IBM @server xSeries 346 Servers – Fast, improved 2.8 GHz, 3.0 GHz, 3.2 GHz, 3.4 GHz, and 3.6 GHz/800 MHz, 1 MB L2 Cache Intel Xeon processors for greater scalability and performance

Overview

The xSeries® 346 server brings the following to rack-optimized server applications:

- Powerful, two-way, SMP-capable Intel® Xeon processing
- 64-bit memory addressing — Up to 16 GB memory (when 2 GB DIMMs become available)
- PCI-X architecture and upgradability to PCI-Express
- Ultra320 SCSI technology
- High-availability and manageability features
- Support for Integrated xSeries Adapter for iSeries (1519-200)

Optimized for Intel’s EM64T, the x346 enables customers whose applications could benefit from greater memory addressability to migrate to 64-bit computing.

This server is available with a 2.8 GHz, 3.0 GHz, 3.2 GHz, 3.4 GHz, or a 3.6 GHz/800 MHz / 1 MB L2 Cache Xeon processor with hyperthreading and simultaneous multithreaded (SMT) technologies for more efficient program execution.

With a compact 2U footprint, the rack-optimized xSeries 346 server helps save valuable rack space and resources. Yet, it is packed with highly integrated, advanced server features designed for compute-intensive, Web-based, or enterprise network applications where space is a primary consideration.

Powered and scaled for e-business growth

The xSeries 346 server applies powerful processors, large amounts of memory, and high-bandwidth PCI/PCI-X buses to Web-farm applications.

800 MHz front-side bus (FSB) processors with 1 MB L2 Cache (dual-pumped 400 MHz) enabling up to 6.4 GB/s data transfer rates
- Two 256 or 512 MB high-speed double data rate (DDR II) 400 ECC SDRAM DIMMs, two-way interleaved, 400 MHz DDR memory interface
- High-speed, wide-bandwidth, PCI/PCI-X bus slots:
  - Support for PCI-Express (PCI-E x4) via option riser card
  - Two 64-bit/133 MHz PCI-X full-length card slots
  - Two 64-bit/100 MHz PCI-X low-profile full-length card slots
- High-performance integrated controllers:
  - Dual Broadcom 5721 chips for Ethernet connections
  - Dual-channel Ultra320 SCSI up to 320 MB/s

High availability for around-the-clock e-business

High-availability, manageability, and serviceability features help you diagnose problems quickly, even from remote locations.

Other options include:
- ServeRAID™ 7k Adapter Option
- IBM SCSI Hot-Swap U320 HDD Options
- IBM xSeries Hot-Swap Power Supply Options

Key prerequisites

- Monitor, keyboard, and mouse
- SCSI HDD
- Rack

Planned availability date:
September 27, 2004

At a glance

New design points and technologies to handle your networked e-business applications

- Powerful 2.8 GHz, 3.0 GHz, 3.2 GHz, 3.4 GHz, or 3.6 GHz Intel Xeon processors with 800 MHz front side bus (FSB) and 1 MB L2 cache
- 512 MB or 1 GB of 400 MHz DDR2 ECC system memory, model dependent
- Integrated dual-channel Ultra320 controller with integrated mirroring
- 625-watt voltage sensing hot-plug power supply
- Up to twelve hot-swap fans; supporting redundant cooling
- Integrated systems-management processor
- Four available PCI/PCI-X slots, up to 133 MHz clock speed
- Eight drive bays: diskette, 8x-24x slim-line DVD-ROM, six hot-swap HDDs
- Up to 880 GB hot-swap Ultra320 SCSI HDD storage
- Integrated dual-channel gigabit Ethernet using Broadcom 5721 chips
- ATI RADEON 7000 M video controller with 16 MB video memory
- One serial port, three USB ports, two Ethernet (RJ-45), two systems management, one external SCSI, mouse, and keyboard ports
- Support for Integrated xSeries Adapter for iSeries (1519-200)
**Description**

**xSeries 346 description**

Intel Xeon processor options

- IBM xSeries 2.8 GHz/800 MHz — 1 MB L2 Cache Xeon Processor (13N0681)
- IBM xSeries 3.0 GHz/800 MHz — 1 MB L2 Cache Xeon Processor (13N0688)
- IBM xSeries 3.2 GHz/800 MHz — 1 MB L2 Cache Xeon Processor (13N0683)
- IBM xSeries 3.4 GHz/800 MHz — 1 MB L2 Cache Xeon Processor (13N0684)
- IBM xSeries 3.6 GHz/800 MHz — 1 MB L2 Cache Xeon Processor (13N0685)

These processors are ideal for data-intensive applications that range from data mining to evolving Web services. Innovative technologies deliver a processing speed of up to 3.6 GHz for performance headroom for unpredictable server workloads and escalating computing needs.

The Intel Xeon processor with 1 MB L2 cache features Intel NetBurst microarchitecture and increases overall throughput via a faster 800 MHz system bus and enhanced level 2 cache. It is designed to enhance the new x346 system.

**IBM ServeRAID 7k Adapter Option — 71P8642**

This device comes with 256 MB DIMM and battery backed cache. The device attaches directly to IBM planar which can provide full RAID capability. The ServeRAID 7k features:

- 256 MB DDR1 333 MHz
- Supports Dobson and Lindsay hardware
- Supports 7901 and 7902 SCSI controllers
- Enables 33 hours of battery life for 3 years at 50°C

RAID features:

- RAID-0, 1, 10, 5, 50 and 5EE
- Copyback
- FlashCopy®
- Stripe-unit size: 8K, 16K, 32K and 64K
- One-year limited warranty on parts

**IBM SCSI Hot-Swap U320 HDD Options**

- IBM 36 GB Hot-Swap U320 10K SCSI Drive (90P1304)
- IBM 73 GB Hot-Swap U320 10K SCSI Drive (90P1305)
- IBM 146 GB Hot-Swap U320 10K SCSI Drive (90P1306)
- IBM 36 GB Hot-Swap U320 15K SCSI Drive (90P1318)
- IBM 73 GB Hot-Swap U320 15K SCSI Drive (90P1319)
- One year limited warranty on parts

**IBM xSeries Hot-Swap Power Supply Options**

- IBM xSeries 625W Hot-Swap Power Supply (North America) (26K5097)
- IBM xSeries 625W Hot-Swap Power Supply (worldwide) (26K5098)

**High-performance server subsystems**

The x346 server expands the xSeries server line by adding a high level of processor power. This high-throughput, two-way, SMP-capable network server offers excellent performance and scalability when you add memory and a second processor. It incorporates powerful Xeon processors with 1 MB L2 cache. The advanced transfer L2 cache is integrated onto the processor core and runs at the same clock speed. The advanced transfer cache is as a result of a “backsie bus” 256 bits wide. It features a quad-wide cache line that can transfer four 64-bit cache line segments at one time to deliver full-speed capability. The cache is eight-way set associative.

Two Intel Xeon processor connectors are standard on the system board to support installation of a second processor. High-speed 400 MHz SDRAM is optimized for 400 MHz processor-to-memory subsystem performance. The x346 server uses the Intel Lindenhurst chipset with Chipkill™ technology to maximize throughput from processors to memory, and to the 32- and 64-bit PCI buses.

**Standard x346 configurations**

<table>
<thead>
<tr>
<th>Model</th>
<th>Processor</th>
<th>Cache</th>
<th>Memory</th>
<th>SCSI Interface</th>
<th>Mechanical</th>
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<td>512 MB ECC</td>
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<td>1 GB ECC</td>
<td>Dual Ultra320</td>
<td>Rack</td>
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</tbody>
</table>

The x346 models 22Y, 32Y, and 42Y are prepackaged models that contain an RSA-II daughter card and redundant power modules. They are open file systems and are easily ordered configurations to offer with the new Integrated xSeries Adapter for iSeries (1519-200).

**Additional features**

- Two-way SMP processing achieved with a second processor of equal speed and processor type
- System board containing eight DIMM connectors supporting 256 MB, 512 MB, 1 GB and 2 GB 400 MHz DDR2 PC3200 SDRAM ECC RDIMMs:
  - Two-way interleaved memory for improved performance (memory must be installed in matched pairs)
  - Up to 16 GB of system memory (using 2 GB DIMMs when available)
- Memory mirroring and hot spare memory configurable using BIOS setup
- High-speed, wide-bandwidth PCI/PCI-X bus slots:
  - Two 64-bit/133 MHz PCI-X full-length card slots
  - Two 64-bit/100 MHz PCI-X low profile full-length card slots
The x346 servers offer solid system throughput from processor, memory, to bus, to disk-intensive I/O. These features, combined with SMP capability, make the x346 server an excellent choice for stand-alone or clustered general-business application, file, and print server.

**High-availability and serviceability features**

- Twelve hot-swap fans
- Hot-swap HDD bays with SCA-2 connectors supports SAF-TE functions
- Adaptec AIC-7902 dual-channel Ultra320 SCSI controller supports internal Ultra320 devices
- DDR2 ECC DIMMs, combined with an integrated ECC memory controller, corrects many soft and hard single bit memory errors, and minimizes disruption of service to LAN clients
- Chipkill basically distributes information covered by Error Correction Coding across separate memory chips so if any of the chips fail, the data can still be reconstructed from the remaining chips and the system can continue running.
- ECC L2 cache processors improves data integrity and helps reduce downtime
- Predictive Failure Analysis® (PFA) on HDD options7, memory, VRMs, processors, and fans (when Remote Supervisor Adapter installed), helps alert the system administrator of imminent component failure
- Support for optional Remote Supervisor Adapter II SlimLine, enables remote systems management through a Web-based browser
- Support for an optional ServeRAID 7k adapter that works directly with on-board Adaptec AIC-7902 SCSI chipset for both Ultra160 and Ultra320 HDDs
- Worldwide voltage-sensing, 625-watt, hot-plug power supply featuring auto restart
- Optional xSeries 625 W Hot-Swap Power Supply Upgrade for high-availability requirements
- Integrated systems management processor that supports:
  - Automatic server restart (ASR)
  - Fan monitoring and control
  - Power supply monitoring
  - Temperature monitoring
  - Voltage monitoring
  - Power on/off, reset sequencing
  - LED controls (on-board diagnostics support with Lightpath LED)
  - Remote power control
  - Local firmware update
  - Error logging
- Information LED panel for visual indications of system well-being
- On-board diagnostics with an LED map to a failing component helps reduce downtime and service costs
- Support for virtual floppy enables user to easily direct a remote host to boot and use standard instructions stored anywhere on the network
- Support for optional ServeRAID 7k for RAID 5 support
- One ServeRAID connector
- System board optional upgrades (PCI slot not required)
  - Remote Supervisor Adapter II SlimLine (RSA II SlimLine)
  - ServeRAID 7k for RAID 5 support
- Rack drawer models designed for 19-inch-wide by 28-inch-deep industry-standard rack enclosures such as the NetBAY42 SR
- Four PCI/PCI-X adapter card slots available, 2 x PCI-X slots may be used for a riser card option to support 2 x PCI-Express slots
- Six slim-high, hot-swap HDD bays
- System board optional upgrades (PCI slot not required)
- System LED control (power, HDD, activity, alerts, Power on/off, reset sequencing, LED controls, Fan tachometer monitor, Fan speed control, Monitor system voltages, Monitor battery voltage, Monitor system temperatures, Fan speed control, Fan tachometer monitor, Good Power signal monitor, System ID and planar version detection, System power control, System reset control, NM1 detection (System Interrupts), SMI detection and generation (System Interrupts), Serial port text console redirection, System LED control (power, HDD, activity, alerts, heartbeat), Supports IPMI v1.5 compliant management software (for example, xCAT)

**Expandability and growth**

The x346 server packs a lot of function and storage capacity into an 2U 19-inch rack-drawer package, yet it is amazingly easy to upgrade and service. Functions such as SVGA video, dual-channel Ultra320 SCSI, and full-duplex 10/100/1000 Mbps Ethernet are integrated on the system board. Features include:

- Rack drawer models designed for 19-inch-wide by 28-inch-deep industry-standard rack enclosures such as the NetBAY42 SR
- Four PCI/PCI-X adapter card slots available, 2 x PCI-X slots may be used for a riser card option to support 2 x PCI-Express slots
- Six slim-high, hot-swap HDD bays
- System board optional upgrades (PCI slot not required)
  - Remote Supervisor Adapter II SlimLine (RSA II SlimLine)
  - ServeRAID 7k for RAID 5 support
- One ServeRAID connector
- Support for up to 880 GB of internal data storage, (using six 146 GB Ultra320 hot-swap HDDs) Internal tape option may be used in place of HDDs
- 8x-24x IDE DVD-ROM3 and 1.44 MB diskette drive
- ATI Radeon 7000 M controller with 16 MB of embedded DDR1 video memory

**Systems management**

Integrated BMC: The xSeries 346 includes an integrated baseboard management controller, that provides industry standard Intelligent Platform Management Interface (IPMI) 1.5 compliant systems management system. The BMC comes standard, and shares one of the two onboard Ethernet ports for access. The BMC can be accessed via software that is compatible with IPMI 1.5 (xCAT, etc) The BMC is implemented using industry leading OSA firmware/applications in conjunction with the integrated baseboard management controller.

**Features and benefits**

- Monitoring of system voltages
- Monitor battery voltage
- Monitor system temperatures
- Fan speed control
- Fan tachometer monitor
- Good Power signal monitor
- System ID and planar version detection
- System power control
- System reset control
- NM1 detection (System Interrupts)
- SMI detection and generation (System Interrupts)
- Serial port text console redirection
- System LED control (power, HDD, activity, alerts, heartbeat)
- Supports IPMI v1.5 compliant management software (for example, xCAT)
In addition the customer can purchase an optional Remote Supervisor Adapter II SlimLine to provide additional systems management functionality.

Optional Remote Supervisor Adapter II SlimLine: The optional RSA II SlimLine adds accelerated graphics and delivers advanced control and monitoring features to manage your IBM eServer® xSeries server (select models) at virtually any time, from virtually any place. This daughter card can be added to the server through a connector that connects to the planar, or through a riser for select models. This adapter enables easy console redirection with text and graphics, keyboard and mouse (Operating system must support USB) support over the system management LAN connections.

With video compression now built into the adapter hardware, it is designed to allow the greater screen sizes and refresh rates that are becoming standard in the marketplace. This feature allows the user to display server activities from power-on to full operation, remotely with remote user interaction at virtually any time.

The embedded Web server provides remote control from any standard Web browser. No additional software is required on the remote administrator’s workstation. For those users who are accustomed to a command line interface, the administrator can also use the provided CLI from a Telnet session to perform some of the functions that they can perform from the Web server. The Remote Supervisor Adapter II SlimLine provides remote management and control of the system independent of the server status, in many cases even if the server is powered off or otherwise disabled.

- **Features and benefits**
  - Continuously monitors system environmental (temperatures and voltages), operating system status, critical system components such as processors, VRMs, memory, fans, power supplies and power backplanes (where supported by the system).
  - Video compression hardware is built in, eliminating drivers.
  - Faster graphics support makes monitoring and control more efficient.
  - Virtual CD and floppy designed to provide the user with the ability to configure and diagnose a server remotely without a visit from your IT staff.
  - RSA II SlimLine supports SSL (Secure Socket Layer) and LDAP (Lightweight Directory Access Protocol).
  - Integrated with IBM Director and Director Agent.
  - Built in LAN and serial connectivity supports virtually any network infrastructure.
  - Multiple alerting functions warn systems administrators of potential problems, over e-mail, pager support, LAN, and/or SNMP.
  - Installs on the system planar using a dedicated connector, and eliminates the need to take a PCI-X slot.

The RSA II SlimLine features are similar to the RSA II except for the following features:

- **Reset button not accessible from back of system.**
- **Mini USB cable no longer required, uses internal USB bus.** System will have designated Systems Management Ethernet port, activated only when RSA II SlimLine is installed.

- **External AC adapter not required, uses standby power from system power supplies.**
- **Status LEDs not external viewable.**
- **The RSA II SlimLine no-longer supports the prior RSA II interconnect function.**

**IBM Director:** x346 servers feature IBM Director, a powerful, highly integrated systems management software solution built on industry standards and designed for ease of use. You can exploit your existing enterprise or workgroup management environments and use rich security features to access and manage physically dispersed IT assets more efficiently over the Internet.

It can help reduce costs through:

- Reduced downtime
- Increased productivity of IT personnel and end users
- Potentially reduces service and support costs

IBM Director integrates leading workgroup and enterprise systems management environments via upward integration modules. This integration enables the advanced management capabilities built into xSeries servers to be accessed from:

- Tivoli® Enterprise and Tivoli NetView®
- Computer Associates Unicenter TNG Framework
- NetIQ — BMC Patrol
- Microsoft™ SMS
- Intel LANDesk™ Management Suite

IT administrators can view the hardware configuration of remote systems in detail and monitor the usage and performance of critical components such as processors, HDDs, and memory.

IBM Director includes self-management features and a portfolio of proactive predictive tools that enable advanced xSeries server management resulting in higher server availability and reliability.

Its industry-standard foundation enables heterogeneous hardware support. It works with the integrated systems-management processor to access environmental system information.

The integrated systems management processor monitors and controls operating status for critical errors:

- ASR monitors the operating system status and automatically restarts the server if the operating system fails to respond. An alert is generated if the system has been restarted through ASR.
- Fan monitoring and control manages fan speed and automatically increases to maintain system cooling if temperature thresholds are exceeded. An alert is generated if a fan:
  - Fails, or failure is predicted (with Remote Supervisor II Adapter card installed)
  - Is installed or removed
- Power supply monitoring monitors.
- Temperature monitoring provides CPU and HDD backplane temperatures. An alert is generated if (preset) temperature warning thresholds are exceeded or restored and if critical temperature thresholds are exceeded. Soft and hard system shutdowns are automatically initiated if critical temperature thresholds are exceeded.
Monitor thresholds on server health, including:
- Voltage monitoring provides CPU and power subsystem voltage thresholds. An alert is generated if abnormal voltages are detected.
- Power on/off, reset sequencing are supported through system monitoring.
- Text console redirect features keyboard and mouse control.
- LED controls (Light Path support); on-board diagnostics with LED map which is illuminated in case of key component errors or failures to enable quick local diagnostics and servicing.
- Flash update enables updates to the integrated systems management processor firmware.

The integrated systems management processor supports upgrading to Remote Supervisor Adapter II SlimLine for full out-of-band and in-band remote management.

**Integrated xSeries Adapter for iSeries**

A new Integrated xSeries Adapter (1519-200) attaches an x346 to connect to an IBM eServer i5 or iSeries server and enables customers to leverage the iSeries family of servers to provide virtual storage, virtual Ethernet, and tape sharing to an attached xSeries. It also integrates security, backup, and operations of a Windows and OS/400 environment. The x346 is ideal for packaging in a rack with the new rack-mounted IBM eServer i5.

**Remote Supervisor Adapter II Slim**

Remote Supervisor Adapter II slim features:
- Easy-to-use, Web-based management from standard Web browsers
- Multimode alerts include e-mail with log, paper, SNMP, and LAN
- Graphical console redirection; keyboard and mouse control
- Remote management in many cases independent of the server status
- Support for virtual floppy enables user to easily direct a remote host to boot and use standard instructions stored anywhere on the network
- Full remote control of hardware and graceful shutdown of operating system
- Remote update of the xSeries server and Remote Supervisor Adapter II slimline firmware

The IT administrator achieves comprehensive, virtual on-site control of xSeries servers through the ability to remotely:
- Access the server in many cases often regardless of the status
- Inventory and display detailed system and component information
- View server bootup during POST
- Browse and delete logs of events and errors
- Reset or power cycle the server
- Run diagnostics, SCSI, and RAID setup during POST
- Monitor thresholds on server health, including:
  - Operating system load
  - POST time-out
- Voltage
- Temperature
- Set proactive alerts for critical server events including PFA on:
  - Processors
  - VRMs
  - Memory
  - Fans (when Remote Supervisor Adapter II slimline is installed)
  - Power supplies
  - HDDs (when ServeRAID 7k is installed)
- Define automated actions such as:
  - Send e-mail or page to an administrator
  - Execute a command or program
  - Pop-up an error message to the Director console
- Manage flash BIOS
- Monitor and graph the utilization of server resources such as:
  - Memory
  - Processor
  - HDDs
- Identify potential performance bottlenecks and react to prevent downtime
- Monitor, manage, and configure RAID subsystems without taking them off line

**Advanced Configuration and Power Interface (ACPI)**

Advanced Configuration and Power Interface (ACPI) is an open industry specification that defines a flexible and extensible hardware interface for the system board. Software designers use this specification to integrate power management features throughout a computer system, including hardware, the operating system, and application software. This integration enables Windows™ to determine which applications are active and handle all of the power management resources for computer subsystems and peripherals.

**World-class support tools and programs**

The x346 server tools and programs can make ownership a positive experience. From the start, IBM programs help you purchase servers, get them running, and keep them running over the long haul. IBM can help your company maintain ownership of technology leadership network servers.
- IBM on-site, three-year limited warranty with next-business-day service (same-business-day service optionally available) helps protect your investment if a problem occurs. This service also includes replacement of parts identified through PFA.
- The ServerProven® program lets you confidently configure your server with various devices and operating systems. This Web-based program provides compatibility information from actual testing of the xSeries 346 server with various adapters and devices.
- The ServerGuide™ CD includes utilities and drivers for assisted loading of popular network operating systems.
- Electronic support on the Web offers additional support in an easy-to-use format.

http://www.ibm.com/pc/support
Product positioning

This two-way, SMP-capable server is positioned between the xSeries 336 and xSeries 365 servers and is a replacement product to the previous xSeries 345 server. The 2U x346 server offers more PCI adapter expansion than the 1U-high xSeries 336 server. The xSeries 365 servers support up to four Intel Xeon Processors MP, driving large memory configurations and requires 3U of rack space.

This high-density, highly integrated x346 server is designed for customer installation of features to handle future expansion to meet changing needs. At the same time, it can handle emerging applications that require maximum computing power and function in the least amount of rack space.

Applications include:
- E-commerce and e-business
- Application serving
- Web serving and
- Messaging and collaboration applications
- Proprietary applications

This powerful server also meets traditional enterprise network server requirements, but with an added benefit of requiring less space.

The x346 is the newest xSeries server to be attached to IBM eServer i5 or iSeries servers. A new Integrated xSeries Adapter (1519-200) attaches an x346 to connect to an IBM eServer i5 or iSeries server and enables customers to cover the iSeries family of servers to provide virtual storage, virtual Ethernet, and tape sharing to an attached xSeries to easily integrate security, backup, and operations of a Windows and OS/400 environment.

Reference information

1 GHz and MHz denote the internal and/or external clock speed of the microprocessor only, not application performance. Many factors affect application performance.
2 PC3200 DDR2 SDRAM is an extension of the PC2100 memory. PC3200 DDR2 memory stands for Double Data Rate and effectively provide 2X data in the same clock cycle. Data transfer is at 400 MHz.
3 Actual playback speed will vary and is often less than the maximum possible.
4 When referring to HDD or tape backup capacity, GB stands for one billion bytes. TB is 1,000,000,000,000 bytes. Total user capacity may vary depending on operating environments.
5 A single physical processor’s resources look like two logical processors to the OS and other applications allowing different tasks to execute simultaneously. This provides a performance boost on multitasking operations.
6 For information on the IBM Statement of Limited Warranty, visit http://www.ibm.com/servers/support/machine_warranties/
7 Call 800-426-7378 or contact your IBM representative or reseller. Copies are available upon request.
8 Available only when a ServeRAID adapter is installed.
10 With respect to on-site service, the customer may be asked certain diagnostic questions before a technician is sent.
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The x346 models 22Y, 32Y and 42Y are prepackaged models containing an RSA II daughter card and redundant power modules. They are open file systems and are easily ordered configurations to offer with the new Integrated xSeries Adapter for iSeries (1519-200).

**Publications**

The following publications and CD-ROMs are shipped with the x346 server:

- The x346 Installation Guide (88P9187) contains an introduction to the computer, installation and setup, installing options, reference information, and problem determination. The installation guide has easy-to-use text and pictorials to enable you to quickly set up the xSeries® 346 servers.

- The ServerGuide™ contains utilities and drivers to support the x346 servers. In addition, it includes a set of easy-to-use utilities for assisted installation via CD of several popular network operating systems.

- IBM Director systems management software is included.

**Note:** Software versions, features, and functions shipped with these systems may change as new releases become available or may be discontinued at any time.

**x346 Installation Guide** and **Hardware Maintenance Manual**, in U.S. English versions, are available from:

http://www.ibm.com/pc/support

Click servers, then Server Family, and then Online Publications.

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The product books are offered in displayable softcopy form. All books are included. The displayable manuals are part of the basic machine-readable material. The files are shipped on DVD-ROM.

Terms and conditions for use of the machine-readable files are shipped with the files.

**Services**

**Integrated Technology Services**

IBM services include business consulting, outsourcing, hosting services, applications, and other technology management.

These services help you learn about, plan, install, manage, or optimize your IT infrastructure for e-business. They can help you integrate your high-speed networks, storage systems, application servers, wireless protocols, and an array of platforms, middleware, and communications software for IBM and many non-IBM offerings. IBM is your one-stop shop for IT support needs.

For details on available services, contact your IBM representative or visit

http://www.ibm.com/services/

For details on education offerings related to specific products, visit


Select your country, and then select the product as the category.

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### Technical Information

#### Physical Specifications

<table>
<thead>
<tr>
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<th>8840-01x</th>
<th>8840-11x</th>
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</tr>
<tr>
<td>Number standard</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Maximum</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>L2 cache (full-speed)</td>
<td>1 MB</td>
<td>1 MB</td>
<td>1 MB</td>
</tr>
<tr>
<td>Memory (400 MHz SDRAM)</td>
<td>512 MB ECC</td>
<td>1 GB ECC</td>
<td>1 GB ECC</td>
</tr>
<tr>
<td>RDIMMs</td>
<td>2x256 MB</td>
<td>2x512 MB</td>
<td>2x512 MB</td>
</tr>
<tr>
<td>DIMM sockets</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Capacity</td>
<td>16 GB</td>
<td>16 GB</td>
<td>16 GB</td>
</tr>
<tr>
<td>Video</td>
<td>SVGA</td>
<td>SVGA</td>
<td>SVGA</td>
</tr>
<tr>
<td>memory</td>
<td>16 MB</td>
<td>16 MB</td>
<td>16 MB</td>
</tr>
<tr>
<td>SCSI controller</td>
<td>Ultra320</td>
<td>Ultra320</td>
<td>Ultra320</td>
</tr>
<tr>
<td>Channels</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Connector internal</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>RAID controller</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Channels</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Connector internal</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Connector external</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>HDD</td>
<td>Open bay</td>
<td>Open bay</td>
<td>Open bay</td>
</tr>
<tr>
<td>Total bays</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>5.25 slim</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3.5-in slim</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Hot-swap</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Internal capacity</td>
<td>880 GB11</td>
<td>880 GB11</td>
<td>880 GB11</td>
</tr>
<tr>
<td>Bays available</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>64-bit/133 MHz</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>64-bit/100 MHz</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>PCl_E</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>System</td>
<td>Standard</td>
<td>Standard</td>
<td>Standard</td>
</tr>
<tr>
<td>management</td>
<td>Ethernet</td>
<td>Dual Gb</td>
<td>Dual Gb</td>
</tr>
<tr>
<td>controller</td>
<td>DVD-ROM (IDE)</td>
<td>8x-24x</td>
<td>8x-24x</td>
</tr>
<tr>
<td>Diskette drive</td>
<td>1.44 MB</td>
<td>1.44 MB</td>
<td>1.44 MB</td>
</tr>
<tr>
<td>Power supply</td>
<td>625 W</td>
<td>625 W</td>
<td>625 W</td>
</tr>
<tr>
<td>Number standard</td>
<td>1</td>
<td>1</td>
<td>1/2</td>
</tr>
<tr>
<td>Hot-swap</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Redundant power</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Auto restart</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Note: Capacities are based on installation of six 146.8 GB slim-high, Ultra320 HDDs. For the latest information on supported HDD options, refer to the Sales Manual or visit [http://www.ibm.com/pc/us/compat](http://www.ibm.com/pc/us/compat).

8x-24x DVD-ROM drive characteristics

- Formatted capacity: 650 MB
- Average access time: 110 ms
- Burst data transfer rate: 16.6 MB/s (ATA PIO Mode 4)
- Technology: Full constant angular velocity (CAV)
- Buffer size: 1 MB

Note: 8x-24x CD-ROM variable read rate. Actual playback speed will vary and is often less than the maximum possible.
36.4 GB / 73.4 GB, 10,000 rpm HDD
- Formatted capacity: 36,400 MB or 73,400 MB
- Rotational speed: 10,000 rpm
- Typical average read seek time: <4.7 ms
- Data transfer rate (maximum bursting): 320 MB/s
- Average latency: 3.00 ms
- Sustained data transfer rate: 33 to 67 MB/s
- PFA/S.M.A.R.T. enabled: Yes
- Interface: Ultra320 SCSI

146.8 GB, 10,000 rpm HDD
- Formatted capacity: 146,800 MB
- Rotational speed: 10,000 rpm
- Typical average read seek time: <4.7 ms
- Data transfer rate (maximum bursting): 320 MB/s
- Average latency: 3.00 ms
- Sustained data transfer rate: 33 to 67 MB/s
- PFA/S.M.A.R.T. enabled: Yes
- Interface: Ultra320 SCSI

36.4 GB / 73.4 GB, 15,000 rpm HDD
- Formatted capacity: 36,400 MB or 73,400 MB
- Rotational speed: 15,000 rpm
- Typical average read seek time: <3.6 ms
- Data transfer rate (maximum bursting): 320 MB/s
- Average latency: 2.00 ms
- Sustained data transfer rate: 56 to 86 MB/s
- PFA/S.M.A.R.T. enabled: Yes
- Interface: Ultra320 SCSI

Video subsystem
- ATI Radeon 7000M controller
- Integrated on planar and connected to the PCI bus
- 16 MB of embedded DDR1 video memory
- 128-bit graphics engine with 8, 16, and 32 bpp mode acceleration
- 32 bpp (4G colors/true color) support
- Integrated 230 MHz RAMDAC
- Display Data Channel Bi-Directional (DDC2B) monitor communications support

Supported video mode capabilities for the SVGA PCI controller:

<table>
<thead>
<tr>
<th>Resolution</th>
<th>Colors</th>
<th>Refresh rate (Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microsoft® Windows® 2000 and Windows 2003</td>
<td></td>
<td></td>
</tr>
<tr>
<td>640 x 480 x 8</td>
<td>256</td>
<td>60, 72, 75, 85</td>
</tr>
<tr>
<td>640 x 480 x 16</td>
<td>64K</td>
<td>60, 72, 75, 85</td>
</tr>
<tr>
<td>640 x 480 x 32</td>
<td>16 million</td>
<td>60, 72, 75, 85</td>
</tr>
<tr>
<td>800 x 600 x 8</td>
<td>256</td>
<td>60, 72, 75, 85</td>
</tr>
<tr>
<td>800 x 600 x 16</td>
<td>64K</td>
<td>60, 72, 75, 85</td>
</tr>
<tr>
<td>800 x 600 x 32</td>
<td>16 million</td>
<td>60, 72, 75, 85</td>
</tr>
<tr>
<td>1024 x 768 x 8</td>
<td>256</td>
<td>60, 70, 75, 85</td>
</tr>
<tr>
<td>1024 x 768 x 16</td>
<td>64K</td>
<td>60, 70, 75, 85</td>
</tr>
<tr>
<td>1024 x 768 x 32</td>
<td>16 million</td>
<td>60, 70, 75, 85</td>
</tr>
<tr>
<td>1152 x 864 x 8</td>
<td>256</td>
<td>60, 70, 75</td>
</tr>
<tr>
<td>1152 x 864 x 16</td>
<td>64K</td>
<td>60, 70, 75</td>
</tr>
<tr>
<td>1152 x 864 x 32</td>
<td>16 million</td>
<td>60</td>
</tr>
<tr>
<td>1280 x 1024 x 8</td>
<td>256</td>
<td>60, 75, 85</td>
</tr>
<tr>
<td>1280 x 1024 x 16</td>
<td>64K</td>
<td>60, 75, 85</td>
</tr>
<tr>
<td>1280 x 1024 x 32</td>
<td>16 million</td>
<td>60, 75, 85</td>
</tr>
<tr>
<td>1600 x 1200 x 8</td>
<td>256</td>
<td>60, 75, 85</td>
</tr>
<tr>
<td>1600 x 1200 x 16</td>
<td>64K</td>
<td>60, 75, 85</td>
</tr>
<tr>
<td>1600 x 1200 x 32</td>
<td>16 million</td>
<td>60, 75</td>
</tr>
</tbody>
</table>

Note: NetWare and SCO drivers are contained in the respective operating system packages or bulletin boards.

Dimensions
- 2U rack drawer:
  - Width: 443.6 mm (17.5 in)
  - Depth: 698.0 mm (27.5 in)
  - Height: 85.4 mm (3.36 in)
- Rack weight:
  - Minimum configuration: 21.1 kg (46.5 lb)
  - Maximum configuration: 28.1 kg (62 lb)

Electrical
- 100 to 127 (nominal) V ac; 50 Hz or 60 Hz; 8.5 A
- 200 to 240 (nominal) V ac; 50 Hz or 60 Hz; 4.5 A
- Input kilovolt-ampere (kVA) (approximately): 1.86A
  - Minimum configuration: 0.36 kVA
  - Maximum configuration: 0.83 kVA
- Btu output:
  - Ship configuration: 1230 Btu/hr (360 watts)
  - Full configuration: 2840 Btu/hr (830 watts)
- Noise level (horizontal position): 6.6 bels (operating)

Note: The noise emission level stated is the declared (upper limit) sound power level, in bels, for a random sample of machines. All measurements made in accordance with ISO 7779 and reported in conformance with ISO 9296.

x346 servers are intended for use as rack-drawer servers and are tested and designed to operate in a horizontal position.

Standards:
- These systems support or comply with the following standards:
  - Multiprocessor Specification (MPS) 1.4
  - Peripheral Component Interconnect (PCI) specification 2.3
  - PCI-X specification v1.0a
  - Hardware-enabled to meet the International Organization for Standardization (ISO) 9241, Part 3

Equipment approvals and safety
- FCC — Verified to comply with Part 15 of the FCC Rules, Class A
- Canada ICES-003, issue 3, Class A
- UL 1950¹²
- CSA C22.2 No. 950
- NOM-018¹²

¹² This server model is certified by the respective UL and NOM agencies.

Operating environment
- Temperature:
  - 10.0° to 35.0°C (50° to 95°F) at 0 to 914 m (0 to 3,000 ft)
  - 10.0° to 32.0°C (50° to 90°F) at 914 to 2,133 m (3,000 to 7,000 ft)
- Relative humidity: 8% to 80%
- Maximum altitude: 2,133 m (7,000 ft)
Hardware requirements: For attended installation of an operating system, this server requires a compatible:

- Keyboard
- Mouse
- HDD
- Display (E51, E54, P76, G78, LCD, or equivalent)

Unattended or remote installation may be performed without requiring some or all of these components. Review your unattended software installation program information for specific hardware configuration requirements.

For service, the server requires a compatible:

- Keyboard
- Mouse
- HDD
- Display (E51, E54, P76, G78, LCD, or equivalent)

When having the unit serviced, plan to have these components attached to your server either directly or indirectly via a console switch.

Software requirements: The following network operating systems are supported on the x346 server:

- Microsoft:
  - Windows 2000 Server
  - Windows 2000 Advanced Server
  - Windows 2003, Standard Edition
  - Windows 2003, Enterprise Edition
  - Windows Server 2003
- Novell: NetWare 6.5
- Linux™:
  - SUSE LINUX Enterprise Server 8
  - Red Hat Enterprise Linux 3AS
  - Red Hat Enterprise Linux 3ES
  - Red Hat Enterprise Linux 3.0 for AMD64 and Intel EM64T

Certification is planned.

Note: For information on additional support, certification, and versions, visit


The following network operating systems are supported as preloads in the xSeries 346 server:

- Microsoft:
  - Windows 2000 Server
  - Windows 2000 Advanced Server
  - Windows Server 2003, Standard Edition
  - Windows Server 2003, Enterprise Edition
  - Windows Server 2003
- Novell: NetWare 6.5
- Linux™:
  - SUSE LINUX Enterprise Server 8
  - Red Hat Enterprise Linux 3AS
  - Red Hat Enterprise Linux 3ES
  - Red Hat Enterprise Linux 3.0 for AMD64 and Intel EM64T

Compatibility: The x346 systems contain licensed system programs that include set configuration, set features, and test programs. System BIOS is loaded from a “flash” EEPROM into system memory. This BIOS provides instructions and interfaces designed to support the standard features of the x346 and to maintain compatibility with many current software programs.

Contact your IBM representative, IBM Business Partner, or refer to the IBM Sales Manual for information on the compatibility of hardware and software for xSeries servers. The Sales Manual is updated periodically as new features and options are announced that support these servers.

Limitations

- The x346 server supports a maximum of 16 GB of system memory by adding a 2 GB PC2-3200 DDR2 ECC SDRAM RDIMM in each of the eight DIMM slots, when the 2 GB DIMMs become available. All supported system memory is addressable through direct memory access. The server supports 256 MB, 512 MB, 1 GB, and 2 GB DDR2 PC2-3200 DDR2 ECC SDRAM DIMMs. DIMMs must be installed in matched pairs. Refer to the Planning information section for supported memory options.
- Microprocessor SMP upgrades must be of the same type and clock speed. Mixing microprocessors of different speeds or cache size is not supported.
- Use the version of ServerGuide shipped with the system, or a later version, to load software and drivers. Earlier versions of ServerGuide cannot be used with the server.

Refer to the Software requirements section for operating system limitations.

User group requirements: This announcement satisfies or partially satisfies the requirements from one or more of the worldwide user group communities. Groups include COMMON, COMMON Europe, Guide Share Europe (GSE), InterAction (Australia/New Zealand), Japan Guide Share (JGS), and SHARE Inc.

Planning information

Customer responsibilities

xSeries 346

The xSeries 346 server is designated as customer setup. Customer setup instructions are shipped with each system.

Configuration information

Integrated RAID One configuration

There are two manufacturing instructions (MI) available to allow the customer to setup a RAID one(1) configuration. These instructions enable configuration via Odyssey (ibm.com).

The two instructions are:

- Integrated Mirroring — 2 HDDs required via Instruction 01R1356
- Integrated Mirroring with HotSpare — 3 HDDs required via Instruction 01R1357

Bay configuration

The xSeries 346 server contains eight bays. The top bay on the right contains the standard, 3.5-inch slim-high diskette drive, the bay under it contains the slim-high DVD-ROM drive. Six slim-high, hot-swap bays at left of the server are ready for various supported hot-swap HDD drive options installation.

The 8x IDE DVD-ROM is connected to the IDE port through an interposer card.

Cabling — Standard Non-RAID configurations

The xSeries 346 server contains a DASD backplane supporting six hot-swap, SCA-2 compliant drive bays. The backplane is connected to the one internal connector of the integrated Ultra320 SCSI controller through a 16-bit LVD SCSI cable. The other connector is for external use.
Note: Mixing Ultra320 drives with drives of any other speed rating causes them to run at Ultra160 speeds.

In configurations where an external SCSI device attachment is required, an external SCSI connector is available at rear of system.

Rack installations

xSeries 346 2U rack-drawer models are designed to be installed in a 19-inch rack cabinet designed for 28-inch deep devices, such as the NetBAY42U ER and NetBAY42U SR. Installation into some of the older Netfinity® racks (9306900, 9306910, 9306200) requires a rack extension kit.

If an xSeries 346 is mounted in a non-IBM rack, the rack must meet the following specifications:

- The rack must meet EIA™-310-D standards for mounting flanges and hole locations.
- The front to rear distance of the mounting flanges must be between 698.5 mm and 762 mm (27.5 and 30 inches).
- The thickness of the mounting flanges must be between 1.9-3.3 mm.
- The mounting flanges must have either 7.1-mm (.28-in) diameter holes or 9.6-mm (.38-in) square holes on the standard EIA hole spacing.
- The rack must have a minimum depth of 70 mm (2.76 in.) between the front mounting flange and inside of the front door for proper cooling.
- The rack must have a minimum depth of 157 mm (6.2 in.) between the rear mounting flange and inside of the rear door to install the server and make space for cable management.
- The minimum side-to-side clearance in the rack between the front and rear mounting flanges must be 467 mm (18.2 in.) to accommodate the width of the server and the slide mounting brackets.
- The minimum side-to-side clearance in the rack between each door and the mounting flanges must be 484 mm (19.1 in.) to accommodate the slide mounting brackets.
- The rack must include perforated front and rear doors and must not prevent the flow of cool air into or out of the rack.
- The weight-handling capacity of the rack must be able to support the maximum rack configuration, including all servers, external cables, and PDUs.
- The rack must provide proper stabilization so that the rack does not become unstable when servers are pulled out for service.

Processor upgrade options

- IBM xSeries 2.8 GHz/800 MHz — 1 MB L2 Cache Xeon Processor (13N0681)
- IBM xSeries 3.0 GHz/800 MHz — 1 MB L2 Cache Xeon Processor (13N0688)
- IBM xSeries 3.2 GHz/800 MHz — 1 MB L2 Cache Xeon Processor (13N0683)
- IBM xSeries 3.4 GHz/800 MHz — 1 MB L2 Cache Xeon Processor (13N0684)
- IBM xSeries 3.6 GHz/800 MHz — 1 MB L2 Cache Xeon Processor (13N0685)

Supported memory options

The following memory options are supported:

- IBM 512 MB PC2-3200 CL3 DDR2 ECC SDRAM RDIMM (73P3523) (2 x 256 MB) Non-Chipkill™
- IBM 1 GB PC2700 DDR II ECC Non-Chipkill SDRAM RDIMM (73P3522) (2 x 512 MB) Non-Chipkill
- IBM 1 GB PC2-3200 CL3 ECC DDR2 Chipkill SDRAM RDIMM (73P2865) (2 x 512 MB) Chipkill
- IBM 2 GB PC2-3200 CL3 ECC DDR2 Chipkill SDRAM RDIMM (73P2866) (2 x 1 GB) Chipkill
- Memory mirroring and hot spare memory configurable using BIOS setup

Power considerations

The xSeries 346 server includes a standard 625-watt hot-swap power supply. This power supply supplies sufficient power to run the server. An xSeries 625 W Hot-Swap Power Supply Upgrade is optionally available to support redundancy.

Cable orders: Two 10/100/1000 Mbps, full-duplex Ethernet PCI controllers, standard with the xSeries 346 server, are connected directly to an independent RJ-45 connector. The RJ-45 connector provides a 10BaseT, 100Base-TX, and 1000Base-TX interface for connecting twisted-pair cable to the Ethernet network. Cabling is not included with the server. To connect the Ethernet controller to a repeater or switch, use an unshielded twisted pair (UTP) cable with RJ-45 connectors at both ends. For 100/1000 Mbps operation, Category 5 cabling must be used. For 10 Mbps operation, Category 3, or better, cabling must be used.

There are no additional cabling requirements, other than for system power, keyboard, mouse, and monitor connections.

Installability: The xSeries 346 server requires about 20 minutes for installation. Installation includes unpacking, setting up, and powering on the system. Additional time is required to install an operating system, additional adapters, or features.

Packaging

xSeries 346

One box

System unit carton

- System unit
- Rack kit
- System unit power cord(1)
- PDU style power cord(1)
- xSeries 346 Installation Guide
- Safety booklet
- ServerGuide and IBM Director
- DVD-ROM packages
- Media mounting kit
- On/off switch cover(1)

The xSeries 346 system is shipped as a single package. Other items are in zipped bags.

Power supply upgrade option

- xSeries 625-watt hot-swap power supply
- Six fans
- C13/14 rack jumper cord
- Safety instructions/warranty
Supplies
For end users: IBM xSeries 346 can be purchased through the dealers around the world.

Security, auditability, and control

Security and auditability features include:

- Power-on and privileged access password functions control access to the data and server setup program on the server.
- Set unattended boot mode allows the system keyboard to be locked to all entries except the password and at the same time allows other computers on the network to access the system disk drive.
- Selectable boot sequence can be used to prevent unauthorized installation of software or removal of data from the diskette drive.

It is a customer’s responsibility to ensure that the server is secure to prevent sensitive data from being removed.

The customer is responsible for evaluation, selection, and implementation of security features, administrative procedures, and appropriate controls in application systems and communications facilities.

Terms and conditions

This product is available for purchase under the terms of the IBM Customer Agreement (ICA).

Each IBM machine is manufactured from parts that may be new or used. In some cases, a machine may not be new and may have been previously installed.

Regardless, IBM’s appropriate warranty terms apply.

IBM Global Financing: Yes

To obtain copies of the IBM Statement of Limited Warranty, contact your reseller or IBM.

In the United States, call 800-IBM-SERV (426-7378), or write to

Warranty Information
P.O. Box 12195
Research Triangle Park, NC 27709
Attn: Dept JDJA/B203

Warranty period

- System hardware — Three years
- Optional features — One year

Optional IBM features initially installed in an IBM system carry the same warranty period as the system. If installed after the initial system installation, they carry the balance of the system warranty or the optional feature warranty, whichever is greater.

Warranty service: If required, IBM provides repair or exchange service depending on the type of warranty service specified below for the machine. An IBM technician will attempt to resolve your problem over the telephone. You must follow IBM’s problem determination and resolution procedures. Scheduling of service will depend upon the time of your call and is subject to parts availability. Service levels are response time objectives and are not guaranteed. The specified level of warranty service may not be available in all worldwide locations. Additional charges may apply outside IBM’s normal service area. Contact your local IBM representative or your reseller for country and location specific information.

Customer Replaceable Unit (CRU) (keyboard, mouse, speaker, memory, HDD, and other easily replaceable parts) Service and On-site Repair (IOR) for other selected parts.

CRU service: IBM will ship CRU parts to you for your replacement. If IBM instructs you to return the replaced CRU, you are responsible for returning it to IBM in accordance with IBM’s instructions. If you do not return the defective CRU, if IBM so instructs, within 30 days of your receipt of the replacement CRU, IBM may charge you for the replacement.

On-site service: IOR: nine hours per day, Monday through Friday excluding holidays, next-business-day response. IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well-lit, and suitable for the purpose. On-site service is not available in all countries, and some countries have kilometer or mileage limitations from an IBM service center. In those locations where on-site service is not available, the normal in-county service delivery is used.

Call IBM at 800-IBM-SERV (426-7378), to assist with problem isolation for hardware to determine if warranty service is required. Telephone support may be subject to additional charges, even during the limited warranty period.

International Warranty Service (IWS): IWS is available during the warranty period to customers who travel or relocate to countries where their computer is sold and serviced by IBM or IBM resellers authorized to perform warranty service. Eligible IBM computers are identified by their four-digit machine type.

You can obtain IWS through the method of service, such as CRU, depot, carry-in, or on-site, provided in the servicing country. Service methods and procedures vary by country, and some service or parts may not be available in all countries. Service centers in certain countries may not be able to service all models of a particular machine type. In addition, some countries may have fees and restrictions that apply at the time of service.

To determine the eligibility of your computer and to view a list of countries where service is available, visit http://www-3.ibm.com/pc/support/site.wss/warranty.warranty.vm

For more information on IWS, refer to Services Announcement 601-034, dated September 25, 2001.

Licensing: Programs included with this product are licensed under the terms and conditions of the License Agreements shipped with the system.

Maintenance services — ServiceElect and ServiceSuite™

ServiceElect and ServiceSuite provide hardware warranty service upgrades, maintenance, and selected annuity support services in one agreement.

Warranty service upgrade: During the warranty period, warranty service upgrade provides an enhanced level of On-site Service for an additional charge. A warranty service upgrade must be purchased during the warranty period.
period and is for a fixed term (duration). It is not refundable or transferable and may not be prorated. If required, IBM will provide the warranty service upgrade enhanced level of On-site Service acquired by the customer. Service levels are response time objectives and are not guaranteed.

An IBM technician will attempt to resolve your problem over the telephone. You must follow IBM’s problem determination and resolution procedures. Scheduling of service will depend upon the time of your call and is subject to parts availability. If applicable, parts that are considered CRUs will be provided as part of the machine’s standard warranty CRU Service.

IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well-lit, and suitable for the purpose.

The following Warranty Service Upgrade options are available:

- **IOR, 9 hours per day, Monday through Friday excluding holidays, 4-hour average response**
- **IOR, 24 hours per day, 7 days a week, 4-hour average response**
- **IOR, 24 hours per day, 7 days a week, 2-hour average response**

**Maintenance service:** If required, IBM provides repair or exchange service depending on the type of maintenance service specified below for the machine. An IBM technician will attempt to resolve your problem over the telephone. You must follow IBM’s problem determination and resolution procedures. Scheduling of service will depend upon the time of your call and is subject to parts availability. Service levels are response time objectives and are not guaranteed.

**CRU service:** If your problem can be resolved with a CRU (keyboard, mouse, speaker, memory, HDD, and other easily replaceable parts), IBM will ship these parts to you for replacement by you. If IBM instructs you to return the replaced CRU, you are responsible for returning it to IBM in accordance with IBM’s instructions. If you do not return the defective CRU, if IBM so instructs, within 30 days of your receipt of the replacement CRU, IBM may charge you for the replacement.

**On-site service:** IBM On-site Repair (IOR), IBM will repair the failing Machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM Machine. The area must be clean, well-lit, and suitable for the purpose.

The following On-site Service options are available:

- **IOR, nine hours per day, Monday through Friday excluding holidays, next-business-day response**
- **IOR, nine hours per day, Monday through Friday excluding holidays, 4-hour average response**
- **IOR, 24 hours per day, Monday through Friday excluding holidays, 4-hour average response**
- **IOR, 24 hours per day, 7 days a week, 4-hour average response**
- **IOR, 24 hours per day, 7 days a week, 2-hour average response**

**Maintenance service (ICA)**

Maintenance services are available for ICA legacy contracts. The preferred go-to-market offerings are ServiceElect. However, ICA legacy contracts will still be available for current customers until they are withdrawn.

**Alternative service (warranty service upgrades):** During the warranty period, warranty service upgrade provides an enhanced level of On-site Service for an additional charge. A warranty service upgrade must be purchased during the warranty period and is for a fixed term (duration). It is not refundable or transferable and may not be prorated. If required, IBM will provide the warranty service upgrade enhanced level of On-site Service acquired by the customer. Service levels are response time objectives and are not guaranteed.

An IBM technician will attempt to resolve your problem over the telephone. You must follow IBM’s problem determination and resolution procedures. Scheduling of service will depend upon the time of your call and is subject to parts availability. If applicable, parts that are considered CRUs will be provided as part of the machine’s standard warranty CRU Service.

IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well-lit, and suitable for the purpose.

The following Warranty Service Upgrade option is available:

- **IOR, 24 hours per day, 7 days a week, 4-hour average response**

**Maintenance service:** If required, IBM provides repair or exchange service depending on the type of maintenance service specified below for the machine. An IBM technician will attempt to resolve your problem over the telephone. You must follow IBM’s problem determination and resolution procedures. Scheduling of service will depend upon the time of your call and is subject to parts availability. Service levels are response time objectives and are not guaranteed.

**CRU service:** If your problem can be resolved with a CRU (keyboard, mouse, speaker, memory, HDD, and other easily replaceable parts), IBM will ship these parts to you for replacement by you. If IBM instructs you to return the replaced CRU, you are responsible for returning it to IBM in accordance with IBM’s instructions. If you do not return the defective CRU, if IBM so instructs, within 30 days of your receipt of the replacement CRU, IBM may charge you for the replacement.

**On-site service:** IOR. IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well-lit, and suitable for the purpose.

The following On-site Service options are available:

- **IOR, 9 hours per day, Monday through Friday excluding holidays, next-business-day response**
- **IOR, 24 hours per day, Monday through Friday excluding holidays, 4-hour average response**
IBM provides with the machine.

Warranty service: IBM is now shipping machines with selected non-IBM parts that contain an IBM field replaceable unit (FRU) part number label. These parts are to be serviced during the IBM machine warranty period. IBM is covering the service on these selected non-IBM parts as an accommodation to their customers, and normal warranty service procedures for the IBM machine apply.

Warranty service upgrades and maintenance services: Under certain conditions, IBM Integrated Technology Services repairs selected non-IBM parts at no additional charge for machines that are covered under a warranty service upgrade or maintenance services.

IBM Service provides hardware problem determination on non-IBM parts (adapter cards, PCMCIA cards, disk drives, memory, and so forth) installed within IBM systems covered under warranty service upgrade or maintenance services and provides the labor to replace the failing parts at no additional charge. If IBM has Technical Service Agreements with the manufacturers of the failing part, or if the failing part is an accommodations part (a part with an IBM FRU label), IBM may also source and replace the failing parts at no additional charge. For all other non-IBM parts, customers are responsible for sourcing the parts. Installation labor is provided at no additional charge, if the machine is covered under a warranty service upgrade or maintenance services.

IBM hourly service rate classification: One

ServicePac® offerings

Warranty and maintenance options: The announced products may be eligible for ServicePacs for Warranty and Maintenance Options, convenient prepackaged offerings for warranty service upgrades and maintenance services.

Installation services: The announced products may be eligible for ServicePacs for Installation Services, convenient prepackaged offerings for installation services. Refer to the Prices section for information on the availability of ServicePac offerings.

For additional ServicePac information, visit


Field-installable features: Yes

Model conversions: No

Machine installation: Customer setup. Customers are responsible for installation according to the instructions IBM provides with the machine.

Graduated charges: No. This product does not contain licensed internal code or licensed machine code.

IBM Electronic Services

IBM Global Services has transformed its delivery of hardware and software support services to put you on the road to higher systems availability. IBM Electronic Services is a Web-enabled solution that provides you with an exclusive, no-additional-charge enhancement to the service and support on the IBM eServer®. You should benefit from greater system availability due to faster problem resolution and preemptive monitoring. IBM Electronic Services is comprised of two separate but complementary elements: IBM Electronic Services news page and IBM Electronic Service Agent™.

IBM Electronic Services news page provides you with a single Internet entry point that replaces the multiple entry points traditionally used by customers to access IBM Internet services and support. By using the news page, it enables you to gain easier access to IBM resources for assistance in resolving technical problems.

The IBM Electronic Service Agent is no-additional-charge software that resides on your IBM eServer system that is designed to proactively monitor events and transmit system inventory information to IBM on a periodic customer-defined timetable. The IBM Electronic Service Agent tracks system inventory, hardware error logs, and performance information. If the server is under a current IBM maintenance service agreement or within the IBM warranty period, the Service Agent automatically reports hardware problems to IBM. Early knowledge about potential problems enables IBM to provide proactive service that maintains higher system availability and performance. In addition, information collected through the Service Agent will be made available to IBM service support representatives when they are helping answer your questions or diagnosing problems.

To learn how IBM Electronic Services can work for you, visit

http://www.ibm.com/support/electronic

Prices

<table>
<thead>
<tr>
<th>Description</th>
<th>Machine type/ model</th>
<th>Part number</th>
<th>IBM list price</th>
</tr>
</thead>
<tbody>
<tr>
<td>xSeries 346 — Rack 2.8 GHz/1 MB, 512 MB</td>
<td>8840-01Y 884001U</td>
<td>$2,339</td>
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<tr>
<td>xSeries 346 — Rack 3.0 GHz/1 MB, 1 GB</td>
<td>8840-11Y 884011U</td>
<td>2,689</td>
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<tr>
<td>xSeries 346 — Rack 3.2 GHz/1 MB, 1 GB</td>
<td>8840-21Y 884021U</td>
<td>2,889</td>
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<tr>
<td>xSeries 346 — Rack 3.2 GHz/1MB, 1 GB</td>
<td>8840-22Y 884022U</td>
<td>3,288</td>
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<td>xSeries 346 — Rack 3.4 GHz/1 MB, 1 GB</td>
<td>8840-31Y 884031U</td>
<td>3,189</td>
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<tr>
<td>xSeries 346 — Rack 3.6 GHz/1 MB, 1 GB</td>
<td>8840-41Y 884041U</td>
<td>3,559</td>
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<tr>
<td>xSeries 346 — Rack 2 x 3.6 GHz/1 MB, 1 GB</td>
<td>8840-42Y 884042U</td>
<td>6,386</td>
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Note: The x346 models 22Y, 32Y, and 42Y are prepackaged models that contain an RSA II daughter card and redundant power modules. They are open file systems and are easily ordered configurations to offer with the new Integrated xSeries Adapter for iSeries (1519-200).
IBM list price does not include tax or shipping and is subject to change without notice. Reseller prices may vary.

<table>
<thead>
<tr>
<th>Description</th>
<th>Part number</th>
<th>IBM list price</th>
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<tbody>
<tr>
<td>IBM ServeRAID™ 7k Adapter Option</td>
<td>71P8642</td>
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<tr>
<td>Xeon Processor Upgrade Option</td>
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<td>IBM 36 GB Hot-Swap U320 10K SCSI Drive</td>
<td>90P1304</td>
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<td>IBM 73 GB Hot-Swap U320 10K SCSI Drive</td>
<td>90P1305</td>
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<tr>
<td>IBM 146 GB Hot-Swap U320 10K SCSI Drive</td>
<td>90P1306</td>
<td>$549</td>
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<tr>
<td>IBM 36 GB Hot-Swap U320 15K SCSI Drive</td>
<td>90P1318</td>
<td>$389</td>
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<tr>
<td>IBM 73 GB Hot-Swap U320 15K SCSI Drive</td>
<td>90P1319</td>
<td>$549</td>
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<tr>
<td>IBM xSeries 625 W Hot-Swap Power Supply (North America)</td>
<td>26K5097</td>
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<tr>
<td>IBM xSeries 625 W Hot-Swap Power Supply (worldwide)</td>
<td>26K5098</td>
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To order direct, call IBM at 877-999-7115 and select option 4.

For the name of the nearest IBM representative or Business Partner, call 800-IBM-4YOU (426-4968).

ServicePac for warranty and maintenance

<table>
<thead>
<tr>
<th>Description</th>
<th>Part number</th>
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<tr>
<td>1-year IOR 9 x 5 NBD response</td>
<td>69P9402</td>
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<tr>
<td>1-year IOR 9 x 5 4-hour average response</td>
<td>69P9403</td>
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<tr>
<td>1-year IOR 7 x 24 4-hour average response</td>
<td>69P9404</td>
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<td>1-year IOR 7 x 24 2-hour average response</td>
<td>69P9405</td>
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<td>2-year 9 x 5 IOR NBD response</td>
<td>96P2121</td>
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<td>2-year 9 x 5 x 4 IOR 4-hour average response</td>
<td>96P2122</td>
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<tr>
<td>2-year 24 x 7 x 4 IOR 4-hour average response</td>
<td>96P2123</td>
</tr>
<tr>
<td>2-year 24 x 7 x 2 IOR 2-hour average response</td>
<td>96P2124</td>
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<tr>
<td>3-year IOR 9 x 5 4-hour average response</td>
<td>21P2077</td>
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<td>3-year IOR 7 x 24 4-hour average response</td>
<td>21P2078</td>
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<tr>
<td>3-year IOR 7 x 24 2-hour average response</td>
<td>21P2093</td>
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</table>

Alternative service (warranty service upgrades)

- IOR 24 x 7
  - $600

Annual maintenance service

- IOR 9 x 5 24 x 7
  - $700
- IOR 9 x 5 24 x 7
  - $1,050

For ServiceElect (ESA) Maintenance Service Charges, contact IBM Global Services at 888-IBM-4343 (426-4343).

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