is selected in the left tree, the disk drives (or storage spaces) defined for Windows servers are listed in the right pane. The name of the drive, its capacity, percent used, and the Windows server (NWSD) it is connected to are listed for each drive.

A right mouse click on Disk Drives brings up the context menu where a new drive can be created.

Hot Addition of Disk

Add Disk Storage to Windows 2000 Server dynamically

- New Dynamic Network Storage Space
- Does not require Windows 2000 Server to be shut down



Attach up to 2 TBs of disk to each server

- 32 storage spaces, each from 1 MB to 64 GB
  - 16 Static and 16 Dynamic

Works with Integrated or direct attach xSeries Servers and Windows 2000 Server

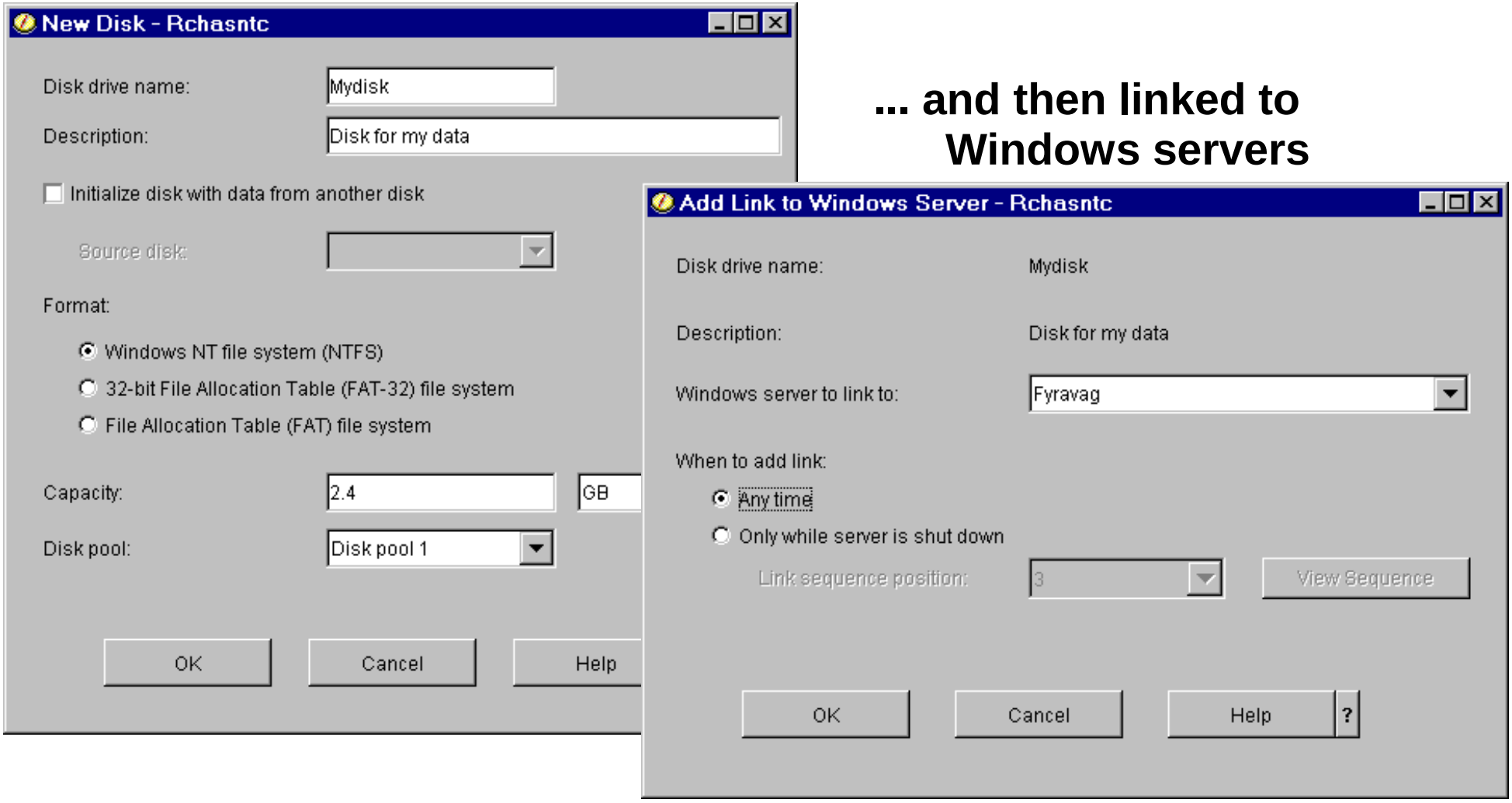
Notes: Hot Addition of Disk

iSeries storage area network support for Windows servers has also been enhanced. For Windows 2000 Servers, the number of storage spaces that can be defined has increased from a maximum of 16 to 32. With a storage space supporting up to 64 GB of disk, each Windows server can now access approximately 2 Terabytes of disk space. Up to 16 of these storage spaces can be added without requiring a shut down of Windows 2000 Server.

The number, size, and support for dynamically adding disk to Windows 2000 Server works with Integrated or direct attached xSeries Servers.

Hot Addition of Disk

Disks are defined...



... and then linked to Windows servers

Notes: Hot Add Disk - Operations Navigator

Additional facilities have been added to Operations Navigator for managing Integrated xSeries Servers and xSeries servers that are directly attached to iSeries via the Integrated xSeries Adapter. In addition to server management, Operations Navigator now supports disk and user management for these Windows servers. Enhancements include the capability to create, delete, copy, link, unlink, and show status for Windows server disks.

The first screen shot shows the panel for creating a new disk drive for a Windows server . In this example a 2.4 GB drive is being added. The administrator selects which Disk Pool the space will be taken from.

The second screen shot shows the panel for linking the new disk drive to a specific Windows server. The administrator selects which Windows server will get the additional disk capacity. These servers can be Integrated or direct attached xSeries servers. The administrator also selects when the disk should be linked ---- Anytime (dynamic) or when the server is shut down (static).

When the disk drive is linked to a Windows server, the Windows administrator uses Windows tools to format the drive and add it to the Windows storage environment.

Summary

Summary

Integrated xSeries Server for iSeries

- Logo'd for Microsoft Windows NT Server and Windows 2000 Server

For branch office and dealership solutions

For server consolidation

For complementary applications

For IBM Network Stations with Citrix MetaFrame

Sources of information

For More Information

iSeries Windows Integration Web Site:

- www.iseries.ibm.com/windowsintegration
- Product information
- Service information (PTFs)
- Library

iSeries InfoCenter:

- http://publib.boulder.ibm.com/html/as400/v4r5/ic2924/info/index.htm
- Articles on Windows NT and Windows 2000 on the IXS

Redbooks:

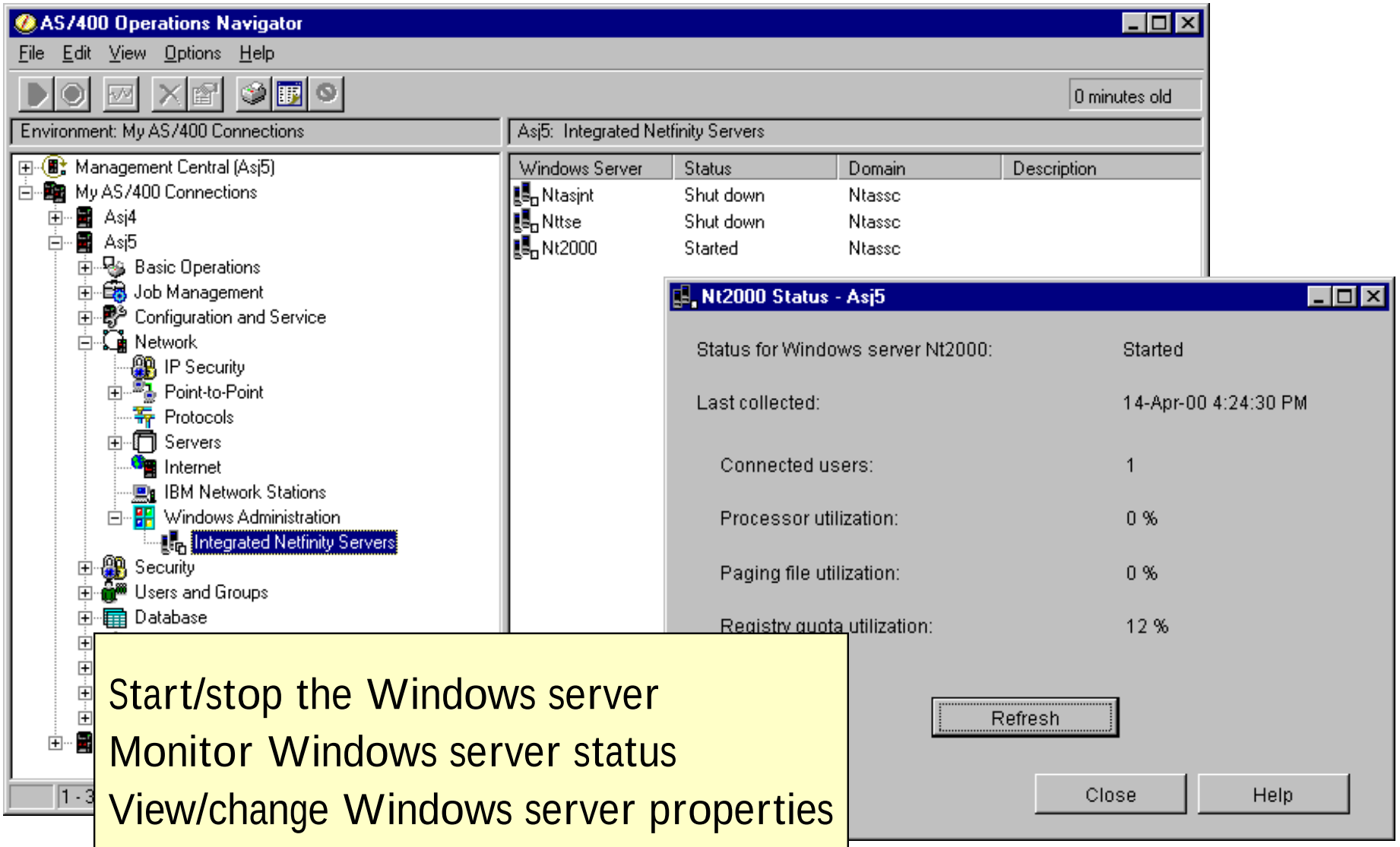
- www.redbooks.ibm.com
- AS/400 - Implementing Windows NT on the Integrated Netfinity Server SG24-2164
- Consolidating Windows 2000 Servers in iSeries SG24-6056-00
- Redpiece for GA: Consolidating bus attached xSeries in iSeries SG24-6222-00

Contacts:

- Server Consolidation Segment Manager: Craig Johnson ... johnsonc@us.ibm.com
- Advanced Technical Support: Bob Schuster ... raschus@us.ibm.com
- PartnerWorld: Kyle Wurgler ... wurgler@us.ibm.com

Other material

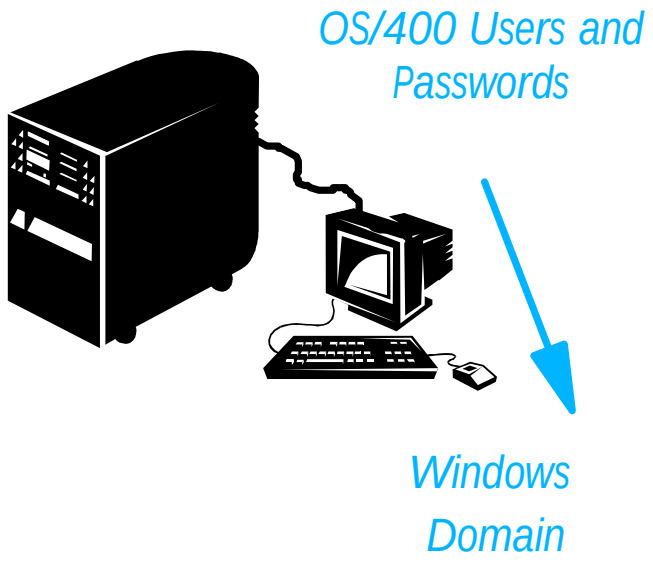
Simplified Operations via Operations Navigator



Start/stop the Windows server
Monitor Windows server status
View/change Windows server properties

Simplified User Administration

- Combined user administration
- OS/400 users or groups propagated to, then passwords synchronized on Windows Domain
- OS/400 password changes synchronized with Windows server



Notes: Simplified User Administration

User administration integration enables OS/400 users and groups to be enrolled on an Windows server or a domain and for user passwords to be synchronized. This feature significantly reduces the overhead of maintaining two separate administration systems for OS/400 and Windows.

When you create an OS/400 user, you can add the user to a group that is predefined to propagate users to the Windows server. The user is then created on the Windows server using a predefined template, to allocate the correct security rights and user preferences. If the user leaves the company, deleting the OS/400 profile will also delete the Windows server profile.

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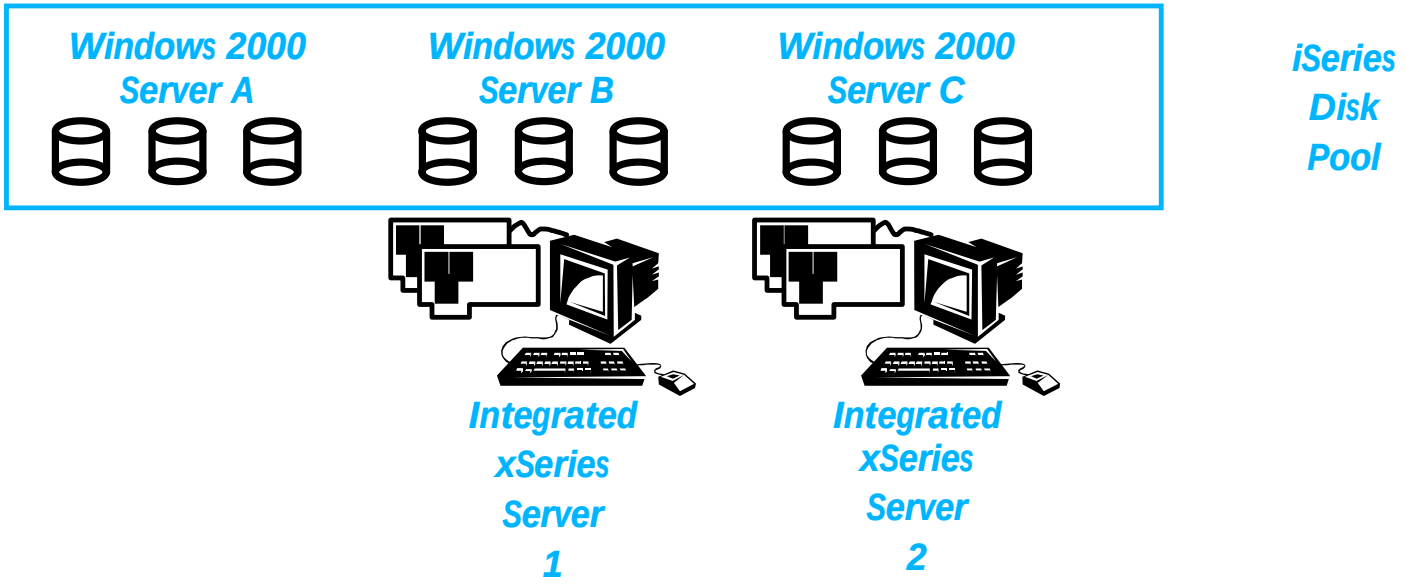
Storage Management for Windows 2000



Manage iSeries storage area network for multiple Windows servers

Allocate 1 MB - 64 GB per Windows drive, 16 drives per server

Create Windows disks in OS/400 system or user auxiliary storage pools

Protect Windows disks with iSeries RAID-5 or mirroring

Distribute Windows disk images to remote servers

Notes: iSeries Storage Management for Windows 2000

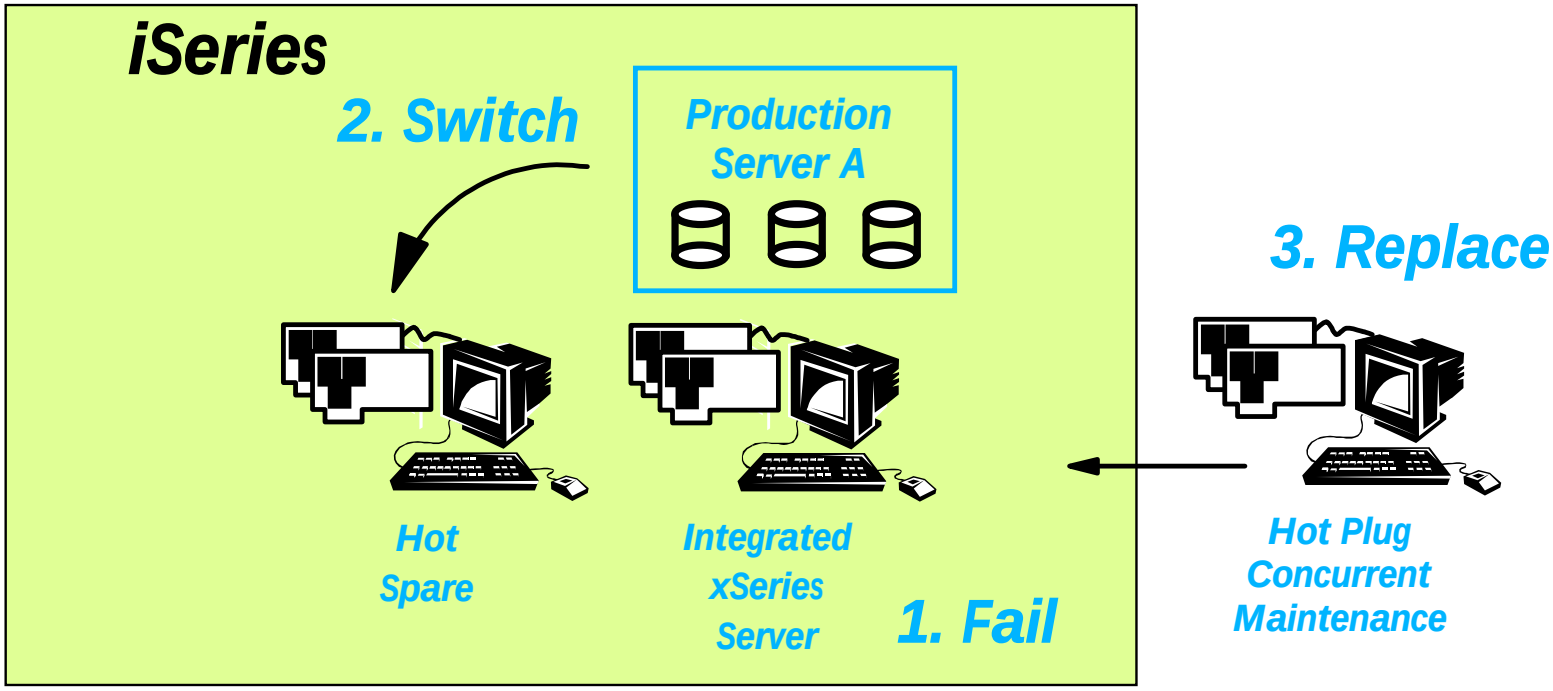
The iSeries can be used to provide a flexible storage area network (SAN) to consolidate the disk requirements of multiple Windows NT and 2000 servers. While full Windows storage capability is maintained, the iSeries provides the value of its advanced storage management facilities and reliability.

iSeries disk storage is allocated to Windows by creating a storage space object or virtual disk space from the iSeries pool of disk resources. Up to 16 storage spaces can be created and linked to each Integrated xSeries Server. Each storage space can be between 1 MB and 64 GB in size, for a maximum of 1024 GB per server. Multiple storage spaces can be linked together using in a volume set using the Windows disk administrator utility.

By using iSeries disks, Windows server files are protected by the iSeries RAID-5 and mirroring.

Windows storage spaces can either be located in the iSeries system disk pool, or separated from iSeries applications and data on specific drives in a user auxiliary storage pool.

Hot Spare, Hot Plug



Simple to switch to hot spare if server hardware fails

- Production server rebooted from hot spare server

Hot plug concurrent maintenance/add

- 850 MHz Integrated xSeries Server on iSeries Models 270 and 820
- LAN adapters on iSeries Models 270 and all 8xx

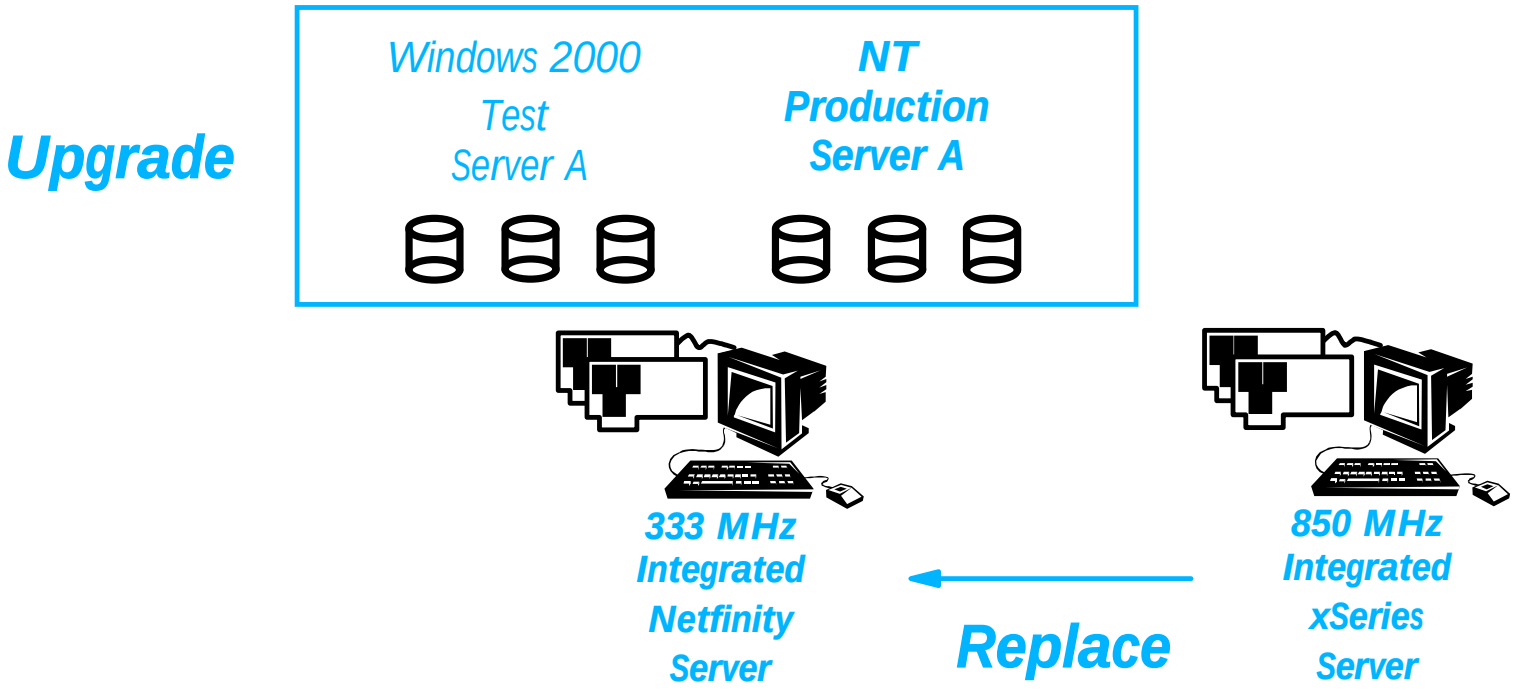
Notes: Hot Spare, Hot Plug

The Windows server objects and disks stored on the iSeries are linked at vary on (boot) time to the Integrated xSeries Server hardware. This flexible hardware linking is the base for the **hot spare** capability of the Integrated xSeries Server. If the Integrated xSeries Server hardware fails, then it is simple to switch the Windows server description to boot on another Integrated xSeries Server in the same iSeries. No reconfiguration of Windows objects is required.

In addition to the hot spare option, **hot plug** PCI provides concurrent maintenance for LAN adapters on all iSeries servers and for the Integrated xSeries Server board on selected iSeries servers as shown in the table below. An Integrated xSeries Server must be varied off to perform concurrent maintenance on either the server board or the LAN adapter.

iSeries Model	IXS Hot Plug in System Unit	IXS Hot Plug in # 5075 I/O Tower	IXS Hot Plug in # 5074 I/O Tower	LAN Adapter Hot Plug
270	Y	Y	N/A	Y
820	Y	Y	N	Y
830	N	N/A	N	Y
840	N	N/A	N	Y

New Release Testing and Migration



Simple to test Windows 2000 upgrade or service pack

- Full switch back to production server if required

Seamless migration from 333 MHz to 850 MHz Integrated xSeries Server without reinstalling Windows server

- OS/400 automatically migrates HAL and device drivers

Notes: New Release Testing and Migration

The Windows NT Server objects and disks stored on the iSeries are linked at vary on (boot) time to the Integrated xSeries Server hardware. When the NT server is down, that Integrated xSeries Server is available to be booted with another configuration of Windows NT or 2000 Server. This flexible hardware linking allows the use of multiple Windows NT or 2000 Server configurations on the same Integrated xSeries Server, although only one can be active at a time.

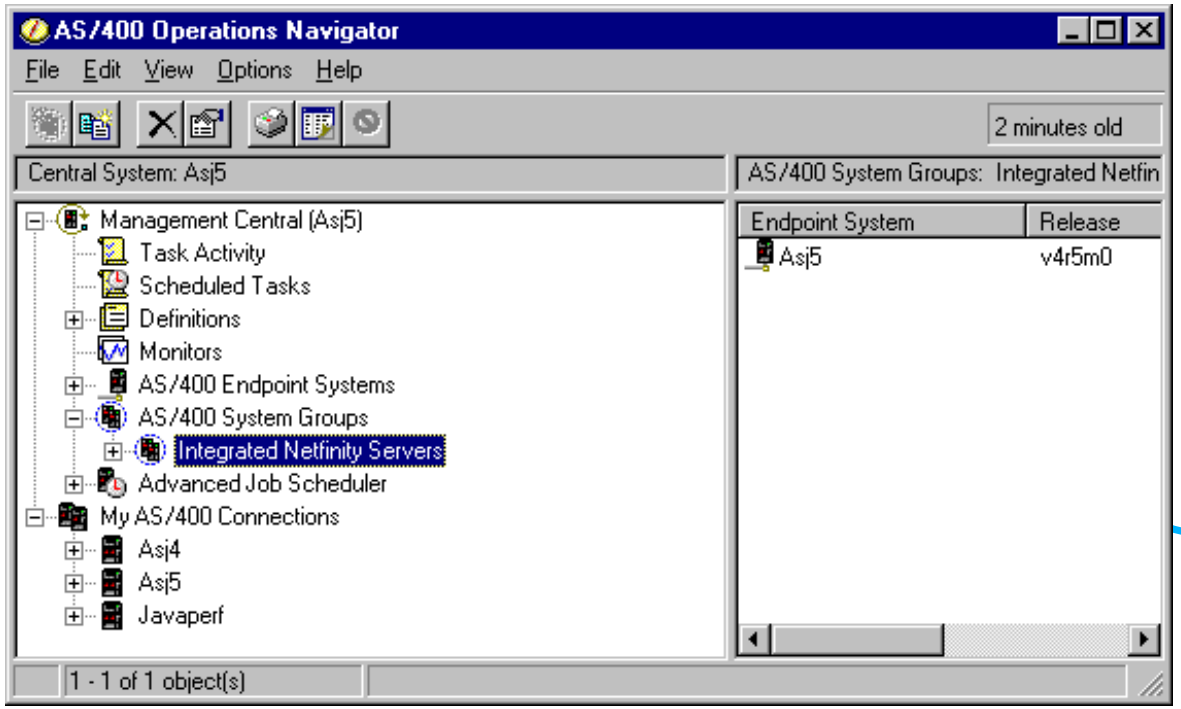
This option allows companies to test a new service pack or upgrade to Windows 2000 Server on the same hardware, without losing the original production server. It is simple to switch back to the original production server.

Therefore this provides the option to test over a weekend and return to the production server during the week. Or to maintain the original production server as a backup during the implementation of the new release.

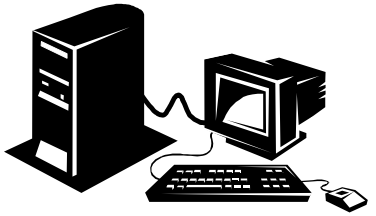
The Integrated xSeries Server also allows a seamless upgrade between 333 MHz, 700, and 850 MHz servers. When upgrading from a AS/400e server 7xx to iSeries server 8xx, the customer first performs an upgrade to V4R5. During the V4R5 upgrade the NT Server objects on the AS/400 (network server description) are automatically switched to use a industry standard hardware abstraction layer (HAL) that supports 333 MHz INS and 700 and 850 MHz Integrated xSeries Servers.

Once at V4R5, the AS/400 is then upgraded to an 8xx model and any 333 MHz Integrated Netfinity Servers are housed in the migration tower or SPD I/O towers, new 700 and 850 MHz Integrated xSeries Servers are housed in the system unit or new I/O towers. Now the NT or Windows 2000 server configuration can simply be switched to boot on the new 700 or 850 MHz Integrated xSeries Server.

Managing Remote Servers



Windows 2000 on Integrated xSeries Server



Management Central operator can:

- Remotely monitor, reboot and add or distribute disk to Window server
- Distribute packages and commands to groups of Windows servers
- Submit Windows server commands from OS/400

Windows 2000 Terminal Server adds

- Remote console takeover capability
- Install and configure NT applications

Notes: Managing Remote Servers

Windows server operations are simplified when using the Integrated xSeries Server, with a central OS/400 operator being able to perform key operations remotely through OS/400 Management Central.

Installation and disk allocation is performed through OS/400. The OS/400 message queue is also used to collect hardware error messages from the Integrated xSeries Server.

For companies with iSeries in a branch office network, new disks can be assigned to a remote Windows server remotely, using OS/400 commands. The Windows server is shutdown during the operation, when a storage space is created on the iSeries and then linked to the Windows server. This is particularly useful when providing operations support for remote installations, where adding hard disk to a server often requires significant downtime.

Disk images can also be saved on the central iSeries and then transmitted as a save file, or sent on a tape to a remote site. This allows a complete disk image to be replaced with new information without a hardware change on the server. This might be used where a company wants to periodically update a catalogue of parts or sales information to its branches.

Many operations are performed directly on the Windows server console that is attached to the Integrated xSeries Server. This preserves the Windows operations interface for most Windows operations, including installing Windows applications.

Windows 2000 Server with Terminal Server support provides additional flexibility in managing local or remote operations of the Windows 2000 Server such as the ability to take active or passive control over the Windows 2000 Server's console screen, keyboard and mouse. This gives the operator the ability, for example, to install a Windows 2000 service pack on the branch office server.

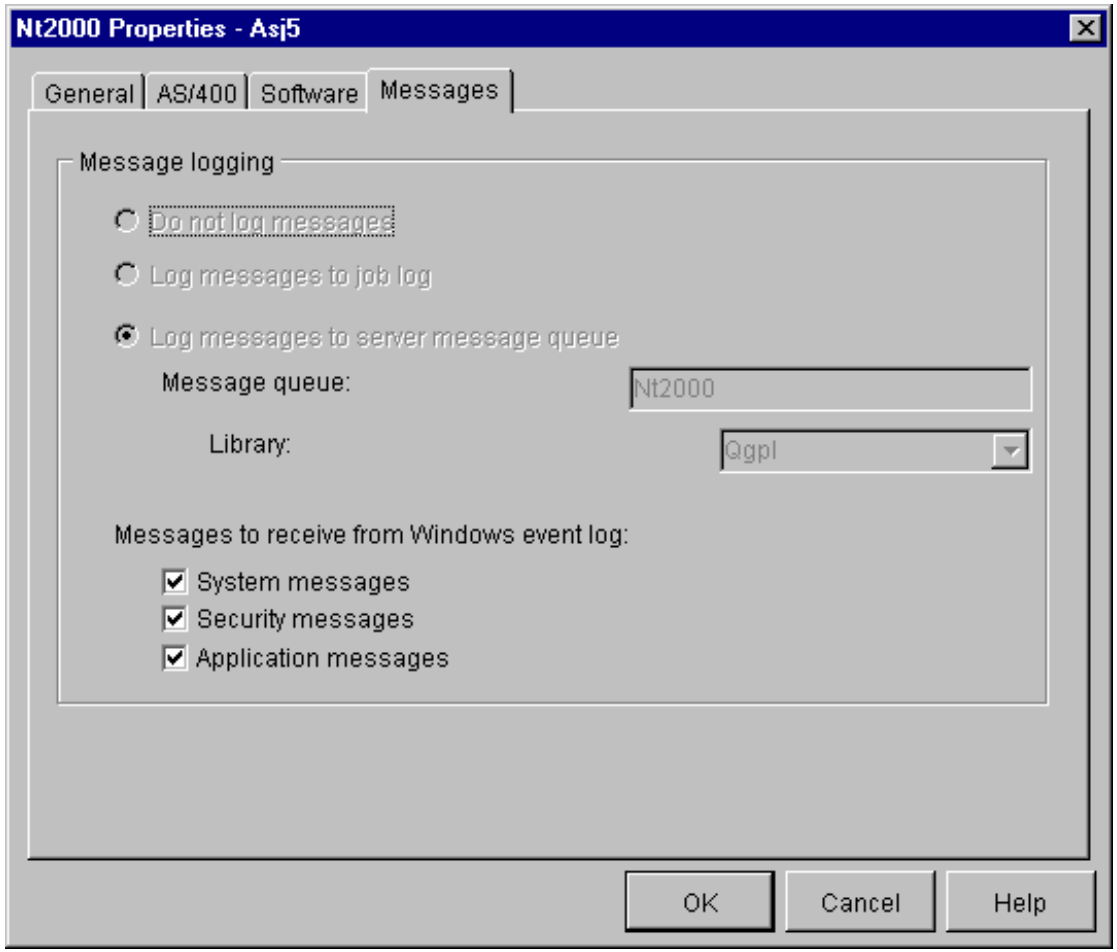
Message Logging

OS/400 operator can monitor Windows operations

Filter and send Windows messages to OS/400 operator

- System, security and application messages

Submit commands to Windows server

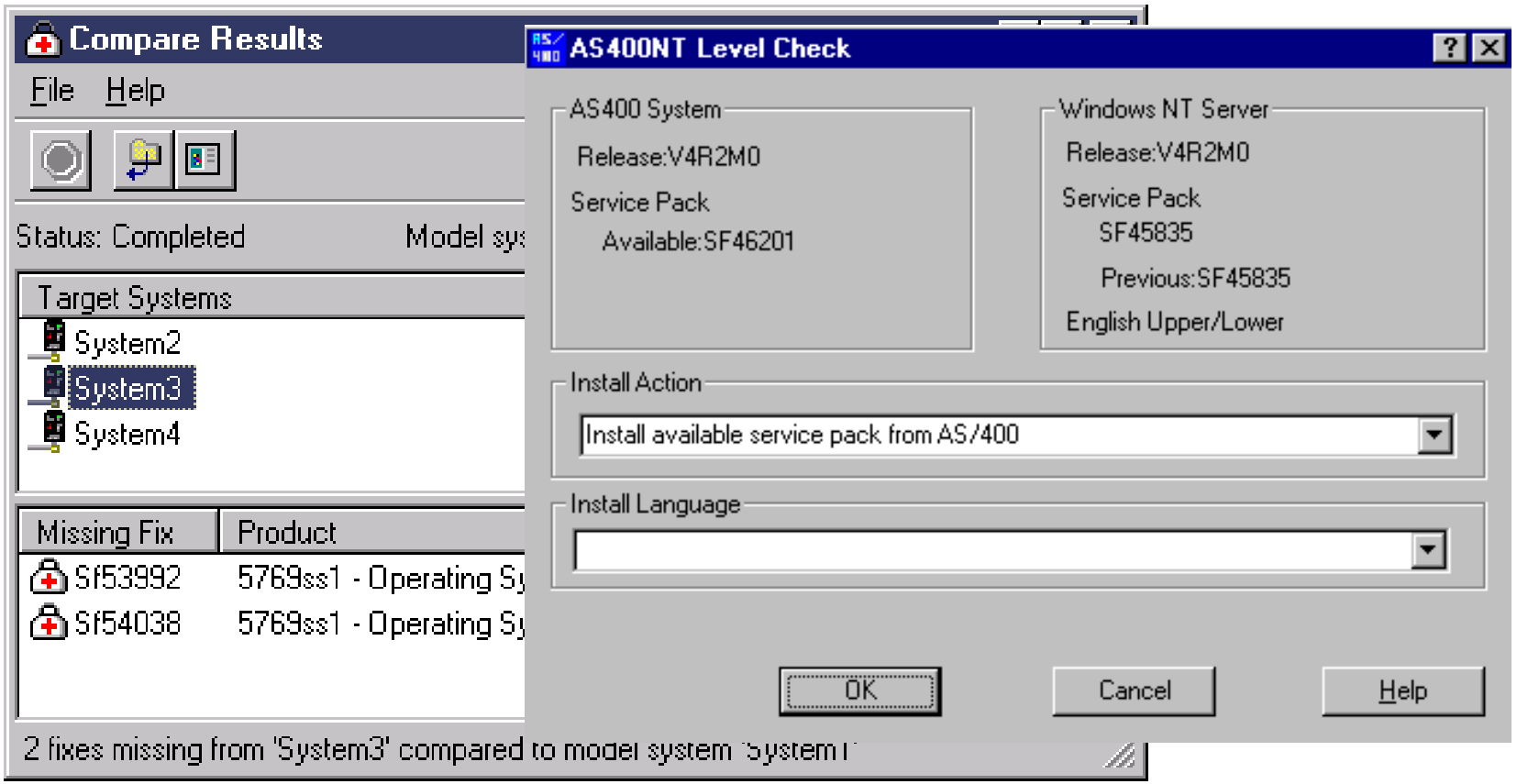


Notes: Message Logging

Windows server system, security and application messages can be filtered and sent from the Windows event log up to a message queue or job log on OS/400. This allows the central OS/400 operator to monitor messages from distributed servers in the network.

The OS/400 operator can use the submit network server command to send an Windows command from OS/400. This can be used to start an Windows application or service.

Managing Device Driver Reliability



Windows server device drivers

- Single supplier, single configuration, integrated testing/support

Fixes to device drivers deployed via OS/400 PTFs

- Simple to manage distribution across entire network

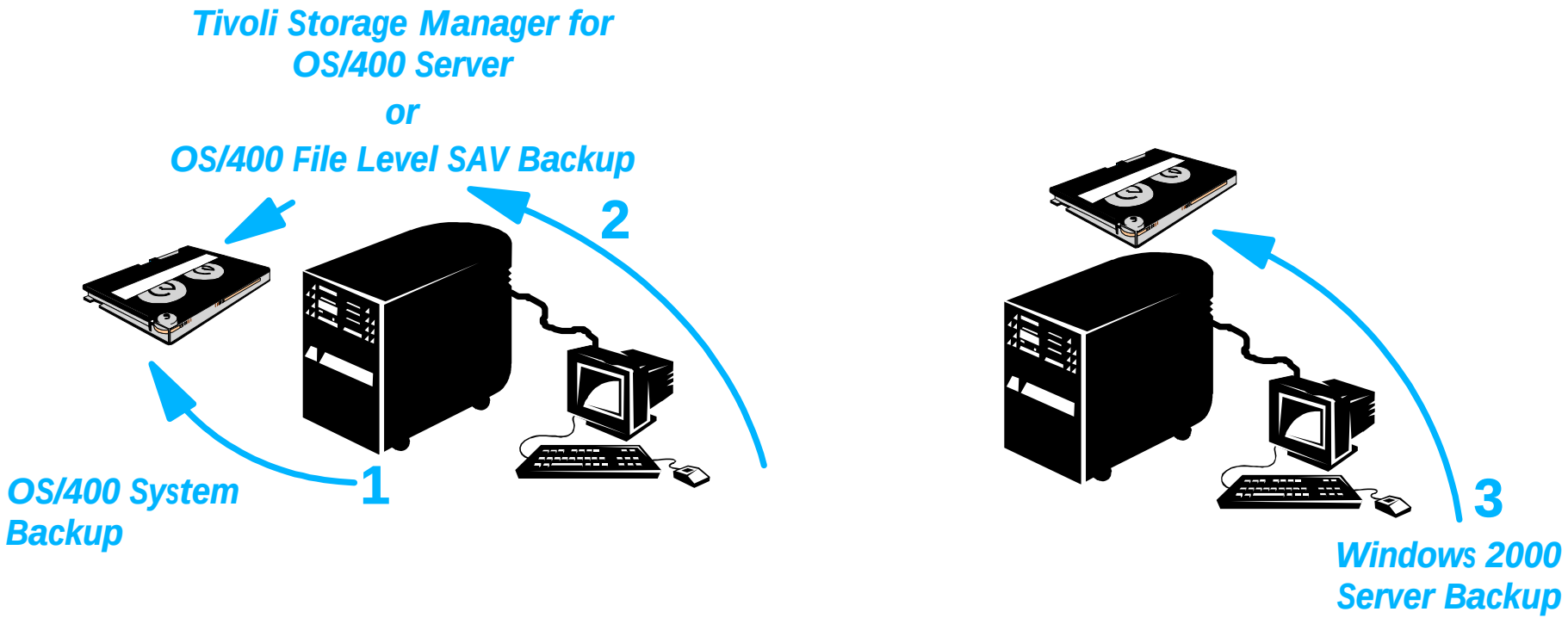
Notes: Managing Device Driver Reliability

Microsoft Windows NT Server 4.0 and Windows 2000 Server are not modified to run on the Integrated xSeries Server. IBM has designed new device drivers, running below Windows, to attach to the iSeries disk, tape and CD-ROM drives.

Common device drivers are used for both the 333 MHz INS and 700 and 850 MHz Integrated xSeries Servers, allowing you to switch back and forth between hardware levels without reinstalling the Windows server. Also, the device drivers can be updated through OS/400 PTFs and downloaded to the Windows server via a level check routine that runs each time the server is started. Thus all servers on your iSeries are kept at a consistent driver level, and at the level that has been tested by IBM with each new Windows service pack.

IBM provides a set of integration programs for Windows as a no-charge licensed program 5769-WSV. This software includes the hardware devices drivers, as well as the software integration programs that are used, for example, to provide integrated user administration.

Business Recovery Protection



Full system backup provides disaster recovery for Windows server

OS/400 managed backup saves daily incremental Windows file changes

Windows backup saves daily Windows files changes direct to iSeries tape

Notes: Business Recovery Protection

There are three approaches to backup of the Integrated xSeries Server:

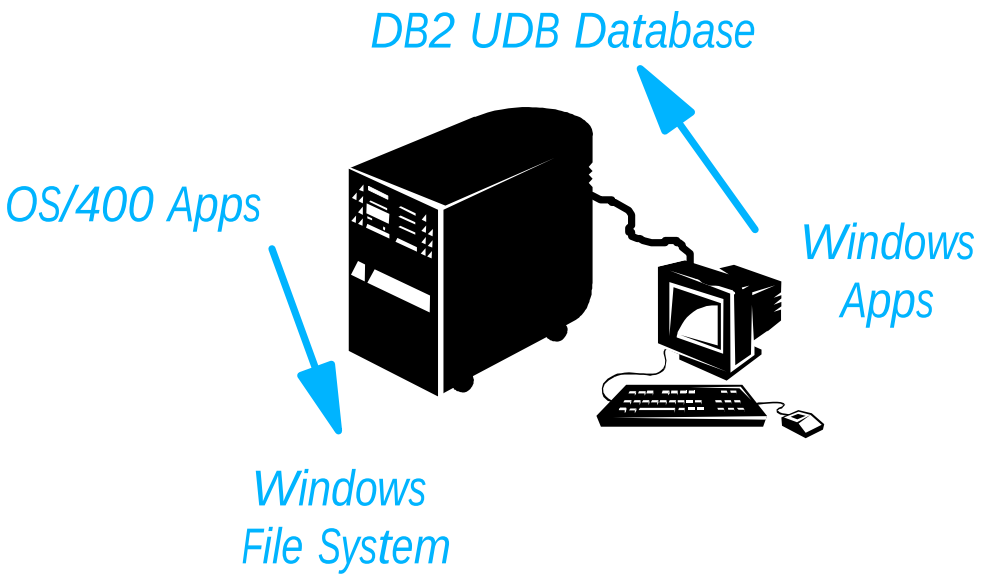
1. **Full server backup for disaster recovery.**
   Backup of the complete Windows disks or storage spaces is excellent for weekly or monthly backups as part of a complete system save; it is also the fastest, but least flexible method of backup. Using this method does not allow you to restore a single file from the storage space. To backup the complete disk images (or storage spaces) of an Integrated xSeries Server to iSeries tape, you first need to vary off the Windows server. The performance of this backup depends on your iSeries model and tape drive speed, but is similar to the performance of any other OS/400 object backup on the system.
2. **Daily file level backup via OS/400 tools.**
   With OS/400 V4R5 Integrated File System backup SAV command can be used for incremental backup of individual files and directories from Windows server running on the Integrated xSeries Server.

   IBM Tivoli Storage Manager (previously ADSM) is an enterprise-wide solution integrating unattended network backup and archive with storage management and powerful disaster recovery planning functions. Tivoli Storage Manager, OS/400 server provides backup and archive services to multiple client platforms including Windows NT and 2000 Server on the Integrated xSeries Server as well as a variety of leading database and groupware products. This broad range of support makes Tivoli Storage Manager a comprehensive storage management solution for heterogeneous networks.
3. **Daily file level backup via Windows server tools.**
   You can use the same Windows backup utilities as you use today on PC-based servers, but target an iSeries tape drive. This OS/400 tape support provides good performance that varies depending on system and tape drive models. The supported backup tools include Windows server's integrated backup applet and also Seagate's Backup Exec and Computer Associates (Cheyenne) ARCserve for Windows NT. While using the Windows tape support, the iSeries tape drive must be varied off, and thus is not available for other tape operations from OS/400 commands. Once varied off, the tape is locked from the Windows Server before using the Windows backup utility. Backups from OS/400 save operations cannot be mixed on tapes that contain backups from Windows utilities. All the common tape drives sold today on the iSeries RISC models including 3570 can be used with these backup tools. The 3480, 3490, 3490e and reel-to-reel drives, however, are not supported.

Application Integration

Combine OS/400 and Windows 2000 in a single platform for integrating applications and databases

- Siebel, Logility, BAAN FOS
- IBM Client Access ODBC driver
- IBM MQSeries
- Microsoft Exchange
- ....



Secure, internal LAN connection between iSeries and Windows

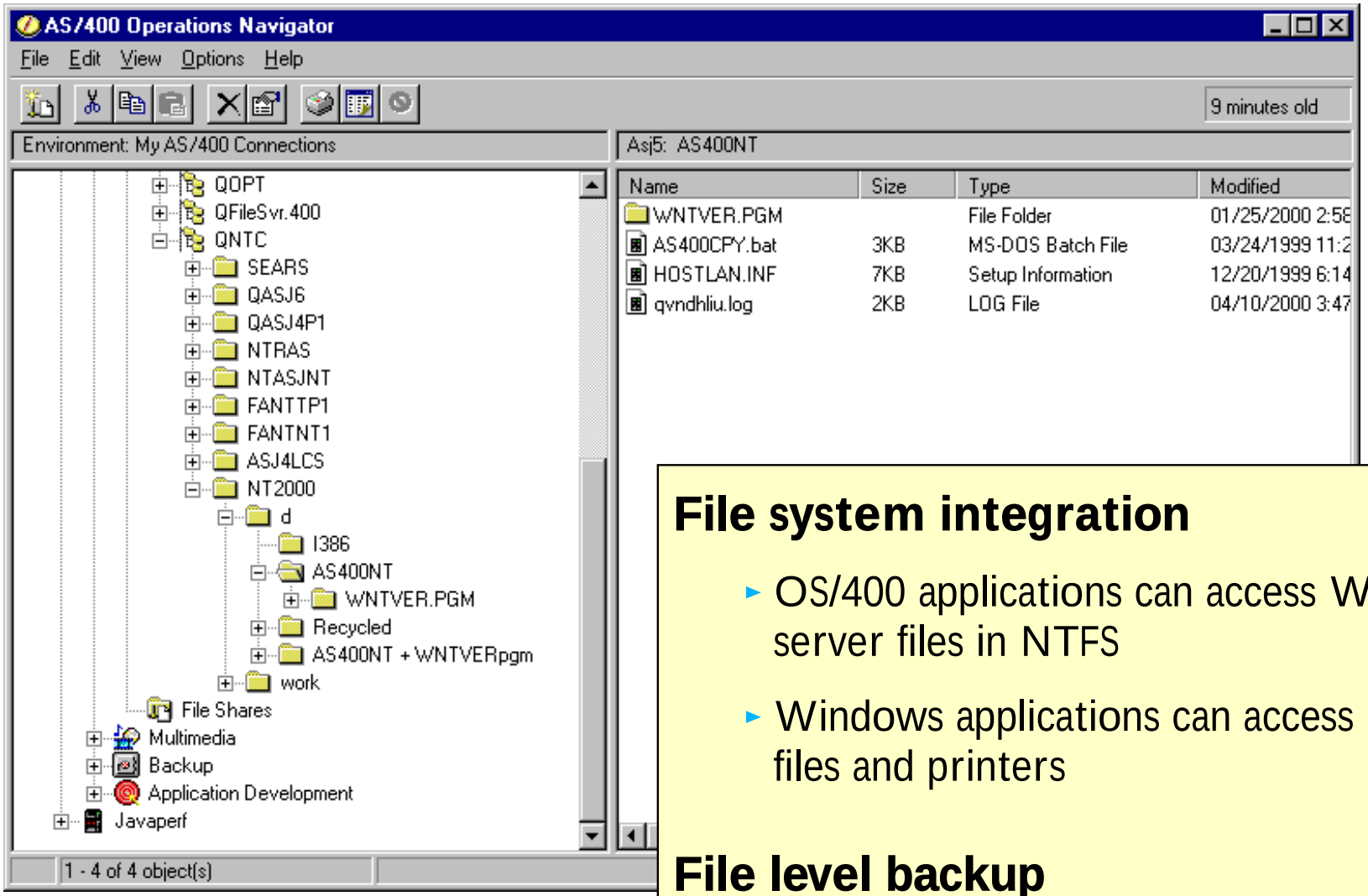
Notes: Application Integration

Many companies who have a mixed iSeries and Windows Server environment want to exchange data between the two systems, or to have an Windows program access the iSeries database directly. The Integrated xSeries Server provides facilities for this database integration between the two systems.

The database integration, and other integration applications, are ideal in this environment because of the internal TCP/IP connection between the iSeries and Windows server. An internal LAN connection between the two systems, provides a link between OS/400 and Windows that is not vulnerable to LAN hub failures.

There are many facilities that provide links between Windows and DB2 UDB, ODBC ad OLE-DB being the most common for general use. The Client Access ODBC driver and OLE-DB provider have been modified to allow it to run as an Windows service, a background application that can serve as a conduit for many Windows applications that need to access the OS/400 database securely. Aside from APIs and application services there are many utilities for data exchange between OS/400 and Windows. One example is IBM's DataPropagator which can be used to interchange data between databases on the two systems.

Integrated File System



File system integration

- OS/400 applications can access Windows server files in NTFS
- Windows applications can access OS/400 files and printers

File level backup

Notes: Integrated File System

The OS/400 Integrated File System provides facilities to exchange files and write OS/400 programs to directly access a variety of PC and UNIX style files systems, including NFS and NTFS file systems.

The QNT Client file system provides OS/400 users and applications seamless access to Windows files stored on the Integrated xSeries Server and other Windows servers connected to the iSeries via TCP/IP. This file system is used primarily by OS/400 programs and utilities and Client Access/400 users through their network drives support.

OS/400 applications can be written using the Integrated File System APIs to access PC files (ASCII stream file data) on a Windows server. An OS/400 file can be copied to/from a file on the Windows server with the OS/400 commands copy to/from ASCII stream file. Also, Client Access users connected to the iSeries (even via a twinaxial cable) can access files on the Windows server through the QNT file system.

The iSeries also supports an Windows style file/print server natively on the iSeries. This SMB Server is called OS/400 NetServer, and is designed to share files and printers into a Windows Network Neighborhood. This file/print server system is designed for Windows 3.11, 95, NT or 2000 clients running TCP/IP that want to access OS/400 files/printers directly, without using an Integrated xSeries Server, and without using Client Access. Using the iSeries NetServer support, users can click on their desktop Network Neighborhood icon, and access files and printers on the iSeries that have been set for shared access. This facility is excellent where you require file serving for a small workgroup, but don't want to use a Windows server.

More Information

www.ibm.com/eserver/iseries/windowsintegration/

- Performance benchmarks for file serving and backup
- Direct attach xSeries server Product Preview information

Microsoft Hardware Compatibility List (HCL)

- www.microsoft.com/hwtest/hcl (Cat:MISC Co:IBM)

Citrix MetaFrame

- www.citrix.com

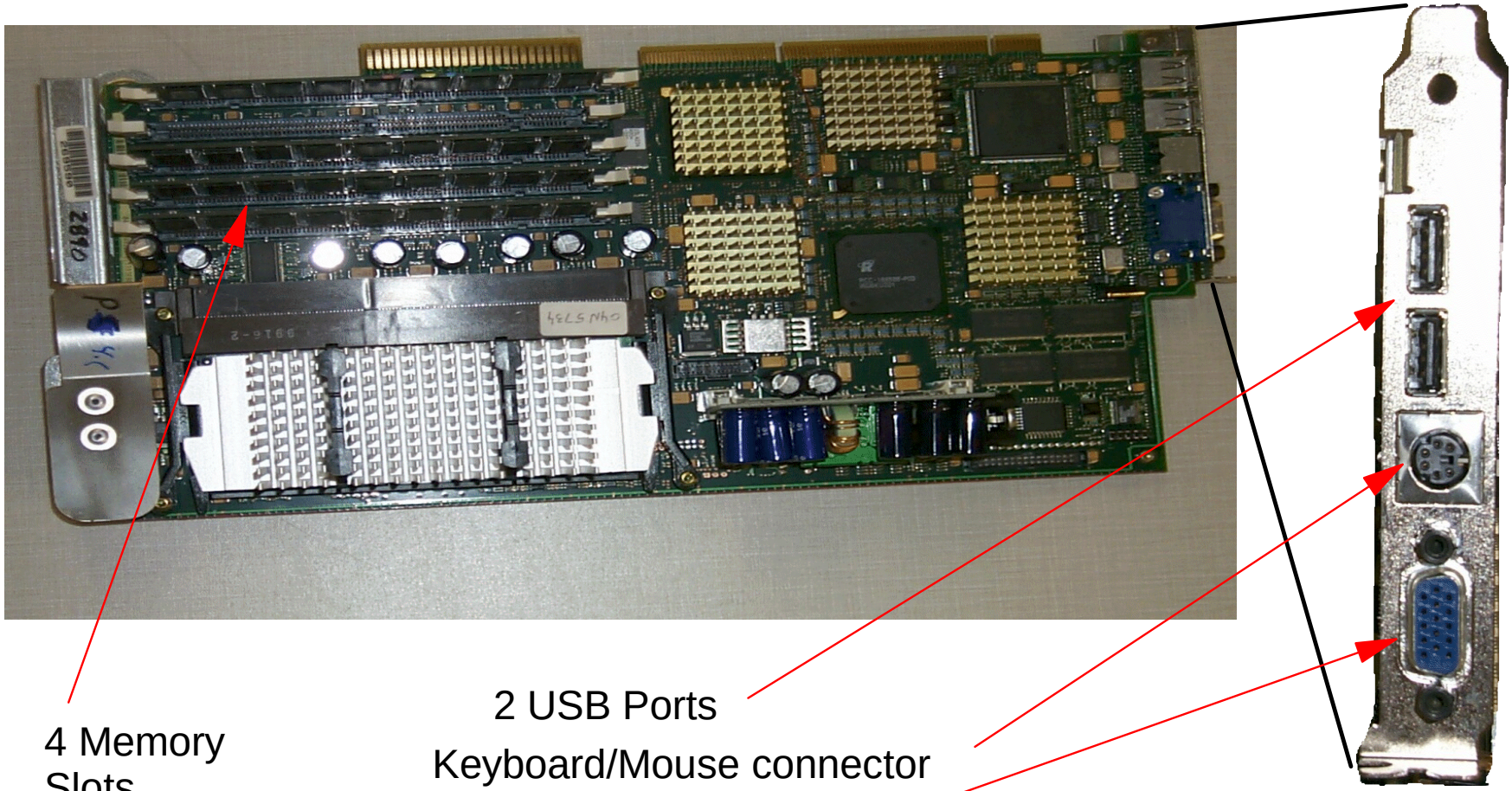
Redbooks

- Implementing Windows NT on the Integrated Netfinity Server SG24-2164-01
- Consolidating Windows 2000 Server in iSeries - SG24-6056

Integration Benefit Comparison

	IXS	Direct Attach with IXA
Support multiple operating systems	Yes	Yes
Storage Area Network	Yes	Yes
User / Password Propagation	Yes	Yes
Windows Messages Sent to OS/400	Yes	Yes
Share Tape, CD-ROM, DVD	Yes	Yes
Manage Remote Servers	Yes	Yes
Hot spare	Yes	Yes
IASP Support	Yes	Yes
Auto update iSeries device drivers	Yes	Yes
Consistent PC Server Configuration	Yes	Yes for IXA
iSeries Warranty / Maintenance	Yes	Yes for IXA
Single footprint	Yes	No

New 700 Mhz integrated xSeries server



Notes: New 700 Mhz ixs

The new integrated xSeries server is supported on iSeries 400 models 270 and 8xx only. It is ordered as feature code 2790 on the 8xx models and 2890 on the 270 model. These new servers do not support an external host LAN for OS/400.

The 2890/2790 support the following:

- 700 MHz Intel Pentium III Microprocessor
- Up to 4 GB memory in 4 memory slots
  - #2795 - 128 MB Memory for 2790, #2895 for 2890
  - #2796 - 256 MB Memory for 2790, #2896 for 2890
  - #2797 - 1GB Memory for 2790, #2897 for 2890
- 1-3 PCI LAN adapters
- 10/100 Mbps Ethernet (#2838)
- 4/16/100 Mbps Token Ring (#2744)
- 2 Industry standard Universal Serial Bus (USB) ports
- Keyboard and mouse via the Y cable that is shipped with the INS

Depending upon where in the iSeries 400 backplane the integrated xSeries server is located, it may not be possible to install more than two LAN adapters.

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AS/400e	DB2	Domino
IBM	OfficeVision	OS/400
Integrated Language Environment	Net.Commerce	Net.Data
PowerPC	PowerPC AS	SanFrancisco
Host on Demand	Screen Publisher	Host Publisher
PCOM	WebSphere Commerce Suite	Payment Manager
WebSphere	WebSphere Standard Edition	WebSphere Advanced Edition
MQSeries	MQSeries Integrator	Host Integration Series
WebSphere Development Tools for AS/400	VisualAge for Java	VisualAge for RPG
CODE/400	DB2 UDB for AS/400	HTTP Server for AS/400
iSeries		

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