Sun Enterprise™ 220R Server

Just the Facts

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Positioning

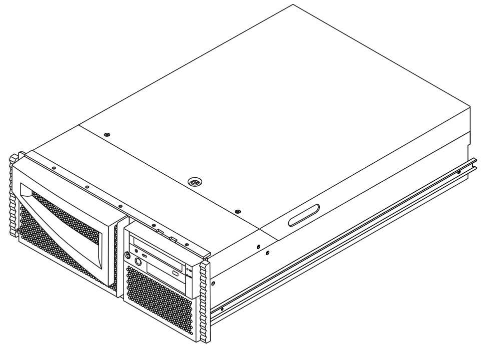


Figure 1. Sun Enterprise™ 220R System

Exceptional Processing Power in a Compact Footprint

The Sun Enterprise™ 220R server is the latest member of Sun's powerful line of servers for enterprise network computing based on the UltraSPARC™ processor technology. This next-generation workgroup server brings multiprocessing power, UltraSCSI disks, and the industry-standard peripheral component interconnect (PCI) I/O bus to a highly modular, rack-optimized 4RU (rack unit) design. The Sun Enterprise 220R server gives customers the flexibility to scale their processing needs without wasting precious space, making it an ideal server for service providers, financial institutions, compute-intensive environments, or anyone who needs strong processing power in a small footprint. Furthermore, Sun's commitment to high-performance computing means the Sun Enterprise 220R server delivers increasing levels of industry-leading performance that users expect from Sun™ servers, while at the same time preserving 100 percent binary compatibility with application software.

Sun Enterprise 220R Servers

The Sun Enterprise 220R server supports up to two 450-MHz UltraSPARC-II 64-bit RISC microprocessors with 4 MB of Ecache (L2) each, 2 GB of main memory, two internal 9.1-GB or 18.2-GB hot-swap UltraSCSI disk drives, four PCI slots connected to two high-performance PCI I/O buses that can move over 350 MB of data per second, and up to two hot-swap power for N+1 redundancy. The Sun Enterprise 220R server is designed to satisfy any application or enterprise where compute density at an affordable price is a high priority.

Sun Enterprise 220R servers continue the Sun tradition of delivering balanced system design and innovation. The powerful Ultra™ port architecture (UPA), introduced on the original Ultra systems, continues in the Sun Enterprise 220R server.

The Sun Enterprise 220R server continues Sun's drive to deliver industry-standard PCI I/O bus, enabling access to hundreds of expansion and networking options. Sun has added innovation to the Sun Enterprise 220R server PCI I/O bus with dual bus channels providing sustained high performance to the system's PCI slots. In addition, Sun has delivered the advanced 66-MHz PCI, which is capable of 200 MB per second throughput, ideal for high-performance networking requirements.

The Sun Enterprise 220R server is *not* just an Ultra system with PCI slots. All UltraComputing™ technologies have been scaled to higher performance; UltraSPARC-II processing power, 112.5-MHz UPA interconnect, and two channels of UltraSCSI for internal and/or external disks and peripherals. It also uses the revolutionary and innovative, multiple channel PCI bus—with 66-MHz support.

Some key applications are:

- E-mail services, web serving, Internet gateway, search engines, and encryption
- DNS, HTTP, and FTP services
- Financial services applications
- On-line transaction processing (OLTP) and electronic commerce (Netgravity, Broadvision, and Lawson)
- Simulation and compute farms

Product Family Placement

The Sun Enterprise 220R server is an advanced member of Sun's current workgroup server product family, which scales from the low-cost, high-performance Sun Enterprise Ultra™ 5S and 10S servers, to the two-way Sun Enterprise 2, 220R, and 250 servers, and up to the four-way Sun Enterprise 420R and 450 servers.

These systems have several things in common, including:

- The UltraSPARC processor
- 100 percent binary compatibility from the low end to the high end, including Sun's server family
- Scalable from the low-end uniprocessor systems to the 64-way Sun Enterprise 10000 (also known as Starfire™) server
- Modular, easy-to-swap components

Servers	Target Users and Markets
Sun Enterprise Ultra 5S (1-way)	Designed as the lowest priced server solution, the Sun Enterprise Ultra 5S server appeals to customers looking for a low-priced system offering expandability, fast application performance, and investment protection. With its "pizza box" form factor, this server is ideal in simulations where space and cost are at a premium.
Sun Enterprise Ultra 10S (1-way)	With architecture similar to the Sun Enterprise Ultra 5S server, the Sun Enterprise Ultra 10S server offers an additional low-priced PCI-based system, but with added expandability and a tower enclosure.
Sun Enterprise 2 (2- way)	A versatile server that gives users high-performance and multiprocessing (MP) capability. MP-ready and multithreaded applications will benefit greatly from the performance of the Sun Enterprise 2 system. The Sun Enterprise 2 server is targeted at medium-sized workgroups that need maximum performance for running Internet or business applications.
Sun Enterprise 220R (2-way)	Designed for customers who require a rack solution at an affordable price. The target customers are Internet, application, and network service providers, along with financial services, compute farms, or any customers running demanding applications in space-constrained environments.
Sun Enterprise 250 (2-way)	Designed for customers who are looking for the RAS features of a high-end system, but in an affordable tower package that is also rackmountable. The Sun Enterprise 250 server is built to handle the most demanding business-critical applications and with its Remote System Control, users can monitor the system 24x7 from virtually anywhere they have access to a browser.

Servers	**Target Users and Markets**
Sun Enterprise 420R (4-way)	Designed to provide compute density at an affordable price. With the 450-MHz UltraSPARC-II processor with 4 MB of external cache, the Sun Enterprise 420R server offers exceptional processing power in a compact, flexible server package. The target customers are internet, application, and network service providers, along with financial services, compute farms, or any customers running demanding applications in space-constrained environments.
Sun Enterprise 450 (4-way)	Sun's most powerful workgroup server. The Sun Enterprise 450 system's blend of computing power, storage capacity, disk I/O throughput, and network I/O performance make it perfect for running or front-ending databases from Oracle, Sybase, and Informix or for implementing thousands of other critical two-tier and three-tier client-server business applications.

Key Features and Benefits

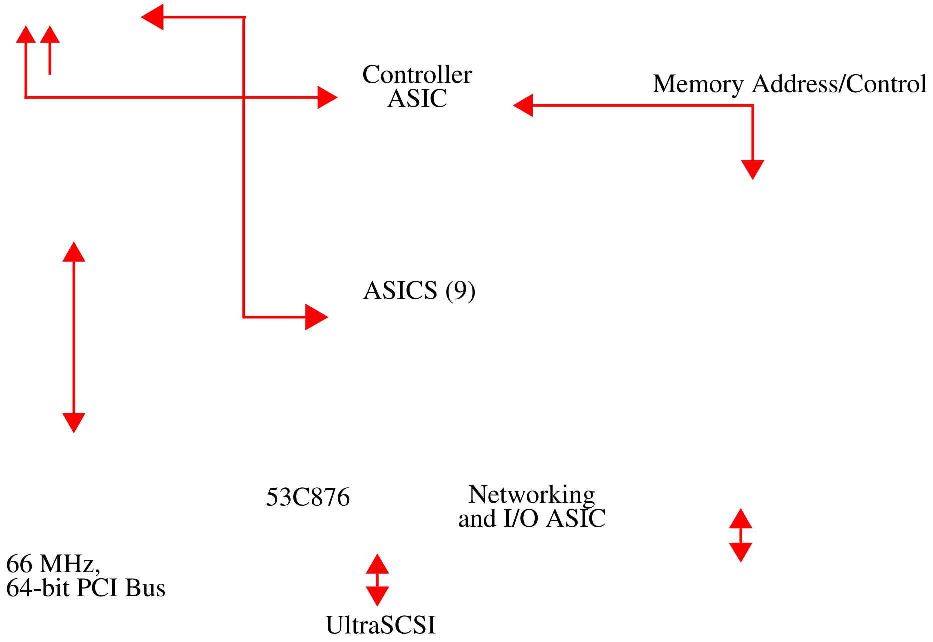
Features	Benefits
• Up to two 450-MHz UltraSPARC-II CPUs with 4-MB Ecache; up to 2 GB of error correcting code (ECC) memory	• Proven UltraSPARC-II technology offers easy performance scalability providing support for heavy, compute-intensive applications and high-traffic environments.
• Space-efficient, rack-optimized 4RU enclosure	• The enclosure offers high compute density giving customers value per rack unit.
• N+1 power, with separate power cords	• A fully configured system can run on one power supply; the second power supply is for redundancy only.
• Five-segment Ultra port architecture (UPA) crossbar datapath moves up to 1.8-GB of data per second between CPUs, memory, and I/O channels	• High-speed parallel data flows enable minimum latency and maximum system resource utilization for sustained high performance under the heaviest workloads.
• Two high-performance, industry-standard PCI I/O buses support four PCI slots plus onboard UltraSCSI, 10/100 Ethernet, and serial and parallel ports delivering up to 200 MB per second total I/O throughput	• Excellent I/O performance makes the Sun Enterprise 220R server an excellent web, e-commerce, or internet gateway server.
• A 40 MB/second UltraSCSI controller supports up to two hot-swap internal 9.1-GB 7200-rpm disks, or 9.1-GB or 18.2-GB, 10000-rpm disks	• Disk drives are front accessible and hot-swappable allowing for ease of servicing.
• High-availability cluster configuration options	• This configuration offers increased availability and uptime with Sun Cluster software.
• Front accessible hot-swap disks and power supplies	• Front doors requiring no tools to open, allow easy access of disk drives and power supplies.

Features	Benefits
The Sun Enterprise 220R server runs Sun's powerful and dependable Solaris™ Operating Environment and is 100 percent binary compatible with all software that runs on the Sun Enterprise 450 server family.	The Solaris Operating Environment, recognized as an industry-leading enterprise network operating system, runs over 12,000 of the most extensively tested, highest quality software packages available today for both commercial and technical applications. Sun Enterprise 220R server customers can deploy systems with confidence, knowing their applications can grow and their investment in network technology, software, and training will be protected.
Solaris Easy Access Server includes many new features, such as Solaris Easy Installer, Sun Management Center software, Sun WebServer™ software, DHCP, PPP, and file and print support for Microsoft Windows, NetWare, and Macintosh clients.	Extensive new software tools make it easier than ever to install and use Sun Enterprise servers for a wide range of applications throughout the enterprise network.

Key Messages

Sun Enterprise 220R server is a new member of the UltraSPARC processor-based workgroup server systems. UltraComputing technology has evolved to new levels of performance and technology innovation.

- **Rack-optimized chassis design provides modularity for flexibility, maximum system growth, and expansion potential**
  - Offers the flexibility of starting with a single CPU and adding another CPU later as compute needs grow
  - Provides memory capacity to 2 GB maximum (16 slots using existing 32-, 64-, or 128-MB DIMMs)
  - Supports 9.1-GB or 18.2-GB drive options (supports 1-inch, 7200-rpm or 10000-rpm UltraSCSI disk drives); up to 36.4 GB of drive space
  - Has expanded front-access capabilities: up to two hot-swap disk drives, power switch, 5.25-inch removable media bay for 32X CD-ROM or tape drive options, and up to two hot-swap power supplies
  - Allows for high I/O expansion with four long, industry-standard PCI bus slots
- **High-performance UltraSPARC-II CPU processor module**
  - 64-bit SPARC version 9 at 450 MHz
  - 4 MB of second-level cache memory
  - 100 percent binary compatibility with the Solaris Operating Environment
  - Runs 32-bit applications unmodified from the Solaris 2.6 and Solaris 7 Operating Environment


Controller
ASIC
Memory Address/Control
ASICS (9)
53C876
Networking
and I/O ASIC
66 MHz,
64-bit PCI Bus
UltraSCSI

Matching performance enhancement in I/O, networking, and memory access

- Application performance without compromise

Technical Fact Summary

- **High-performance system bus provides fast access to memory and graphics**
- **Flexible hard disk expandability**
  - Up to two internal 9.1-GB or 18.2-GB hot-swappable UltraSCSI disks
  - Up to 36.4 GB of total internal disk storage
- **High-performance memory subsystem**
  - Up to 2 GB for all configurations using 16 x 128-MB DIMMs (installed in sets of four)
  - Supports Sun Enterprise 2, 250, and 450 server DIMMs for compatibility and investment protection
- **High-performance I/O**
  - Two channels at 40 MB/second UltraSCSI
  - Innovative high-performance PCI I/O bus offering dual independent PCI buses, plus 66-MHz PCI support
- **Expansion to advanced networking**
  - Fast Ethernet, 100BASE-T, autosensing, and autoswitching to 10BASE-T for backward compatibility
  - MII connector to Fast Ethernet for connection to other types of Ethernet transceivers and media
  - PCI networking options include Gigabit Ethernet, ATM, token ring, and FDDI
- **Power supply**
  - Second power supply allows for complete redundancy
  - Power supplies are hot-swappable
  - Each power supply has its own power cord
- **System enclosure**
  - Rack optimized 4RU system fits in a standard 19-inch rack
  - Front-accessible disk drives and power supplies

UltraSPARC Processor

The Sun Enterprise 220R server is a high-performance, multiprocessing system built around the UltraSPARC-II microprocessor. The UltraSPARC-II processor is Sun's latest generation of the SPARC™ processor family and the second generation of 64-bit UltraSPARC chips. It utilizes the latest 0.35-micron technology (compared to the UltraSPARC-I CPU's 0.5-micron technology), which shrinks the die size to 149^2 mm (from 218^2 mm). This reduced die size is the key to UltraSPARC-II CPU's higher clock rates and increased performance. This smaller die size also enables the UltraSPARC-II processor to operate at a core voltage of 2.5 volts, rather than UltraSPARC-I CPU's 3.3 volts. This lower voltage reduces power consumption and allows the chip to operate at higher frequencies without increasing total power requirements or heat dissipation—both major design issues in today's high-performance systems.

The UltraSPARC-II processors used in the Sun Enterprise 220R server are individually mounted on 4-inch x 6-inch, field-installable module cards along with associated UPA data buffers and up to 4 MB of high-speed SRAM external cache memory. This modular design facilitates easy system processor upgrades (to next-generation UltraSPARC processors), and system service.

Features	Benefits
• 450-MHz performance	• Fastest application performance of any Sun workgroup server
• Integrated VIS™ instruction set	• Ready for increased performance on multimedia and networking operations
• Multilevel trap handling	• Efficient process handling
• CPU is mounted on field-installable module card with associated UPA data buffers and 4 MB of Ecache	• Facilitates easy system processor upgrades and system service

UPA System Bus

The Sun Enterprise 220R server processors, memory, and I/O subsystems are interconnected by the high-speed Ultra port architecture (UPA) crossbar datapath. This is an enhanced implementation of the same UPA design used in the Ultra 60 workstations. The CPU datapaths are 144-bits wide, with 128 bits for data and 16 bits for error correcting code (ECC). The UPA data path that support system I/O is 72 bits wide, with 64 bits for data and 8 bits for ECC. The memory interface supports a single 576-bit-wide datapath.

With 450-MHz CPU installed, the UPA transfers data at 112.5 MHz, or one transfer every 9 nanoseconds. CPU segments, which transfer 16 bytes of data in parallel every clock cycle, each have a maximum transfer rate of 1.8 GB per second.

Features	Benefits
• Single 576-bit-wide, high-speed memory bus	• High-performance memory access • Flexibility in memory expansion options
• 112.5-MHz UPA	• Able to use advanced UltraSPARC-II processors

Memory

The Sun Enterprise 220R server has eight memory slots supporting up to 2 GB of 60-ns, 5-volt, dynamic RAM memory. The dual in-line memory modules (DIMMs) used by the Sun Enterprise 220R server are the same type as those used in the Sun Enterprise 2, 250, and 450 workgroup server products. Memory is organized into four banks of four DIMMs. DIMMs must be installed in sets of four identical DIMMs.

Feature	Benefit
• Uses the same type of memory as the current workgroup server products	• Protects customer's investment and enhances upgradability

System I/O—High-Performance PCI Technology

System I/O for the Sun Enterprise 220R server is provided by two industry-standard peripheral component interconnect (PCI) data buses. Both PCI buses in Sun Enterprise 220R servers comply with the 2.1 revision of the PCI specification, released in March 1995.

Slot	Slot Width	Clock Rate	Card Input Voltages Supported
1	32 or 64 bits	33 or 66 MHz	3.3 volt or universal
2–4	32 or 64 bits	33 MHz only	5 volt or universal

- PCI slot 1 operates at 33 or 66 MHz and supports either a 32-bit or 64-bit, 3.3-volt or universal PCI card
- PCI slots 2 through 4 operate at 33 MHz and provide for 32- or 64-bit, 5-volt or universal PCI cards.

In addition to the I/O capabilities available through PCI option cards, the Sun Enterprise 220R server provides the following I/O channels directly from the main system board:

- One internal 40-MB UltraSCSI channel
- One external 40-MB UltraSCSI channel with an external 68-pin SCSI connector
- One external 10/100BASE-T autoselect Ethernet port (supports either a Cat-5 UTP, RJ45 connector, or 40-pin miniature "D" MII connection)
- Two external EIA-232D or EIA-423 serial ports via two DB25 connectors (support EIA-423 synchronous data rates from 50 baud to 384 Kbps, and asynchronous data rates from 50 baud to 460.8 Kbaud)
- One external 2-MB Centronics-compatible, bidirectional, EPP parallel port with one DB25 connector
- One external standard Sun keyboard/mouse port (mini DIN-8 connector)

Features	Benefits
• 66-MHz PCI with 200 MB/second bandwidth (sustained)	• High performance I/O throughput • Access to many third-party solutions
• Two independent PCI buses	• High, sustained I/O throughput
• Two independent UltraSCSI buses	• Higher performance throughput through the use of independent buses

Storage

Internal data storage for the Sun Enterprise 220R server is provided by up to two 3.5-inch, 1.0-inch high hot-swappable UltraSCSI disk drives. UltraSCSI drive size is 9.1 or 18.2 GB. These 7200-rpm or 10000-rpm drives offer a peak data transfer rate of 40 MB per second. Front accessibility allows for ease of servicing.

In addition to its internal and external high-speed fixed storage capabilities, the Sun Enterprise 220R server provides a 32X CD-ROM drive.

Features	Benefits
• 40 MB/second UltraSCSI	• Fast access and retrieval of mass storage data
• 9.1- or 18.2-GB disk options	• Flexibility in internal disk expansion and high internal capacity
• Front accessible, hot-swappable	• Ease of servicing

The Sun Enterprise 220R server accommodates front-access peripheral expansion.

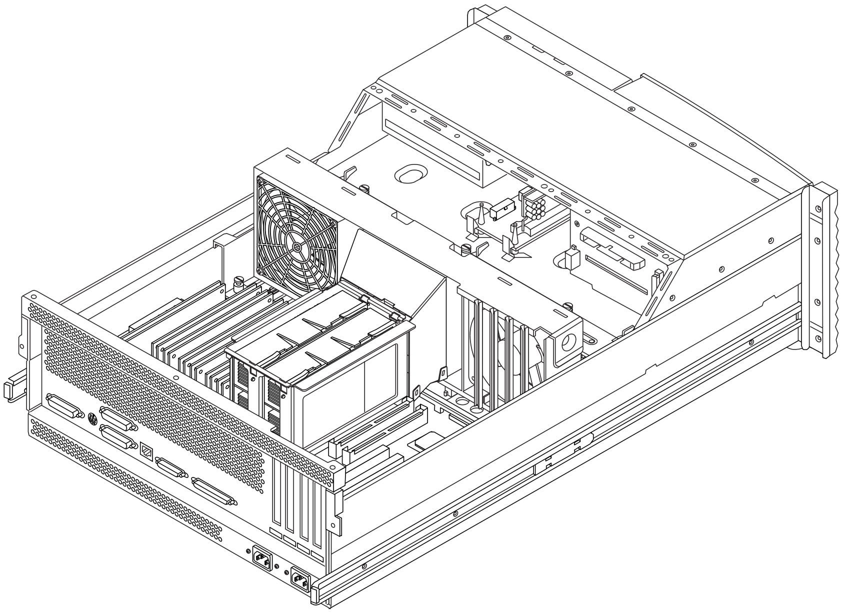


Figure 3. Sun Enterprise 220R server chassis with access panel removed, provides full access to internal options

Sun Enterprise 220R System Configuration

Dimensions	17.78 cm x 44.90 cm x 69.56 cm (H x W x D) 7.0 inches x 17.25 inches x 27.25 inches
Weight	29.5 kg (65 pounds)
CPU and UPA	
• Architecture	UltraSPARC-II
• Clock rate	450 MHz
• Processor slots	2
• Cache on chip	32 KB
• External cache	4 MB
• UPA speed	112.5 MHz
Memory	
• Memory type	ECC
• Number of slots	16
• Capacity	128 MB to 2-GB
• DRAM speed	60 ns
• Bus width	576 bits
• DIMM sizes	32, 64, and 128 MB
Storage	
• Maximum internal	Up to two internal hot-swap disks with up to 18.2-GB capacity each
• Maximum total internal	36.4 GB

I/O Interfaces	
• UltraSCSI	40 MB/sec. UltraSCSI (SCSI-3), 2 channels
• Serial ports	Two RS-232C/RS423 DB25
• Parallel port	Centronics compatible (DB25)
• PCI I/O bus	Four long PCI slots (version 2.1): Three at 33 MHz; one at 33 or 66 MHz
Networking Ports	TP Ethernet 10/100BASE-T or MII port
Power Supply	Up to 2 hot-swap 380 watt power supplies, with separate power cords
Backup and Distribution	
• CD-ROM	SunCD™ 32X
• Internal	Optional 12 to 24-GB DDS-3 4-mm or 20-40-GB 8-mm, up to two 9.1-, or 18.2-GB hot-swap disks
• External	8.4 to 109.2-GB Sun StorEdge™ MultiPack system 20 to 40 GB, 8-mm 12 to 24-GB, 4-mm DDS-3 400-GB Sun StorEdge L400 tape library Sun StorEdge A1000/D1000 array Sun StorEdge A3500 array Sun StorEdge A5200 array

System Management

System Administration

Built into the Solaris™ 7 Operating Environment are systems management and security features that will help deliver the computing environment demanded by these customers. Sun also offers unbundled systems management products that will supplement the systems management features in the Solaris 7 Operating Environment. Together, the Solaris 7 Operating Environment management features and Sun's unbundled systems management products create one of the most stable and available computing environment, in the industry.

Virtually any administrative task can be executed over a remote connection from any client by an authenticated administrator. And since a Solaris Operating Environment rarely requires rebooting, administrators will not lose their network connection when adding new software or reconfiguring the system. Solaris Operating Environment applications can be installed or upgraded on a Solaris server without affecting users and without disabling the network services running on that computer.

Management Function	Sun Management Tools	Standard or Sold Separately
System installation, Software installation	• Sun OpenBoot™ firmware • Solaris Web Start and Solaris WebStart Wizards™	• Standard • Standard
System configuration	• Solstice AdminSuite™ • Solaris Management Console™	• Standard • Standard
User administration	• Solstice AdminSuite • Solaris Management Console	• Standard • Standard
Security management	• Solstice AdminSuite • Sun Enterprise Authentication Mechanism™ • SunScreen™ Secure Net • SunScreen SPF-200	• Standard • Standard • Sold separately • Sold separately
Storage management	• Solstice AdminSuite • Solstice DiskSuite™ • Solstice Backup™ • VERITAS Volume Manager • VERITAS File System • Sun StorEdge LibMON™ • VERITAS NetBackup • Sun StorEdge™ Instant Image	• Standard • Standard • Standard • Sold separately • Sold separately • Sold separately • Sold separately • Sold separately
System monitoring	• Solstice AdminSuite • Solaris Management Console • Sun™ Management Center • Solstice Site Manager™ • Solstice Domain Manager™	• Standard • Standard • Sold separately • Sold separately • Sold separately
Tuning, resource, and performance management	• Solstice AdminSuite • Solaris Resource Manager™ • Solaris Bandwidth Manager • Sun Bandwidth Allocator	• Standard • Sold separately • Sold separately • Sold separately

Management Function	Sun Management Tools	Standard or Sold Separately
Fault detection and recovery	• ShowMe How™ • Power On Self Test (POST) • OpenBoot Diagnostics • SunVTS™ • Sun Management Center • Sun Cluster	• Standard • Standard • Standard • Standard • Standard • Sold separately
Upgrade administration	• ShowMe How	• Standard
Management application development environments	• Sun Management Center • Solaris WBEM Services • Solstice Enterprise Agents™ • Solstice Enterprise Manager™ • Solstice CMIP • Solstice TMN Product Set	• Standard • Standard • Standard • Sold separately • Sold separately • Sold separately

OpenBoot Diagnostics

OpenBoot Diagnostics (OBDiag) reside in flash PROM on the server's main logic board. OBDiag can isolate errors in the following system components:

- Main logic board
- Diskette drive
- CD-ROM drive
- Tape drive
- Disk drives
- Any option card that contains on-board self-test capabilities

OBDiag tests not only the main logic board, but also its interfaces:

- PCI
- SCSI
- Ethernet
- Serial
- Parallel
- Keyboard/mouse

OBDiag reports test results via the LEDs located on the system front panel. OBDiag also displays detailed diagnostic and error messages on a local console or terminal, if one is attached to the system.

OBDiag tests run automatically under certain conditions. Users can also run OBDiag interactively from the system OK prompt. When users run OBDiag interactively from the OK prompt, they invoke the OBDiag menu, which lets users select which tests they want to perform. The system also provides configuration variables that users can set to affect the operation of the OBDiag tests.

OpenBoot Firmware

The OpenBoot firmware is stored in the boot programmable read-only memory (PROM) of the system. It is executed immediately after the customer turns on the system. The primary task of the OpenBoot firmware is to boot the operating system from either a mass storage device or from a network. The firmware also provides extensive features for testing hardware and software interactively.

The OpenBoot firmware provides a command line interface for customers at the system console. Customers can enter the OpenBoot environment by halting the operating system, using the Stop-A key sequence from the keyboard, or by power-cycling the system.

The OpenBoot device tree is a data structure that describes both the permanently installed and plug-in devices attached to a system. Both the user and the operating system can determine the hardware configuration of the system by inspecting the OpenBoot device tree.

Power On Self Test (POST)

The POST diagnostic code resides in flash PROM on the system's main logic board. It runs whenever the system is turned on or when a system reset command is issued. POST tests the following system components:

- CPU modules
- Memory modules
- NVRAM
- Main logic board

POST reports its test results via LEDs located on the system keyboard and on the system front panel. POST also displays detailed diagnostic and error messages on a local terminal, if one is attached to the system's serial port A.

ShowMe How Software: State of the Art Installation and Maintenance Instruction

ShowMe How software is a documentation system that presents information in a highly understandable multimedia format. ShowMe How software is included in Solaris Easy Access Server package. Installation and service tutorials, as well as reference information provide users with comprehensive, easy-to-use instruction. ShowMe How software streamlines installation and maintenance to lower service costs and maximize system uptime. Some of the features of this CD-ROM distributed tool are:

- Movies of installation and replacement procedures (can be played through ShowMe TV™ software)
- Photo sequences with narrated installation and replacement procedures
- Text-based instructions (can be viewed on-line and printed, excerpted from standard Sun documentation)
- Photos with active callouts link to more detailed photos and text-based reference information

Solaris Bandwidth Manager Software

Solaris Bandwidth Manager software, available with Solaris ISP Server software, allows the administrator to control the bandwidth assigned to particular applications, users, and departments that share the same Internet link. By installing Solaris Bandwidth Manager software on their network's major links and application servers, and by setting consistent policies, customers can distribute bandwidth evenly. And customers can prioritize traffic, preventing a small number of applications or users from consuming all available bandwidth.

Solaris Bandwidth Manager software enables customers to:

- Provide differentiated classes of service to users, and bill accordingly
- Provide bandwidth to priority users, applications, or servers
- Reduce traffic congestion and increase network efficiency
- Control users and applications in their access to network resources
- Gather detailed network use statistics and accounting data for usage-based billing

Solaris Bandwidth Manager enables network service providers to get the most out of their existing network resources. It helps them to enable adequate levels of service to their customers, and collect accurate accounting information for usage-based billing.

Solaris Management Console™ Software

Solaris Management Console™ software, an integral component of Solaris Easy Access Server, makes it easy for administrators to configure and administer Solaris Operating Environment systems. Based on Java™ technology, Solaris Management Console software can launch any UNIX® application on any Solaris server in a network. It provides views of servers on the network as well as applications on those servers, which allows for easy local and remote administration of multiple servers running Solaris Management Console software. It also delivers powerful capabilities to make the process of adding users, hosts, or applications as simple as pointing and clicking from virtually any client on the network.

Solaris Management Console software enables administrators to register other Solaris Management Console servers and applications on the network. When the console is accessed, it dynamically configures tree views of registered hosts and services, making it easier to manage each Solaris server. Solaris Management Console software enables administrators to view activity on all their servers and modify applications and services running on them.

Solaris Management Console software allows administrators to launch applications, such as administration tools on a remote server, while monitoring the application via a light front-end GUI on the client. This eliminates the need to download large applications over the network and install and run them on the client. With Solaris Management Console software, remote servers can be managed easily with tools already located on the server. This remote capability allows administrators to manage administrative and network services from home or virtually any other location without having to come in to the network operation center when a trouble call comes in.

Solaris Management Console software makes Solaris Operating Environment administration easier by providing:

- Centralized administration—current Solaris Operating Environment administration tools can be integrated and run from one location
- Centralized management—all servers on a network can be managed from a single console
- Single login—eliminates multiple logins into applications launched by Solaris Management Console software
- Instant access to administration tools by running existing Solaris Operating Environment administration tools found in Solaris Easy Access Server

Solaris Management Console software also provides a set of wizards to simplify complex administration tasks:

- DNS server configuration
- DNS client configuration
- Default router modification
- Change root password
- Network connection configuration
- Shutdown/restart computer

Solaris Administration Wizards can be run from Solaris Management Console software or invoked via the command line. The wizards make the Solaris Operating Environment easy to administer by providing a point-and-click, Java technology-based graphical user interface (GUI) for configuring Solaris systems.

Solaris Resource Manager Software

Solaris Resource Manager software is a tool for enabling resource availability for users, groups and applications. It provides the ability to allocate and control major system resources such as CPU, virtual memory, and number of processes. Solaris Resource Manager software is the key enabler for server consolidation and increased system resource utilization. With this product, multiple applications and groups receive a consistent level of service on a single server. In fact, resources can be allocated to the individual user. Resource utilization can actually increase because unused capacity is dynamically allocated to active users and applications. Systems can become easier to manage because system administrators have the ability to set and enforce resource usage policies. Solaris Resource Manager software makes resource usage data available for use in user-defined reports, accounting tools and scripts.

Solaris Resource Manager software includes the following features:

- Ability to control CPU, virtual memory, number of processes, number of logins, and connect time
- Dynamically allocate resources according to predefined policies
- Map resources to groups within applications and individual users within groups
- Ability to automate dynamic resource allocation through easy to set resource policies

Solaris WBEM Services

Part of the Solaris Easy Access Server, Solaris WBEM Services makes the Solaris Operating Environment manageable by tools from other enterprise management vendors. It also allows Solaris software tools to manage existing heterogeneous networks. This is because WBEM is compatible with existing major protocols, such as Simple Network Management Protocol (SNMP), Desktop Management Interface (DMI), and Common Management Information Protocol (CMIP). Developers can write WBEM agents or providers to convert information from these protocols to the CIM schema.

Solaris WBEM Services contains a set of tools (Sun WBEM SDK) and services to make it easier for software developers to create applications based on the CIM schema and XML/HTTP communication standards that manage Solaris software systems and administer the Solaris Operating Environment. By combining information from diverse applications, objects from different vendors can be managed as if they were from one vendor, which can greatly reduce the complexity and cost of managing such a heterogeneous system.

Solaris Web Start Software

Solaris Web Start software, a key component of the Solaris Operating Environment, is an easy-to-use Java technology-based application that guides system administrators through the installation of both the Solaris Operating Environment and copackaged application software. Solaris Web Start software makes installing the Solaris Operating Environment as simple as clicking a button. Solaris Web Start software offers the industry's first Web-based installation process, enabling all of the setup and administration to be done locally or remotely through a web browser. It also virtually eliminates the UNIX system administration normally associated with software installation and setup. As a result, Solaris Operating Environment and co-packaged software can be installed by less-experienced administrators, or administrators familiar with Microsoft Windows installations, safely and easily.

Solaris Web Start Wizards Software

Solaris Web Start Wizards technology extends the point-and-click simplicity of Solaris Web Start software, bringing this same ease of use to applications written for the Solaris Operating Environment. Built into new applications, Solaris Web Start Wizards software simplifies the installation, setup, and administration of native Solaris Operating Environment and Java technology-based applications.

Applications built with Solaris Web Start Wizards software can be installed on a Solaris Operating Environment system locally or remotely from virtually any client running a web browser supporting the Java programming language.

With Solaris Web Start Wizards software, the source for an application may be a CD-ROM drive on the administrator's PC, a drive on the network, or a URL on the Web. The administrator may be using a Solaris Operating Environment workstation, a Microsoft Windows or Macintosh PC, or a network computer.

Solaris Web Start Wizards software is based on technology supplied by and supported by InstallShield Software Corporation, a industry-leading install tools vendor. For administrators, the inclusion of Solaris Web Start Wizards software with the Solaris Operating Environment makes installing applications as easy as installing Microsoft Windows applications.

Solstice AdminSuite Software

Solstice AdminSuite software is a collection of graphical user interface tools and commands that enable system administrators to locally or remotely perform tasks such as managing users, groups, hosts, system files, printers, disks, file systems, terminals, and modems.

Solstice Backup Software

The Solstice Backup software products provide a tightly integrated backup and storage management solution for distributed enterprise environments. It provides scalable, high-performance, lights-out data protection and management services for environments ranging from a stand-alone server to networks with hundreds of multi-platform systems and multi-gigabytes of data. This solution delivers the best heterogeneous data protection available today and provides consistent, reliable data protection as well as comprehensive, automated storage management. These products reduce administrative overhead, improve data accessibility to users and applications, and reduce cost of ownership.

Solstice Backup software allows a Solaris Operating Environment server to provide automated, high-performance backup, recovery, and storage management services to a wide array of machines on the network. This heterogeneous platform support enables a consistent, centralized approach to data storage management across the enterprise. Solstice Backup software, through the use of its SNMP module, can be integrated with Solstice Site Manager software, Solstice Domain Manager software, and Solstice Enterprise Manager software for improved, centralized network management of larger, complex environments.

Solstice Backup software provides simple, centralized administration through a single, unified view of the entire data management operation from any point on the network. All Solstice Backup software applications are cooperatively managed and fully integrated, greatly simplifying administration in a large, dynamic environment. Intuitive user interfaces simplify administrative tasks such as configuring clients and servers and setting up enterprise-wide backup schedules for file systems and databases. Network users can also backup, recover, or archive their local files without assistance from the system administrator.

Solstice Backup software delivers high-speed backup through parallel processing of client backup that can be directed to multiple devices simultaneously. This dramatically improves client performance and backup throughput for reduced backup time.

Through archival services, data can be optionally removed from disk for conservation of storage space once it has been safely stored off-line. Hierarchical storage management services automatically moves less frequently used data on disk to less expensive media, freeing up on-line storage space. Automated media handling such as labeling and mounting media reduces operator intervention.

Solstice Backup Server Edition software brings high-performance, automated, unattended parallel backup and restore capabilities to stand-alone servers. The Server Edition software is ideally suited for backup/restore services for high-volume database and file servers. The Server Edition software can be upgraded to the Network Edition software to support network backups.

Solstice Backup Network Edition software delivers network storage backup for distributed networks of servers and clients. The Network Edition software is ideally suited for multiplatform, enterprise-wide installations.

Solstice CMIP Software

Solstice CMIP 8.2.1 software is the foundation of the Solstice Telecommunications Management Network (TMN) product family. It is the Common Management Information Protocol (CMIP) for other Solstice TMN software products such as Solstice Enterprise Manager software, Solstice TMN Agent Toolkit, Solstice TMN Agent Tester, Solstice TMN/SNMP Q-Adaptor, and Solstice TMNscript software.

Solstice CMIP software is the ideal solution for system integrators and telecommunications equipment manufacturers who want to develop CMIP-based management applications for their products and to deploy these applications to their customer base.

Solstice CMIP software enables the development and deployment of TMN applications and is delivered as two related products. The Solstice CMIP Standard Development Environment (SDE) is used to develop management applications that conform to the TMN management model.

Solstice CMIP Runtime (RT) is a standard implementation of the CMIP and the Common Management Information Service (CMIS). When it is combined with the SunLink™ OSI Communications Platform, Solstice CMIP RT forms a TMN Q3 stack and supports any application developed using Solstice CMIP SDE.

Solstice DiskSuite Software

Solstice DiskSuite software, part of Solaris Easy Access Server, is a disk and storage management solution for enterprise environments. It provides high data availability and reliability, delivers excellent I/O performance, and simplifies large system and disk administration. With Solstice DiskSuite software, customers get a powerful set of tools to enhance data availability.

- **Mirroring**

  Solstice DiskSuite software provides a comprehensive data-redundancy solution. It transparently maintains a mirror copy of data on another disk, and automatically uses the surviving copy in the event of hardware failure.

- **RAID 5**

  The RAID 5 feature in Solstice DiskSuite software provides highly available data storage at a lower cost—using less disk space—than mirroring. By distributing parity information across all disks in the RAID array, it allows recovery from any single disk failure within the array without the loss of data.

- **Hot spare**

  Online system recovery is supplemented by the use of a hot-spare utility that automatically replaces failed mirror or RAID-5 components. This facility migrates new partitions to replace failing ones. Users continue to access the surviving copy of the data—while a new mirror is automatically generated—with no interruptions of operation.

- **UNIX File System (UFS) logging**

  When coming back online after a reboot, UNIX software typically checks file systems for integrity. Although a time-consuming process—especially on large systems—it was necessary to avoid data corruption. With the UFS logging feature in Solstice DiskSuite software, the need for this process has been eliminated. Reboots are much shorter, and system recovery is faster.

Solstice DiskSuite software offers a powerful yet simple graphical user interface (GUI) in addition to the traditional command-line interface. The GUI provides error-free setup of disks such as mirrors and UFS logs, as well as easy, on-going administration of disk subsystems. It delivers a visual representation of the storage subsystem along with drag-and-drop capabilities, both of which are invaluable in managing large, complex disk subsystems.

Other Solstice DiskSuite software features:

- Disk striping enables parallel I/O and load balancing for improved performance
- Alternate pathing support enables Solstice DiskSuite software to use multiple data paths in the case of failure
- A performance monitor helps eliminate bottlenecks
- Concatenation and the grow file system command allow the construction of large, logical devices, and enable online expansion and reconfiguration

Solstice Domain Manager Software

Solstice Domain Manager software is designed for managing larger sites (1,000 to 10,000 nodes). Solstice Domain Manager software provides the scalability and the extra features and user tools needed to manage large sites or multiple sites effectively. Solstice Domain Manager software includes Solstice SunNet Manager™ 2.3 software with no restriction on the number of managed nodes, the full version of Solstice Cooperative Consoles, and an advanced Layout Tool. Solstice Domain Manager software also includes the same tools as Solstice Site Manager software.

To achieve a high level of scalability and remote management, the proxy agent is included in Solstice Domain Manager software. The proxy agent distributes the SNMP polling allowing Solstice Domain Manager software to manage up to 10,000 nodes. The proxy agent also facilitates remote management as all of the polling is localized at the remote site and information is sent back to console via reliable RPC.

Solstice Domain Manager software has full console distribution, meaning it can send and receive information to other consoles. Multiple Solstice Site Manager software systems can feed information into a Solstice Domain Manager software or multiple Solstice Domain Manager software systems, hooked up as peer-to-peer, to share administration capabilities. Solstice Domain Manager software also has an advanced topology Layout Tool. In a large network there are many icons, and users are concerned about the organization of these icons on the console. The Layout Tool addresses this concern by organizing icons by visual representation on the console.

Solstice Domain Manager software solutions should meet the majority of management needs. But just in case, there are 300+ applications that run on Solstice Site Manager and Solstice Domain Manager software for additional network management and data analysis.

Solstice Enterprise Agents Software

Solstice Enterprise Agents software, included in Solaris Easy Access Server, enables a Sun server to be managed from Simple Network Management Protocol (SNMP)-based system/network management tools. Solstice Enterprise Agents software is based on a new extensible agent technology or manager/subagent technology. The manager agents receive and respond to SNMP or desktop management interface (DMI) requests. After retrieving the appropriate values from the respective subagents, responses are sent. The subagents manage information bases (MIBs or MIFs) designed for specific components and applications.

Solstice Enterprise Manager Software

Solstice Enterprise Manager (Solstice EM) software is an advanced management platform designed for managing large enterprises or complex network element devices. It provides the scalability and features to better organize and manage large environments.

Solstice EM software is designed for customers who need to:

- Accommodate network growth
- Automate identification of network problems
- Manage multiple protocols from a single system

Solstice EM software is a standards-based, object-oriented, distributed network management platform that allows customers to monitor, evaluate, and refine the network. It provides tools for performing common network management tasks, such as fault management, performance management, and configuration management, and includes an application programming interface that allows developers to integrate Solstice EM software capabilities into their network management environment.

Solstice EM software provides the following features and functions:

- Support for CMIP, SNMP, and Solstice SunNet Manager software remote procedure call (RPC) protocols
- Full conformance with the TMN standards
- Support for multiple concurrent users
- Graphical user interface (GUI) applications for managing networks
- Application programming interface (API) for developing user-specific applications that integrate with the Solstice EM software platform

To help isolate complex system or network problems, the Solstice Enterprise Manager Nerve Center technology provides advanced event correlation. Plus, Solstice Enterprise Manager supports multiple protocols such as SNMP, CMIP, and allows support for proprietary protocols.

Solstice Cooperative Consoles™ software will connect Solstice Site Manager software and Solstice Domain Manager software to Solstice Enterprise Manager software.

Solstice Site Manager Software

Solstice Site Manager software is designed for small site management of PC-LAN servers, networking, and UNIX technology-based devices. Solstice Site Manager software is intended to address small site management by cost-effectively centralizing the management efforts.

Solstice Site Manager software includes Solstice SunNet Manager 2.3 software with a license restriction of 100 nodes, along with the sender portion of Solstice Cooperative Consoles software which allows management data (topology, events, and traps) to be forwarded to Solstice Domain Manager software.

All of the Solstice SunNet Manager software tools are incorporated into Solstice Site Manager software. Discover Tool automatically finds devices on the network and populates the database. Request Management handles data or event requests. Browser Tool simplifies reviewing problem areas. Finally, Grapher Tool allows data to be quickly displayed in 2D or 3D graphics.

Solstice Site Manager software also includes the SNM Proxy agents for remote management. In this scenario, all of the polling is localized at the remote site and sent back to the console via reliable RPC.

Solstice Site Manager software can centralize LAN management by accessing the NetWare Management Agent (NMA) 2.0. This agent resides on a NetWare server that also has TCP/IP installed on it. The NMA agent allows Solstice Site Manager software to manage the NetWare server's file system, print queues, user groups (who is logged in), and other key attributes.

Solstice Site Manager software can also import the topology data from the Novell ManageWise network management console. With this feature, Solstice Site Manager software can view the PCs that are on the NetWare LAN as a separate view from the IP network that it is managing.

Solstice TMN Product Set

Sun provides a range of telecommunications management network (TMN)-based products that let customers develop and deploy both agent and manager applications for the network. The products in the Solstice TMN product set are listed below:

- Solstice GDMO Builder
- Solstice TMN Agent Toolkit
- Solstice TMN Agent Tester
- Solstice Enterprise Manager software
- Solstice TMNscript Toolkit™
- Solstice TMNscript Runtime™
- Solstice TMN/SNMP Q-Adaptor Toolkit
- Solstice CMIP Runtime
- Solstice Enterprise Manager Dev Plus Kit

- Solstice OSI
- Solstice CMIP SDE
- Solstice TMN/SNMP Q-Adaptor Runtime

The definition of managed objects, software abstractions representing the management view of resources, is the core of network management using the TMN model. The Solstice GDMO Builder includes most of the object models that have been defined by standards organizations, for example ISO and the ITU-T. This means that customers can import and use objects from these models and then either modify them or add to them to tailor the object model to their own needs.

The Solstice GDMO Builder software provides the following tools:

- The Model Editor—a graphical tool for browsing and editing GDMO templates
- A GDMO/ASN.1 Semantic Checker—so customers can check the validity of the GDMO model
- A Proforma generator—a graphical tool for producing conformance statements
- A central database for storing GDMO models—so users can reuse objects they have created

Solstice TMN Agent Toolkit software greatly simplifies the development of TMN agent applications. It does this by automating a large part of the agent development process.

Solstice TMN Agent Toolkit has the following components:

- An ASN.1/GDMO compiler
- A library of functions common to all TMN agents (referred to as the core agent) with APIs to use when adding functions
- Commonly used object modules, used for logging information and forwarding events

Solstice TMNscript software provides a simple interface to CMISE services, allowing easy management of information model data. This facilitates the integration of systems based on the telecommunications management network (TMN) model and legacy systems. Solstice TMNscript software can also be used to build stand-alone applications, to create dedicated test tools quickly or to prototype complex management services.

Solstice TMNscript software allows customers to develop applications in the following languages:

- **Tcl**

  Solstice TMNscript software provides an extension to the generic Tcl scripting language so that customers can access CMISE services from within an application written in the Tcl language.

- **Java programming language**

  Solstice TMNscript software provides Java programming language classes that allows customers to access CMISE services from within an application written in the Java programming language.

- **C**

  An example C API allows customers to execute Solstice TMNscript commands from within programs written in the C language.

Solstice TMNscript provides client interfaces which make it possible to access the functions of Solstice TMNscript from programs written in the Java programming language or Tcl. This allows access to CMISE services from any hardware platform and not just from machines that are running Solstice TMNscript software and Solstice CMIP software.

The Solstice TMN Agent Tester software accelerates the testing of TMN agents, allowing them to be tested in isolation before they are integrated with TMN managers and deployed on the network.

Solstice TMN Agent Tester software is fully compatible with Solstice GDMO Builder and Solstice TMN Agent Toolkit software, but can also be used to validate TMN agents developed using other development tools.

To deploy a TMN application, customers require a protocol stack and a manager application. In TMN, managers and agents are connected by the Q3 protocol stack. The Solstice Enterprise Manager TMN Q3 software Interface has the following component parts:

- Solstice CMIP Runtime
- Solstice OSI
- The CMIP Management Protocol Adaptor (MPA) that forms part of Solstice Enterprise Manager software

Solstice CMIP software comes with an RFC 1006 module, which means that it is also possible to use it over the TCP/IP protocol set, allowing TMN applications to be deployed in TCP/IP environments. Both CMIP over OSI and CMIP over TCP/IP are valid Q3 stacks.

TMN applications can be managed using Solstice Enterprise Manager software. Solstice EM software is particularly well-suited for use in large, complex networks and has been designed for customers who need to:

- Accommodate network growth
- Automate identification of network problems
- Manage multiple protocols from a single system

Solstice EM software is a standards-based, object-oriented, distributed network management platform that allows customers to monitor, evaluate and refine the network. It provides tools for performing common network management tasks, such as fault management, performance management, and configuration management, and includes an application programming interface that allows developers to integrate Solstice EM software capabilities into their network management environment.

Solstice EM software provides the following features and functions:

- Support for CMIP, SNMP and Solstice SunNet Manager software remote procedure call (RPC) protocols
- Full conformance with the TMN standards
- Support for multiple concurrent users
- Graphical user interface (GUI) applications for managing networks
- Application programming interface (API) for developing user-specific applications that integrate with the Solstice EM platform

Solstice TMNscript software can be used to develop simple manager applications for use with a straightforward agent, or on a small system or network. This avoids the overheads involved in deploying a more complex system, such as Solstice Enterprise Manager software. Solstice TMNscript software can also be used to develop large applications for situations where the services provided by Solstice Enterprise Manager software are not required and for integration with legacy management systems.

The Solstice TMN/SNMP Q-Adaptor software enables a TMN management network and an SNMP management network to interoperate by enabling CMIP managers to manage SNMP agents. Using Solstice TMN/SNMP Q-Adaptor software, telecommunications operators and service providers can immediately integrate SNMP subnetworks within their TMN management framework. Telco manufacturers can immediately upgrade their existing SNMP devices to TMN standards.

There are two versions of the Solstice TMN/SNMP Q-Adaptor software. Solstice TMN/SNMP Q-Adaptor Runtime software provides a default translation dictionary that supports the standard SNMP MIB-II and Sun-specific extensions to MIB-II. Solstice TMN/SNMP Q-Adaptor Toolkit software allows customers to extend the capabilities of the runtime product to support proprietary SNMP MIBs.

Sun Bandwidth Allocator Software

Sun Bandwidth Allocator software allows Internet service providers (ISPs) and enterprise MIS departments to perform bandwidth provisioning and accounting to help ensure quality of service to their customers.

MIS departments need to be able to help ensure their users quality of service, and ISPs need to offer their customers Service Level Agreements. In order to do this, they must to be able to:

- Provide increased bandwidth and quality of service
- Monitor the levels of bandwidth and quality of service they are providing
- Keep corresponding accounts

Sun Bandwidth Allocator software is a product that provides the means to perform all of these actions. By installing Sun Bandwidth Allocator on the network's major links and known congestion points—and by setting consistent policies—customers can implement bandwidth control throughout the network.

By enabling control of the bandwidth allocated to users, applications, and organizations which are sharing the same link, Sun Bandwidth Allocator software provides the means to enable service providers to deliver adequate levels of service without overprovisioning their network equipment. The traffic prioritization provided by Sun Bandwidth Allocator software can reduce the risk of network congestion and prevents a small number of applications or users from consuming all the available bandwidth.

Sun Bandwidth Allocator software controls traffic sent over a link. It can be installed as a Traffic Manager or as an Application Performance Manager. Installed in "IP-transparent mode" on a device which controls access to the network (LAN, WAN, or Internet), it controls traffic while remaining transparent to IP users. The IP traffic is prioritized by application, traffic type, or customer.

Installed as an Application Performance Manager, Sun Bandwidth Allocator software controls IP traffic from a server to the network (LAN, WAN, or Internet). The server may be a file server, a web server, or any applications server. Traffic can be controlled by application and/or by customer.

Sun Bandwidth Allocator software provides the following functions:

- Provisioning by rule enforcement
- Remote monitoring
- Web flow accounting
- Provisioning rules

Sun Bandwidth Allocator software manages traffic transmission based on provisioning rules which sort and prioritize traffic according to:

- Traffic type (for example, http, ftp, e-mail, news, Telnet, or NFS™ software traffic)
- End-user source or destination address
- Network source or destination address

Sun Bandwidth Allocator software provides real-time statistics on resource usage. These can be accessed via a Java technology-based GUI, Solstice Enterprise Manager software, or any SNMP manager (for example, Solstice Domain Manager or Solstice Site Manager software). A statistics API enables customers to integrate Sun Bandwidth Allocator software statistics into their own monitoring systems.

Flexible accounting schemas allow payment by class of service, per customer, or by actual bytes or packets transferred. A web flow agent collects statistics information and outputs it in ASCII format, which can be automatically sent to a billing system.

Sun Bandwidth Allocator software manages any type of IP-based traffic. It is transparent, and works within a heterogeneous environment without any modification of the systems accessing the gateway.

A comprehensive and user-friendly Java technology-based configuration utility makes it easy to specify bandwidth allocation policies and perform remote management from virtually anywhere on the network.

Reporting utilities can be used to monitor network use by traffic type and by IP address.

The product runs over WAN and LAN links such as Ethernet and FDDI. It can also be integrated with web servers to provide outgoing flow control.

Sun Cluster Software

Sun Cluster software provides higher levels of availability than is possible with a single server. This solution automates recovery from any single hardware or software failure by automatically restarting a failed application or migrating the application and its resources to a backup server in the event of a hardware failure.

Sun Cluster software provides mainframe-class reliability, availability, and scalability for e-commerce, ERP, data warehousing and other mission-critical applications and services. It delivers an easy-to-use, continuously available, multiplatform clustering solution that is completely integrated with the Solaris Operating Environment.

Key features of Sun Cluster software include support for Solaris 7 and 2.6 Operating Environment, up to four clustered nodes from Sun's entire line of servers, failover agents for key applications, and a unified clustering foundation for standard and parallel applications.

Highlights:

- Cluster up to four servers to meet the needs of any workgroup, department, or data center
- Run both standard and parallel applications on the same cluster
- Dynamically add nodes
- Manage the cluster through the easy-to-use Sun Cluster Management Console
- Fault management API to customize applications for high availability
- Individual application failover, local application restart, and local network adaptor failover for fast recovery
- High-speed cluster interconnects and high-bandwidth networking deliver exceptional throughput

Sun Enterprise Authentication Mechanism Software

Sun Enterprise Authentication Mechanism software, a component of Solaris Easy Access Server, delivers an extra layer of security inside the firewall to protect the enterprise from unauthorized access. Through powerful authentication and single sign-on capabilities, Sun Enterprise Authentication Mechanism software provides increased data privacy and integrity.

While firewalls are designed to fend off intruders from the outside, they cannot address security incidents that originate from within. Today, growing evidence indicates that most security breaches start with people inside—or known to—the enterprise. For true network security, customers need to take steps to protect the company's valuable data resources from unauthorized access—from both inside and outside the enterprise.

Sun Enterprise Authentication Mechanism software provides the extra layer of security customers need to protect the enterprise. By combining centralized authentication with strong encryption, Sun Enterprise Authentication Mechanism software provides a more secure login process, which helps customers to better protect their data privacy and integrity.

- **Centralized authentication and management**

  Sun Enterprise Authentication Mechanism software offers a single repository for enterprise authentication information called the Key Distribution Center (KDC). The KDC maintains a database of user, server, and password information. Through that database, Sun Enterprise Authentication Mechanism software can authenticate users, servers, and applications. Anyone and everyone attempting to access information must first be checked against the KDC database before being ticketed as an authenticated user. Because security information is centralized, Sun Enterprise Authentication Mechanism software allows customers to manage and control all enterprise-wide logins from a single console, which helps their enterprise reduce the total cost of administering and managing security.

- **Strong encryption support**

  Sun Enterprise Authentication Mechanism software provides strong encryption support. During the authentication process, all the information exchanged between customers and the KDC is encrypted for an extra level of security. Sun Enterprise Authentication Mechanism software also uses an encrypted channel when storing KDC entries over the network.

- **Ease of use**

  Sun Enterprise Authentication Mechanism software supports a Java technology-based administrative tool for easy access and configuration. It also enables users to load authentication information in batch mode, which is particularly useful if the enterprise loses or gains large numbers of users each year.

  Sun Enterprise Authentication Mechanism software supports single sign-on capabilities. With single sign-on, Sun Enterprise Authentication Mechanism software can authenticate users (to gain access to multiple applications) by ticketing them only once when they first log in. It also spares users the need to memorize multiple passwords, or enter passwords multiple times in a session.

- **Higher availability**

  Sun Enterprise Authentication Mechanism software's distributed architecture provides enterprises with higher availability. With Sun Enterprise Authentication Mechanism software, customers can replicate their security information. This provides faster access to information as well as duplicate copies in the event of an emergency. Should the master KDC fail, the read-only replicated slave KDC still holds the necessary information for the authentication process to take place without interruption. What's more, if the master becomes unrecoverable, customers can easily convert the replicated slave to be the new master.

- **Faster performance**

  Sun Enterprise Authentication Mechanism software is faster and more reliable because its replicated KDCs reduce contention for security verification from across the enterprise. For example, replicas may be created for use by different business divisions or remote offices. Instead of competing for a single copy, the division or office has its own copy. Consequently, access to secured applications becomes faster.

- **Multiple realms**

  Sun Enterprise Authentication Mechanism software supports multiple realms. A realm is the set of users or servers registered with a specific KDC—basically, the scope of authentication for a given KDC. Separating an enterprise into multiple realms enables Sun Enterprise Authentication Mechanism software to operate across organizational boundaries and between different systems. A client in one realm can be authenticated to a server in another.

  Sun Enterprise Authentication Mechanism software allows enterprises to isolate individual departments from each other, decentralizing control to local network administrators. For large corporations, realms enable Sun Enterprise Authentication Mechanism software to be configured to allow administration at the local level.

- **A more secure environment**

  Currently, Sun Enterprise Authentication Mechanism software supports secure ftp, NFS software, Telnet, and r* commands. These secure network services, combined with strong encryption support, enable the enterprise to preserve data privacy and data integrity by eliminating snooping around the network and tampering with data. With Sun Enterprise Authentication Mechanism software, users can access files securely over the network.

- **Interoperability**

  Sun Enterprise Authentication Mechanism software is compliant with Internet RFC 1510 and RFC 1964. These RFCs define the Kerberos V5 protocols, the de facto industry standard. Through this standards compliance, Sun Enterprise Authentication Mechanism software allows enterprises to integrate with other vendors' compliant security products.

- **Cost-effective**

  Because Sun Enterprise Authentication Mechanism software is included in Solaris Easy Access Server, it offers feature-rich security mechanisms—with unlimited usage—at a significantly lower cost than many third-party solutions available today.

  It requires fewer administrators because it is centrally managed, enabling customers to lower the cost of securing their enterprise.

- **Programmable security APIs**

  Sun Enterprise Authentication Mechanism software allows ISVs to secure their applications by Remote Procedure Call API (RPCSEC_GSS). This API is an implementation of the RPCSEC_GSS security protocol defined in Internet RFC 2203. When future security products from Sun or third-parties become available, these products can be easily plugged into the interface without requiring modifications to the application, enabling customers to adopt evolving security technologies quickly and easily. For example, if Sun developed a public-key security mechanism in the future, this mechanism would be easily accessible by any application that uses the RPCSEC-GSS interface.

Sun Management Center Software

Sun Management Center software (formerly Sun Enterprise SyMON™ software) is a scalable, SNMP-based platform for managing Sun servers. The most advanced systems management solution from Sun to date, Sun Management Center software offers a single point of management for all Sun servers, desktops, storage systems, the Solaris Operating Environment, applications, and data center services.

Sun Management Center software lets customers scale from management of a single system to thousands of systems on a single, unified management platform. And it integrates easily with leading third-party platforms for added flexibility.

With predictive failure reporting and comprehensive event and alarm management, Sun Management Center software warns customers of potential problems—so they can solve them before they cause downtime.

Sun Management Center software simplifies the management of their Sun environment, so customers can use their administration staff and technical resources more efficiently and help reduce the cost of delivering network services.

Sun Management Center software enables administrators to spend more time optimizing service delivery, less time dealing with management complexity. For example, Sun Management Center software provides remote online control, so administrators can work from virtually anywhere. “No cease” management provides uninterrupted monitoring while new features are added or existing features are reconfigured. And built-in security enables multiple administrators with different responsibilities to manage the environment.

Sun Management Center software provides real-time system performance and configuration data, enabling administrators to isolate bottlenecks. It even provides optional centralized data storage and performance analysis, including historical trend analysis.

Sun Management Center software delivers everything administrators need to perform remote system configuration, monitor performance, and isolate hardware and software faults—all through an easy-to-use Java technology interface. It provides:

- A single point of management, enabling administrative resources to be used more effectively
- Active configuration management controls, providing a secure interface for remote dynamic reconfiguration capabilities and helping to ensure availability
- A single event model, enabling information to be shared with multiple consoles or users with ease
- Multiple system support, enabling administrators to monitor and manage all Solaris Operating Environment systems remotely
- Predictive failure analysis, enabling administrators to predict potential failures before they occur
- Health monitoring, along with suggested steps for problem resolution, resulting in simplified administration
- Logical element grouping, enabling Sun systems to be grouped by geographical location, server role, administrative responsibility, among others.
- A comprehensive topology map, providing a high-level view of all the objects that are being managed, along with hierarchies
- Automatic discovery of Sun systems, including IP address, subnet address, hostnames, and more
- Event and alarm management, providing administrators with the information they need when they need it
- Enterprise-wide security measures, such as authentication, data integrity, and access control lists for management of data and active management functions
- Standard interfaces and protocols, enabling integration with third-party management tools, including Tivoli, Computer Associates, and BMC
- A Java technology interface, providing heterogeneous GUI support, a common look-and-feel for all Sun Management Center applications, and the flexibility to manage the enterprise from any platform using Java technology

SunScreen Secure Net Software

SunScreen Secure Net software is a bundled solution which includes SunScreen EFS™ and SunScreen SKIP software. It enables users to establish a secure business network. SunScreen Secure Net software is a comprehensive security solution (including one of the industry's fastest firewalls) that builds on the power of the Solaris Operating Environment.

The customer can configure SunScreen Secure Net software to be a stealth box like the current SunScreen SPF-200 software, including hardening the operating system. Or the customer could select a few interfaces to be stealth and elect for other interfaces to be SunScreen EFS software interfaces, thereby allowing for functionality such as proxies. This gives SunScreen Secure Net software a unique capability of using stealth when connecting to untrusted networks (e.g., the Internet), while providing added functionality of proxies in other interfaces.

SunScreen SPF-200 Software

SunScreen SPF-200 software is Sun's strongest platform for perimeter defense, providing secure business operations over the Internet. SunScreen SPF-200 software uses a stealth design to prevent attack and state-of-the-art SunScreen SKIP encryption to protect data going over the network. SunScreen SPF software's advanced dynamic packet filtering coupled with Sun's high-speed hardware is designed to meet the most demanding performance requirements.

SunScreen EFS software was rated the fastest firewall in a recent Data Communications performance test that included the top firewall vendors. Given SunScreen SPF software's internal design and optimization, SPF should run even faster. The performance of SunScreen SPF software enables it to keep up with the demands required to screen large amounts of Internet traffic.

The stealth design, which makes SunScreen SPF software not addressable with an IP address, provides two benefits. The stealthing makes SunScreen SPF software more secure as potential intruders can not address the machine running SunScreen SPF-200 software. Also, installation of SunScreen SPF software into the network is easy, since the administrator can install it without changing routing tables.

The stealth design "hardens" the operating system and turns the system into a dedicated SunScreen SPF software system that only runs SunScreen SPF-200 software. Hardening the operating system enhances security since other applications do not run on the system, there is less exposure. SunScreen SPF software uses a separate administration station that can be any SPARC machine and need not be dedicated. State-of-the-art SunScreen SKIP encryption technology provides secure network communication and acts as the infrastructure for electronic commerce, Extranets, and secure remote access. SunScreen SKIP software protects the data being transmitted, helps ensure its integrity, and provides a high level of authentication.

SunScreen SPF software covers both TCP and UDP services. SunScreen SPF software keeps track of the sequence of events that occur with a UDP service even though UDP is in fact a stateless protocol. This is done to improve security and performance.

SunScreen SPF software allows flexibility in logging what has passed or failed through the screen. Administrators can choose what they want to monitor and also be alerted to problems through alerts to network management stations.

To provide additional protection of the internal network, network address translation (NAT) converts internal address to a different set of public addresses. This also helps those customers that didn't formally register internal host IP addresses. NAT supports both static and dynamic translation of internal addresses to public addresses. Since hackers do not know internal addresses of hosts, attacks are minimized.

Administration is done through secured remote administration stations, enhancing security, and meeting the needs of organizations for remote management.

VERITAS NetBackup Software

VERITAS NetBackup software provides high-performance, industrial-strength backup, archive, recovery and space management services for UNIX and PC clients in the large enterprise. With high-speed backup of large databases, centralized management capabilities, mainframe-class media management, and support for high-end tape drives and robotics, VERITAS NetBackup software is specially geared for the large data center customer.

VERITAS NetBackup software cost-effectively automates backup and recovery for thousands of nodes across multiple servers, while enabling the enterprise to manage its storage from a single console. With optional add-on modules, VERITAS NetBackup software provides high-performance hot or cold database backup, as well as archive capabilities that allow the enterprise to effectively manage data that is rarely accessed yet requires long-term storage. VERITAS NetBackup software features sophisticated media and device management capable of managing media across the enterprise from a single location, and enabling sharing of tape robotics hardware with other applications.

Sun StorEdge Instant Image Software

Sun StorEdge Instant Image software is a point-in-time copy facility which runs on a Solaris Operating Environment application or storage server. Instant Image will enhance the ability of businesses to achieve non-stop business processing by capturing frequent snapshots of live data for independent read and write purposes. Sun StorEdge Instant Image software enables point-in-time copies, or shadow volumes, to be created on a Sun storage system. A shadow volume is a replicated view of data which has been frozen at a specific point in time and is used to enable a secondary application to non-disruptively access a primary application’s data. Product applications include the following:

- **Backups**—Enable on-line processing to continue while backup processes backup a point-in-time snapshot image of on-line data
- **Data warehouse loading**—Populate a data warehouse from a snapshot image of on-line data
- **Application development and testing**—Make a snapshot image of production data available as test data for new applications
- **Data migration**—Use Sun StorEdge Instant Image software to help migrate from one storage platform to another

Sun StorEdge LibMON Software

Sun StorEdge LibMON software is host-based software used to monitor and administer tape libraries via a web browser enabled by Java technology. Sun StorEdge LibMON software allows for event logging and notification as well as remote monitoring of library activity.

Sun StorEdge LibMON software will monitor library status and activity through periodic polling of the library, providing status on the DLT drives, library robotics, inventory, and cartridge slot status. Library status can be monitored from virtually anywhere on the network.

Library activity and Sun StorEdge LibMON software commands will be logged. Notification of important events can be sent to defined recipients via e-mail.

Sun StorEdge LibMON software will allow the operator to remotely control certain library features, such as placing the library online/offline, downloading new firmware for the library robotics, initiating the actuator self-test, and deleting libraries.

VERITAS Volume Manager Software (VxVM)

VERITAS Volume Manager (VxVM) software provides easy-to-use on-line disk storage management for enterprise computing environments. Traditional disk storage management is a labor intensive process often requiring machines to be taken off-line—a major inconvenience to users. Once the system is off-line, the system administrator is faced with the tedious process of backing up existing data, manually changing system parameters, and reloading the data. In today's distributed client/server environments, users are demanding that databases and other resources be available 24 hours a day, are easy to access and are safe from corruption or loss caused by hardware malfunction.

VxVM software provides system administrators with the tools to dynamically configure disk storage, to perform administrative tasks while the system is active, and to analyze disk usage.

VxVM software provides on-line administration of disk resources so that the disk subsystems can be managed without interrupting users or applications. Disk spanning helps eliminate media size limitations and allows load balancing and extension of file systems and databases. Disk mirroring increases data availability in the case of disk failures. It also provides a hot relocation algorithm, allowing subdisks to be relocated from a failing disk.

VxVM software provides disk striping and RAID features to increase I/O throughput and fault tolerance. It provides support for performance monitoring, and flexible allocation of free space for application load balancing.

VxVM software provides an easy-to-use graphical administrative interface, providing the ability to quickly create disk configurations, reducing administrative costs. It also presents a logical pool of free space which can be automatically or directly allocated. The on-line architecture allows the partitioning of arbitrary areas on a disk, and the creation of sparse non-contiguous mirrors, enabling the replication of critical disk areas.

SunVTS Software

The Sun Validation and Test Suite, or SunVTS software, is an online diagnostics tool and system exerciser for verifying the configuration and functionality of Sun hardware controllers, devices, and platforms. SunVTS software is included in Solaris Easy Access Server software.

Customers can run SunVTS software using any of these interfaces: a command line interface, a tty interface, or a graphical interface that runs within a windowed desktop environment.

SunVTS software lets customers view and control a testing session over modem lines or over a network. Using a remote system, customers can view the progress of a SunVTS testing session, change testing options, and control all testing features of another system on the network.

The SunVTS system exerciser is a graphically oriented UNIX application that permits the continuous exercising of system resources and internal and external peripheral equipment. Used to determine if the system is functioning properly, SunVTS software incorporates a multifunctional stress test of the system through operating-system-level calls, and allows the addition of new tests as they become available.

VERITAS File System Software

VERITAS File System (VxFS) software is a high-performance, quick-recovery file system. VxFS software augments UNIX file management with high availability, increased bandwidth, and up-to-date and reliable structural integrity. It provides scalable performance and capacity to meet the demands of increased user loads and client/server environments.

VxFS software provides fast recovery following a system crash or reboot. The system completes a file system check (fsck) in seconds, regardless of file system size. In addition, VxFS software supports on-line backup, on-line resizing (shrinking and growing of a file system), and on-line defragmentation. These capabilities allow administrators to respond to dynamic data capacity and performance requirements while reducing scheduled maintenance interruptions.

VxFS software allocates disk space to files in large, contiguous areas called extents, rather than in small fixed-size blocks. This results in a significant reduction in the number of I/O operations required to read and write large amounts of data.

Ordering Information

Ordering the Sun Enterprise™ 220R Server

The Sun Enterprise™ 220R system is an assemble-to-order system. Assemble-to-order configurations begin with a base chassis that includes one power supply, a CD-ROM drive, internal and external UltraSCSI buses, PCI buses, and two internal disk bays. Valid system configurations must include at least one CPU module, at least two identical memory options, and at least one internal disk.

Assemble-to-order Configurations

Build-to-order configurations are customized from the options listed below. Assemble-to-order sales orders must specify a CPU module, memory, and internal disks.

Note: *When ordering CPU, memory, and disk for assemble-to-order configurations, use the appropriate part number without the preceding "X".*

All customer-specified system components and buildable options appearing on a sales order on the same line item with a base system will be installed in that system at the factory for no additional charge.

Build-to-order sales orders for the Sun Enterprise 220R server must specify:

- The family part number (A34) as the first entry in a line item
- A base system configuration (A34-AA)
- System components: CPU module, memory, and internal disk
- Internal options: second power supply, memory, I/O cards, and so on

Base System Configurations

Order Number	Title and Description
A34-AA	Base configuration. The Sun Enterprise 220R server base configuration includes: • SunCD™ 32 • External SCSI port • UltraSCSI and/or Fast/Wide • 68-pin SCSI connector • 10/100 Ethernet with RJ45 • Two serial ports • Parallel port with DB25 connector • One 380-watt power supply • Solaris™ Server license • 3-year, second-day, on-site hardware warranty • 90-day software SunSpectrum℠ program warranty

System Components

Follow the steps listed below to prepare a complete and valid sales order. Steps 1 to 6 are required. Steps 7 to 9 are optional.

Step 1: Enter Product Family (required)

Specify:	**A34**	Sun Enterprise 220R server

Step 2: Order Base Configuration (required)

Order:	**A34-AA**	Sun Enterprise 220R server base configuration

Step 3: Add CPU Modules (required)

Order one or two:	**1195A**	450-MHz UltraSPARC™-II CPU module with 4-MB Ecache

Step 4: Add Internal Memory (required)

Order two, four, six or eight:	**7002A**	64-MB memory (2 x 32-MB DIMMs)
	7003A	128-MB memory (2 x 64-MB DIMMs)
	7004A	256-MB memory (2 x 128-MB DIMMs)

Notes:

- 16 memory expansion DIMM slots are available.
- Maximum memory configuration: 2-GB.
- DIMMs must be added in matched groups of four (e.g., two, four, or six or eight x 7003A).

Step 5: Add Internal Disk (required)

Order one or two:	**5234A**	9.1-GB, 10000-rpm, hot-swap, 1-inch UltraSCSI
	5237A	18.2-GB, 10000-rpm hot-swap, 1-inch UltraSCSI

Step 6: Order Power Cord Kit (one per power supply is required)

Select from:	**X386L**	Australian
	X312L	Continental European
	X383L	Danish
	X384L	Italian
	X311L	North American/Asian
	X314L	Swiss
	X317L	UK

Step 7: Order PCI Host Adapters and Network Interface Cards (optional)

Select from:	**6540A**	Dual-channel single-ended UltraSCSI host adapter, PCI
	6541A	Dual-channel differential UltraSCSI host adapter, PCI
	1032A	SunSwift™ adapter (UltraSCSI plus FastEthernet), PCI
	1033A	SunFastEthernet™ controller, PCI
	1152A	SunFDDI™/P single-attach adapter, PCI
	1153A	SunFDDI/P dual-attach adapter, PCI
	1154A	Sun TRI/P™ token ring interface, PCI
	1155A	Sun HSI/P™ high-speed serial interface, PCI
	1156A	Sun SAI/P multiport serial interface, PCI
	3668A	PGX32™ graphics card, PCI

Notes:

- Order maximum of three 1155A or 3668A.
- Maximum of four PCI cards for all other part numbers. For other PCI cards see *Sun Enterprise 220R Options.*
- See *Sun Enterprise 220R Server Options* table for further information on maximum number of each card supported.

Step 8: Order Additional Power Supply (optional)

Order one:	**9684A**	380-watt universal power supply

Notes:

- Maximum configuration: two power supplies (one is standard).
- Adding a power supply requires an additional Power Cord Kit (see Step 6).

Step 9: Order Other Options (optional)

Order: See options list

Typical Sun Enterprise 220R Server Configuration Example

Sun Enterprise 220R server base configuration with two 450-MHz UltraSPARC-II processors, 256-MB main memory, internal SunCD 32, two disk drives with 18.2-GB internal disk storage, and two 360-watt power supplies.

Quantity	Order Number	Description
1	**A34-AA**	Sun Enterprise 220R server family
1	**1195A**	UltraSPARC-II CPU module, 450 MHz, 4-MB external cache
2	**7003A**	128-MB memory (2 x 64-MB DIMMs)
2	**5234A**	9.1-GB internal hot-plug disk drive, 10000-rpm, 1-inch high
1	**9684A**	380-watt universal power supply
2	**X311L**	Power cord

Maximum Sun Enterprise 220R Server Configuration Example

Sun Enterprise 220R server with two 450-MHz UltraSPARC-II CPUs, 2-GB main memory, two internal disk drives with, 36-GB disk storage, internal SunCD 32, fully redundant power supply, four available PCI slots to support network cards and external storage options

Quantity	Order Number	Description
1	**A34-AA**	Sun Enterprise 220R server family
2	**1195A**	UltraSPARC-II CPU module, 450 MHz, 4-MB external cache
8	**7004A**	256-MB memory (2 x 128-MB DIMMs)
2	**5237A**	18.2-GB, internal, hot-plug disk drive, 10000-rpm, 1-inch high
1	**3668A**	PGX™ m64 graphics card, PCI
1	**9684A**	380-watt power supply
1	**6540A**	Dual single-ended UltraSCSI disk controller, PCI (32/33/Universal)
2	**1032A**	“Fresh Choice” UltraSCSI/FastEthernet controller, PCI (32/33/Universal)
2	**X311L**	Power cord

Ordering Guidelines and Notes

- **Memory**
  - The Sun Enterprise 220R server supports 2 GB of main memory. This architecture currently accepts 32-, 64-, and 128-MB memory modules.
  - The Sun Enterprise 220R server can accommodate up to 16 DIMM modules in increments of four. DIMM modules within each set *must* be of the same type. DIMM module sets of four may be mixed.
- **Graphics**
  - The Sun Enterprise 220R server supports the PGX32 PCI graphics for non-3D applications.
- **SCSI**
  - The internal SCSI host controller operates in Fast-20 (UltraSCSI) mode by default. Installation of non-FAST-20 devices, although allowed, will decrease overall SCSI performance.
  - The total combined SCSI cable length must not exceed three meters for Fast/Wide operation or 1.5 meters for Fast-20 (UltraSCSI) operation.
  - To enable Fast-20 speeds on all devices on the bus, it is recommended that:
    - A maximum of two Sun StorEdge™ UniPack systems using Fast-20 cables be connected to the external connector.
    - All devices on the SCSI bus should be Fast-20 devices. (Non-Fast-20 devices may cause the internal devices to run at Fast/Wide speeds, but are supported.)

Options

Below is a partial list of options available for the Sun Enterprise 220R systems. Refer to the Sun Price Book for complete option listings, configuration notes, and ordering information. When no maximum number is listed, consult the configuration information for that option.

Part Number	Option Description	Maximum Number Supported	Comments
Processors			
(X)1195A	420-MHz UltraSPARC-II CPU module with 4-MB Ecache	2	
Memory			
(X)7002A	64-MB, 60-ns memory expansion (2 x 32-MB DIMMs)	8	See memory configuration requirements
(X)7003A	128-MB, 60-ns memory expansion (2 x 64-MB DIMMs)	8	
(X)7004A	256-MB, 60-ns memory expansion (2 x 128-MB DIMMs)	8	
Internal Storage Devices			
X5229A	9.1-GB 7200-rpm, hot swap, 1-inch UltraSCSI disk drive	2	
(X)5234A	9.1-GB, 10000-rpm, hot swap, 1-inch UltraSCSI disk drive	2	
(X)5237A	18.2-GB, 10000-rpm, hot-swap, 1-inch UltraSCSI disk drive	2	
Internal Removable Storage Devices			
X6234A	20- to 40-GB, 8-mm internal tape drive	1	
X6286A	12- to 24-GB DDS-3 internal tape drive	1	
PCI Cards			These PCI cards are available either as factory-installed options or as X-options
(X)1032A	10/100BASE-T Fast/Wide UltraSCSI adapter 1.0	4	
(X)1033A	10/100BASE-T SunFastEthernet™ controller, PCI adapter	4	
(X)1152A	SunFDDI™/P SAS 2.0	4	
(X)1153A	SunFDDI/P—DAS dual-attach adapter 2.0, PCI	4	
(X)1154A	SunTRI/P™ token ring interface PCI bus adapter 2.0	4	
(X)1155A	SunHSI/P™ 2.0 high-speed serial interface, PCI	3	
(X)1156A	SunSAI/P Multiport Serial Interface, PCI	4	
(X)3668A	PGX32™ Color Graphics Card, PCI	3	
(X)6540A	Dual-channel single-ended UltraSCSI host adapter, PCI	4	
(X)6541A	Dual-channel differential UltraSCSI host adapter, PCI	4	

Part Number	Option Description	Maximum Number Supported	Comments
Additional PCI Cards			
X1034A	PCI Quad Fast Ethernet controller PCI adapter	2	These PCI cards are available only as X-options.
X1141A	Sun Gigabit Ethernet 2.0 network interface card	1	
X1157A	SunATM™/P-155MMF 3.0	2	
X1158A	SunATM/P-155UTP 3.0	2	
X1159A	SunATM/P-622MMF 3.0	2	
X6729A	FC/AL host adapter	1	
X1066A	SunATM/P-155MMF 2.0	3	
X1067A	SunATM/P-155UTP 2.0	3	
X1068A	SunATM/P-622MMF 2.0	1	
Other Options			
(X)9684A	380-watt, hot-swap, universal power supply	1	
Note: *Sun Enterprise 220 server systems ship with one power supply as standard. Order up to one additional power supply for a maximum of two per system.*			
Hardware RAID Controller			
X6542A	Sun StorEdge SRC/P Intelligent SCSI RAID Controller™	3	
X3832A	2-meter SCSI data cable for SRC/P Controller	3	
Note: *Sun Enterprise 220R server systems support SRC/P to control external storage Sun StorEdge MultiPack systems. The Sun Enterprise 220R server supports one additional two-meter SCSI data cable per card in addition to the two cables supplied with each X6542A.*			
External Disk Storage Options			
SG-XARY135A-72G	72-GB Sun StorEdge A1000 for rack		
SG-XARY136A-72G	72-GB Sun StorEdge D1000 for rack		
SG-XARY146A-36G	36-GB Sun StorEdge A1000 for rack (10000 rpm)		
SG-XARY147A-36G	36-GB Sun StorEdge D1000 for rack (10000 rpm)		
SG-XARY152A-72G	72-GB Sun StorEdge A1000 for rack		
SG-XARY154A-72G	72-GB Sun StorEdge D1000 for rack		
SG-XARY162A-145G	145-GB Sun StorEdge A1000 for rackmount		
SG-XARY164A-145G	145-GB Sun StorEdge D1000 for rackmount		
Note: *Sun StorEdge A1000/D1000 requires PCI UltraSCSI host adapter.*			
SG-XARY351A-180G	180-GB Sun StorEdge A3500 (1 x 5 x 18 GB)		
SG-XARY353A-1008G	1008-GB Sun StorEdge A3500 (2 x 7 x 18 GB)		
SG-XARY353A-360G	360-GB Sun StorEdge A3500 (2 x 7 x 18 GB)		
SG-XARY355A-2160G	2160-GB Sun StorEdge A3500 (3 x 15 x 18 GB)		
SG-XARY360A-545G	545-GB Sun StorEdge A3500 (1 x 5 x 9 GB, 10000 rpm)		
SG-XARY360A-90G	90-GB Sun StorEdge A3500 (1 x 5 x 9 GB, 10000 rpm)		

Part Number	Option Description	Maximum Number Supported	Comments
External Disk Storage Options (cont.)			
SG-XARY362A-180G	180-GB Sun StorEdge A3500 (2 x 7 x 9 GB, 10000 rpm)		
SG-XARY362A-763G	763-GB Sun StorEdge A3500 (2 x 7 x 9 GB, 10000 rpm)		
SG-XARY364A-1635G	1653-GB Sun StorEdge A3500 (3 x 15 x 9 GB, 10000 rpm)		
SG-XARY366A-72G	72-GB Sun StorEdge A3500 (1 x 2 x 9 GB, 10000 rpm)		
SG-XARY380A-1092G	1092-GB Sun StorEdge A3500 (1 x 5 x 18 GB)		
SG-XARY381A-1456G	1456-GB Sun StorEdge A3500 (1 x 5 x 36 GB)		
X6532A	63-GB Sun StorEdge A3000 array in a Sun Enterprise expansion cabinet with 128-MB cache memory		
X6533A	147-GB Sun StorEdge A3000 in a Sun Enterprise expansion cabinet with 128-MB cache memory		
X6534A	136.5-GB Sun StorEdge A3000 in a Sun Enterprise expansion cabinet with 128-MB cache memory		
X6535A	318.5-GB Sun StorEdge A3000 in a Sun Enterprise expansion cabinet with 128-MB cache memory		
Note: *Sun StorEdge A3500 array requires dual-channel differential UltraSCSI host adapter X6541A*			
SG-XARY520A-200G	200-GB Sun StorEdge A5200		
SG-XARY520A-63G	63-GB Sun StorEdge A5200		
SG-XARY521A-200G	200-GB Sun StorEdge A5200		
SG-XARY522A-200G	200-GB Sun StorEdge A5200		
SG-XARY523A-1200G	1200-GB Sun StorEdge A5200		
SG-XARY523A-400G	400-GB Sun StorEdge A5200		
SG-XARY523A-800G	800-GB Sun StorEdge A5200		
SG-XARY530A-254G	254-GB Sun StorEdge A5100		
SG-XARY530A-91G	91-GB Sun StorEdge A5100		
SG-XARY531A-254G	254-GB Sun StorEdge A5100		
SG-XARY532A-254G	254-GB Sun StorEdge A5100		
SG-XARY533A-1528G	1.5-TB Sun StorEdge A5100		
SG-XARY533A-509G	509-GB Sun StorEdge A5100		
SG-XARY541A-400G	400-GB Sun StorEdge A5200		
SG-XARY551A-509G	509-GB Sun StorEdge A5100		

Part Number	Option Description	Maximum Number Supported	Comments
External Mass Storage			
X6226A	Sun StorEdge library, 140 GB, 2 tape drives, rack		
SG-XLIB8MM1-400G	Sun StorEdge L400 400 GB/8 mm, 2 drives		
SG-XLIBDLT1-280G	Tape 280/560-GB Sun StorEdge L280 DT		
SG-XLIBDLT2-280G	Tape 280/560-GB DLT 7000 for rack		
Sun StorEdge MultiPack Systems			
SG-XDSK020B-36G	36.4-GB/7200-rpm disk MultiPack		
SG-XDSK020C-18G	18.2-GB/10000-rpm disk MultiPack		
SG-XDSK020C-36G	36.4-GB/10000-rpm disk MultiPack		
SG-XDSK040B-72G	72.8-GB/7200-rpm disk MultiPack		
SG-XDSK040C-36G	36.4-GB/10000-rpm disk MultiPack		
SG-XDSK040C-72G	72.8-GB/10000-rpm disk MultiPack		
SG-XDSK060B-109G	109.2-GB/7200-rpm disk MultiPack		
SG-XDSK060C-109G	109.2-GB/10000-rpm disk MultiPack		
SG-XDSK060C-54G	54.6-GB/10000-rpm disk MultiPack		
SG-XTAPDLT-021-A	FlexiPack: 35–70-GB, DLT 7000 tape drive		
Power Cord Kits			
X386L	Australian	2	One power cord per power supply is required
X312L	Continental European	2	
X383L	Danish	2	
X348L	Italian	2	
X311L	North American/Asian	2	
X314L	Swiss	2	
X317L	U.K.	2	

Part Number	Option Description	Maximum Number Supported	Comments
Country Kits			
X3500A	North America	1	Correct power cord supplied based on ship-to address
X3540A	UNIX	1	
X3576A	Australia	1	
X3579A	Canada - Bilingual	1	
X3573A	Denmark	1	
X3552A	Euro UNIX	1	
X3578A	European Universal	1	
X3548A	European UNIX	1	
X3577A	Finland	1	
X3502A	France	1	
X3503A	Germany	1	
X3574A	Italy	1	
X3546A	Japan	1	
X3542A	Japanese UNIX	1	
X3545A	Korea	1	
X3575A	Netherlands	1	
X3550A	North American Universal	1	
X3570A	Norway	1	
X3571A	Portugal	1	
X3572A	Spain	1	
X3506A	Sweden	1	
X3504A	Swiss-French	1	
X3505A	Swiss-German	1	
X3544A	Taiwan	1	
X3507A	United Kingdom	1	
X3547A	United Kingdom - UNIX	1	
X3551A	UNIX Universal	1	

Part Number	Option Description	Maximum Number Supported	Comments
Miscellaneous / Other Options			
X467A	MII to AUI converter	1	
X7121A	21-inch color monitor	3	Use of a monitor requires the PGX color frame buffer and cable (X)3660A.
X7119A	19-inch color monitor	3	
X7103A	17-inch entry color monitor	3	
X7124A	24-inch wide-screen color monitor	3	
X3872A	Video adapter, HD15F/13W3M	3	
X470A	Video adapter, 13W3F/HD15M	3	
X903A	1.2-meter, 68- to 50-pin SCSI adapter cable		
X904A	1.2-meter, 67- to 50-pin SCSI adapter cable		
X3830A	4-meter VHDC- to 68-pin SCSI adapter cable	8	
X3831A	10-meter VHDC- to 68-pin SCSI adapter cable	8	
Server License Media Kit			
SOLMS-26W9999	Solaris 2.6 Operating Environment media kit, includes CD and documentation		
SOLMS-070W999	Solaris 7 Operating Environment media kit, includes CD and documentation		

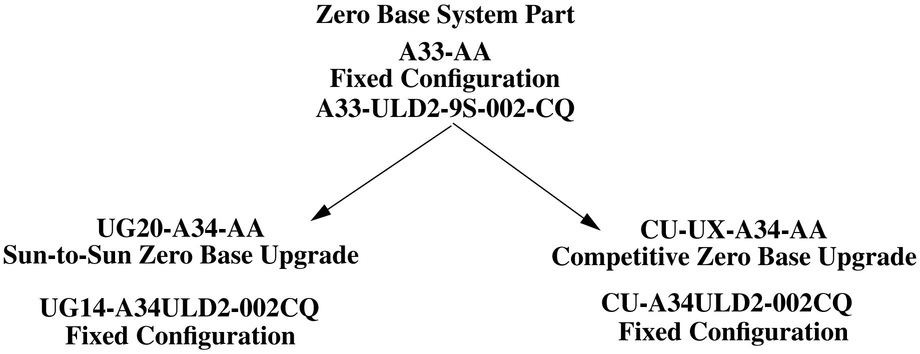
Upgrades

Sun upgrades offer customers superior investment protection for their existing Sun equipment.

Key Messages

- Sun offers customers a variety of flexible upgrade paths to the most popular Sun systems
- Choose from chassis-only to full-system upgrades
- Sun upgrades allow as many components as possible to be carried forward, to protect the customer's hardware investment
- Existing investments in non-Sun hardware can be preserved by upgrading to Sun through competitive full-system upgrades
- SPARCstation™ 20 or Ultra™ upgrades offer outstanding value by allowing the migration of memory to Sun Enterprise 220R systems

Marketing Upgrade Numbering Scheme



Zero Base System Part

A33-AA
Fixed Configuration
A33-ULD2-9S-002-CQ

UG20-A34-AA
Sun-to-Sun Zero Base Upgrade

UG14-A34ULD2-002CQ
Fixed Configuration

CU-UX-A34-AA
Competitive Zero Base Upgrade

CU-A34ULD2-002CQ
Fixed Configuration

- The differences between the upgrade and system part numbers lie in the first eight characters; the ten trailing characters carry the same interpretation as system parts.
- Sun-to-Sun upgrades begin with U or UG; UGFA indicates factory assembled upgrades; competitive upgrades begin with CU.
- Sun-to-Sun upgrades show the "from" path system in the first three characters that follow the U or UG.
- Character representations following the "from" system have the same interpretation as system parts, but dashes may be removed from left to right, as necessary, to meet the maximum part number length of 18 characters.

System Upgrades

From	Receive	Return
UG20-A34-AA **UG20-A34-AA-O** Full chassis SPARCserver or station 20, 10, 5, or 4	Sun Enterprise 220R server base; must order CPU, memory and drive	Complete SPARCstation or server including CPU, memory, and drive
UG11-A34-AA **UG11-A34-AA-O** Full chassis Sun Enterprise 1 or 150 and Ultra 1 system	Sun Enterprise 220R server base; must order CPU, memory and drive	Complete Sun Enterprise 1 or 150 server or Ultra 1system including CPU, memory, and drive
UG14-A34-000-CQ **UG14-A34-000-CQ-O** Sun Enterprise 2 or Ultra 2 single processor system	Sun Enterprise 220R server base with 9.1-GB drive; must order CPU. 32-MB/64-MB/128-MB memory DIMMs migrate	Complete Sun Enterprise 2 server or Ultra 2 system including CPU and drive
UG14-A34ULD2-002CQ **U14-A34ULD2-002CQO** Sun Enterprise 2 or Ultra 2 system	Sun Enterprise 220R server with 2 x 450-MHz, 4-MB Ecache CPUs, 2-GB memory, and two 9.1-GB, 10000-rpm drives	Complete Sun Enterprise 2 server or Ultra 2 system including CPU(s), memory and drive(s)
CU-UX-A34-AA Full chassis non-Sun Category 3 UNIX server	Sun Enterprise 220R server base; must order CPU, memory, and drive	Complete non-Sun UNIX server including CPU, memory, and drive
CU-PC-A34-AA Full chassis non-Sun Category 3 PC/NT server	Sun Enterprise 220R server base; must order CPU, memory, and drive	Complete non-Sun PC/NT server including CPU, memory, and drive
CU-A34ULD2-002CQ Full chassis non-Sun Category 3 UNIX or PC/NT server	Sun Enterprise 220R server with 2 x 450-MHz, 4-MB Ecache CPUs, 2-GB memory, and two 9.1-GB, 10000-rpm drives	Complete non-Sun UNIX, PC/NT server including CPU, memory, and drive

CPU and Memory Upgrades

From	Receive	Return
UGFA-MXXX-M450 360MHz CPU or slower in Sun Enterprise 2, 250, or 450 system. This is the second + CPU in the server configuration	450-MHz with 4-MB Ecache CPU **FACTORY INSTALLED**	360-MHz CPU or slower from n Sun Enterprise 2, 250, or 450 system
UGFA-M400-M450 400MHz CPU in Sun Enterprise 2, 250 or 450 system. This is the second + CPU in the server configuration.	450-MHz with 4-MB Ecache CPU **FACTORY INSTALLED**	Second, third or fourth CPU in the Sun Enterprise 2, 250, or 450 system in the system chassis under one RMA kit
UG-MXXX-M450 360MHz CPU or slower in Sun Enterprise 2, 250, or 450 system	450-MHz with 4-MB Ecache CPU **FIELD INSTALLED**	360-MHz CPU or slower from a Sun Enterprise 2, 250, or 450 system
UG-M400-M450 400MHz CPU in Sun Enterprise 2, 250, or 450 system	450-MHz with 4-MB Ecache CPU **FIELD INSTALLED**	400-MHz CPU from a Sun Enterprise 2, 250, or 450 system

From	Receive	Return
UGFA-MEM128-MEM512 Upgrade from 128 MB of Sun memory	512-MB memory (4 x 128-MB DIMM modules) Equal to 2 x (7004A) **FACTORY INSTALLED**	Any Sun memory DIMMs totaling 128 MB of memory
UG-MEM128-MEM512 Upgrade from 128 MB of Sun memory	512-MB memory (4 x 128-MB DIMM modules) Equal to 2 x (X7004A) **FIELD INSTALLED**	Any Sun memory DIMMs totaling 128 MB of memory
CUCONSLFA-A3X450 Trade in qualified non-Sun or Sun servers specified in the Server Consolidation Program	450-MHz with 4-MB Ecache CPU **FACTORY INSTALLED**	Qualified non-Sun or Sun workgroup server system. **Must order CU-CONSOL-RMA for each system returned.** May return system for a combination of CPU and memory
CU-CONSL-A3X450 Trade in qualified non-Sun or Sun servers specified in the Server Consolidation Program	450-MHz with 4-MB Ecache CPU **FIELD INSTALLED**	Qualified non-Sun or Sun workgroup server system. **Must order CU-CONSOL-RMA for each system returned.** May return system for a combination of CPU and memory
CUCONSLFA-512MB Trade in qualified non-Sun or Sun servers specified in the Server Consolidation Program	512-MB memory (4 x 128-MB DIMM modules) Equal to 2 x (7004A) **FACTORY INSTALLED**	Qualified non-Sun or Sun workgroup server system. **Must order CU-CONSOL-RMA for each system returned.** May return system for a combination of CPU and memory
CU-CONSL-512MB Trade in qualified non-Sun or Sun servers specified in the Server Consolidation Program	512-MB memory(4 x 128-MB DIMM modules) Equal to 2 x (X7004A) **FIELD INSTALLED**	Qualified non-Sun or Sun workgroup server system. **Must order CU-CONSOL-RMA for each system returned.** May return system for a combination of CPU and memory

Ordering Process for Chassis and Base System Upgrades

The Sun Enterprise 220R server is a configure-to-order product with the exception of any Quick Ship configuration(s). All required customer-specified system components and configurable options appearing on a customer's order with a base system will be installed at the factory for no additional charge.

As with other Sun configure-to-order systems, Sales Orders for upgrading to the Sun Enterprise 220R server specify:

- The Family Part Number as the first entry in a line item
- A Full System upgrade or Non-Full System upgrade
- Required system components—country kit or power cord
- Internal (configured) options—CPU, memory, disk, PCI cards, etc.
- External (non-configured) options

Sun Enterprise 220R Server Non-Full System Upgrades

Non-Full System upgrades require migration of Sun Enterprise 220R server-compatible components from the Sun server being upgraded (i.e., 7200 rpm, 1-inch high, 4.2-GB and 9.1-GB disks; or 10000-rpm, 1-inch, 9.1-GB and 18-GB disk drives; 32-MB/64-MB/128-MB greater memory DIMMs). Valid Non-Full System upgrades must declare the compatible components to be migrated using Configtool. A Configuration List Report generated by Configtool must be attached to any Non-Full System upgrade quote to the customer.

Non-Full System Upgrades

Order Number	Title and Description
UG14-A34-000-CQ	Non-Full System upgrade to Sun Enterprise 220R 2-way server in 4-RU rackmount enclosure includes: • One 380-watt, hot-swap power supply • Four PCI slots • SunCD 32 (32X CD-ROM) • One 1-inch, 9.1-GB, 10000-rpm drive • Solaris Server license • 3-year second day, on-site hardware warranty • 90-day software SunSpectrum program warranty • Choice of 1 or 2 CPU(s), additional memory or drives • 32-MB/64-MB/128-MB DIMMs migrate in banks of four.

Full System Upgrades (CTO)

Order Number	Title and Description
UG20-A34-AA **UG11-A34-AA** **CU-UX-A34-AA** **CU-PC-A34-AA**	Sun Enterprise 220R server CTO zero base system in rackmount enclosure includes: • One 380-watt, hot-swap power supply • Four PCI slots • SunCD 32 (32X CD-ROM) • Solaris Server license • 3-year second day, on-site hardware warranty • 90-day software SunSpectrum program warranty • Must order choice of CPU, memory, and internal drive

Fully Configured System

Order Number	Title and Description
CU-A34ULD2-002CQ **UG14-A34ULD2-002CQ**	Sun Enterprise 220 server in rackmount enclosure includes: • 2 x 450-MHz, 4-MB Ecache CPUs • 2-GB memory • 2 x 1-inch, 9.1-GB, 10000-rpm drives • One 380-watt hot-swap power supply • Four PCI slots • SunCD 32 (32X CD-ROM) • Solaris Server license • 3-year second day, on-site hardware warranty • 90-day software SunSpectrum program warranty • Field-installed options available

To Order:

Follow the steps listed below to prepare a complete and valid Sales Order.

Step 1: Enter the Family Part Number

Specify:	**UG-A34**	Sun Enterprise 220R server upgrades

Step 2: Order Base Package*

Order:	**UG14-A34-000-CQ**	Sun Enterprise 220R server, chassis and choice of 450-MHz, 4-MB Ecache CPU (1 or 2), additional memory or memory upgrade, and additional drive
	UG20-A34-AA **UG11-A34-AA**	Sun Enterprise 220R server CTO base system, no CPU, memory, or drive
	CU-PC-A34-AA	Sun Enterprise 220R server CTO base system, no CPU, memory, or drive
	CU-UX-A34-AA	Sun Enterprise 220R server CTO base system, no CPU, memory, or drive
	***UG-RMA**	RMA kit required for CTO base system

Step 3: Order CPU (required for full system CTO or UG14-A25 partial system)

Order one to two:	**1195A**	450-MHz UltraSPARC-II CPU module with 4-MB Ecache
	UGFA-MXXX-M450	450-MHz UltraSPARC-II CPU module with 4-MB Ecache (Factory-installed CPU upgrade from UltraSPARC 167/200/250-MHz CPU Module)
	UGFA-M400-M450	450-MHz UltraSPARC-II CPU module with 4-MB Ecache (Factory-installed CPU upgrade from UltraSPARC 400-MHz CPU Module)
	CUCONSLFA-A3X450	450-MHz UltraSPARC-II CPU module with 4-MB Ecache (Factory-installed CPU upgrade from qualified non-Sun or Sun server system)

Notes:

- 1 to 4 CPUs can be installed in a system
- CU-CONSOL-RMA must be ordered for each returned system when ordering CUCONSLFA-A3X450. Consolidation orders require a proposal page from the Consolidation Trade-in Calculator be attached.

Step 4: Order Memory (required for full system CTO)

Order two, four, six or eight:	**7002A**	64-MB ECC memory (2 x 32-MB DIMMs)
	7003A	28-MB ECC memory (2 x 64-MB DIMMs)
	7004A	256-MB ECC memory (2 x 128-MB DIMMs)
Or, order one to four of the memory upgrades	**UGFA-MEM128-MEM512**	512-MB ECC memory (4x 128-MB DIMMs) Factory-installed equivalent of 2 x 7004A; memory trade-in
	CUCONSLFA-512MB	512-MB ECC memory (4x 128-MB DIMMs) Factory-installed equivalent of 2 x 7004A; memory trade-in

Notes:

- Memory is configured with 4 identical memory DIMMs)
- Maximum memory configuration: 16 DIMMs (4 groups of 4)
- Each memory option includes two DIMMs
- DIMMs must be added in matched groups of four (e.g., 2, 4, or 6 x 7002A).
- Memory upgrades are configured in the required matched groups of four.
- For best performance, systems should be configured with 8 or 16 identical DIMMs (add 2 or 6 identical memory options)
- CU-CONSOL-RMA must be ordered for each returned system when ordering CUCONSLFA-512MB. Consolidation orders require a proposal page from the Consolidation Trade-in Calculator be attached.

Step 5: Order Internal Disks—Maximum of 2

Order one or two:	**(X)5234A**	9.1-GB, 10000-rpm, 1-inch, UltraSCSI-III disk drive
	(X)5237A	18.2-GB, 10000-rpm, 1-inch, UltraSCSI-III disk drive

Notes:

- Maximum of two per system
- Drives may be mixed in any combination

Step 6: Follow Steps for Regular CTO Options Ordering with a Base System.

See "Ordering Information" for Sun Enterprise 220R server systems in the earlier section.

Step 7: Submit "E220R Component Migration Assessment Form" with Order (Required)

Obtain assessment from Configtool 4.4:	**UG14-A34-000-CQ**	Valid Non-Full System upgrade orders must declare the compatible components that are migrating using Configtool 4.4.

Service and Support

The SunSpectrum℠ program is an innovative and flexible service offering that allows customers to choose the level of service best suited to their needs, ranging from mission-critical support for maximum solution availability to backup assistance for self-support customers. The SunSpectrum program provides a simple pricing structure in which a single fee covers support for an entire system, including related hardware and peripherals, the Solaris™ Operating Environment software, and telephone support for Sun™ software packages. The majority of Sun's customers today take advantage of the SunSpectrum program, underscoring the value that it represents. Customers should check with their local Sun Enterprise™ Services representatives for program and feature availability in their areas.

FEATURE	SUNSPECTRUM PLATINUM℠ Mission-critical Support	SUNSPECTRUM GOLD℠ Business-critical Support	SUNSPECTRUM SILVER℠ Systems Support	SUNSPECTRUM BRONZE℠ Self Support
Systems Features				
Systems approach coverage	Yes	Yes	Yes	Yes
System availability guarantee	Customized	No	No	No
Account Support Features				
Service account management team	Yes	No	No	No
Local customer support management	No	Yes	No	No
Personal technical account support	Yes	Yes	Option	No
SunStart℠ installation service	Yes	No	No	No
Account support plan	Yes	Yes	No	No
Software release planning	Yes	No	No	No
On-site account reviews	Monthly	Semiannual	No	No
Skills assessment	Yes	No	No	No
Site activity log	Yes	Yes	No	No
Coverage / Response Time				
Standard telephone coverage hours	7 day/24 hour	7 day/24 hour	8 a.m.–8 p.m., Monday–Friday	8 a.m.–5 p.m., Monday–Friday
Standard on-site coverage hours	7 day/24 hour	8 a.m.–8 p.m., Monday–Friday	8 a.m.–5 p.m., Monday–Friday	N/A
7-day/24-hour telephone coverage	Yes	Yes	Option	Option
7-day/24-hour on-site coverage	Yes	Option	Option	N/A
7-day/12-hour on-site coverage	No	Option	No	No
5-day/24-hour on-site coverage	No	Option	No	No

FEATURE	**SUNSPECTRUM PLATINUM℠ Mission-critical Support**	**SUNSPECTRUM GOLD℠ Business-critical Support**	**SUNSPECTRUM SILVER℠ Systems Support**	**SUNSPECTRUM BRONZE℠ Self Support**
Coverage / Response Time (cont.)				
Customer-defined priority setting	Yes	Yes	Yes	Option
• Urgent (phone/on-site)	Live transfer/ 2 hour	Live transfer/ 4 hour	Live transfer/ 4 hour	4 hour / N/A
• Serious (phone/on-site)	Live transfer/ 4 hour	2 hour/next day	2 hour/next day	4 hour / N/A
• Not critical (phone/on-site)	Live transfer/ customer convenience	4 hour/ customer convenience	4 hour/ customer convenience	4 hour / N/A
2-hour on-site response	Yes	Option	Option	N/A
Additional contacts	Option	Option	Option	Option
Premier Support Features				
Mission-critical support team	Yes	For urgent problems	No	No
Sun Vendor Integration Program (SunVIP℠)	Yes	Yes	No	No
Software patch management assistance	Yes	No	No	No
Field change order (FCO) management assistance	Yes	No	No	No
Hardware Support Delivery				
Replacement hardware parts	On-site technician	On-site technician	On-site technician	Courier
Two day parts delivery	N/A	N/A	N/A	Yes
Overnight parts delivery	N/A	N/A	N/A	Option
Same-day parts delivery	Yes	Yes	Yes	Option
Remote Systems Diagnostics				
Remote dial-in analysis	Yes	Yes	Yes	Yes
Remote systems monitoring	Yes	Yes	No	No
Remote predictive failure reporting	Yes	Yes	No	No
Software Enhancements and Maintenance Releases				
Solaris enhancement releases	Yes	Yes	Yes	Yes
Patches and maintenance releases	Yes	Yes	Yes	Yes
Sun unbundled software enhancements	Option	Option	Option	Option
Internet and CD-ROM Support Tools				
SunSolve℠ license	Yes	Yes	Yes	Yes
SunSolve EarlyNotifier℠ Service	Yes	Yes	Yes	Yes

Glossary

100BASE-T	See Fast Ethernet.
DIMM	Dual inline memory module. A memory unit that can come in a variety of sizes, such as 16 MB, 32 MB, 64 MB, and 128 MB.
Fast Ethernet	IEEE standard for 100-Mb Ethernet. This technology supports a data transfer rate of 100 megabits per second over special grades of twisted-pair wiring.
MII	Media independent interface. Used for connecting external transceivers to Fast Ethernet.
NFS™	Sun's distributed computing file system.
ODBC	Open database connectivity.
PCI	Peripheral component interconnect. A industry-standard for connecting peripherals such as disk drives, tapes drives, and other devices used in the PCs.
UPA	Ultra™ port architecture. A high-speed, crossbar-oriented, packet-switched motherboard interconnect.
V9	Version 9 of the SPARC™ definition.

Materials Abstract

All materials are available on SunWIN except where noted otherwise.

Collateral	Description	Purpose	Distribution	Token # or COMAC Order #
PowerPack				
– *Sun Enterprise 220R server Just the Facts*	Reference Guide for Sun Enterprise 220R Server	Training Sales Tool	SunWIN, Reseller Web	111554
– *Sun Enterprise 220R Server Customer Presentation*	Presentation	Sales Tool	SunWIN, Reseller Web	111564
References				
– *Sun Intro — Sun Enterprise 220R Server, November 1999*	Introduction E-mail	Sales Tool	SunWIN, Reseller Web, E-mail	111555
– *Quick Reference Card — Sun Server Product Line Overview*	Quick Reference Card	Sales Tool	SunWIN, Reseller Web, First Resort	111539
– *Sun Enterprise 220R Server White Paper*	Technical Reference for Sun Enterprise 220R Server	Training	SunWIN, Reseller Web	111570
Product Literature				
– *Sun Enterprise 220R Server Data Sheet*	Product Data Sheet	Sales Tool	SunWIN COMAC	100314 DE957-0
External Web Site				
– *Sun Enterprise Server Family Information*	`www.sun.com/servers/workgroup`			