

Sun Netra T5440
Codename: Congo

Just the Facts

SunWIN token # 520071

PROPRIETARY AND CONFIDENTIAL: SIGNED CDA REQUIRED

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Version 7

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Sun Netra T5440 Servers – Overview and Positioning

Figure 1 - Sun Netra T5440 Server



Introduction

According to INSTATS, Telco is emerging from the downturn driven by widespread broadband adoption, the availability of enhanced IP services, the explosive deployment of wireless data networks, and the overwhelming need for more IP bandwidth to enable new multimedia services. The telco segment will remain strong through the forecast period due to low penetration of mobile telco services in large emerging markets such as BRIC (Brazil, Russian, India, and China). In the more mature markets telco will be boosted by rollout of 3G and Fixed Mobile Convergence services around the IMS network reference architecture theme. These markets will also have steady growth based on further adoption of open standards based technologies (Database, OS, Platforms, I/O interfaces, x64/x86, etc) vs. legacy, proprietary implementations. Netra rackmount servers have held a dominate roll within the OAM&P market segment and these new servers will help to maintain and enhance that market position. New opportunities exist in four distinct areas:

- 1) Service Providers moving to DC power in the datacenter as some network functionality moves to the datacenter ie. Netra Best in Breed product line for DC.
- 2) Demand for L4-L7 line-rate packet processing (CMT & NDPS) that provides for QoS (Quality of Service) or QoE (Quality of Experience) for new broadband and mobile application services.

- 3) Increased storage and file-system demand for multimedia based content application services.
- 4) Increased demand for X64/X86 based systems running Linux/Carrier Grade Linux – eg. a market segment currently not served by Netra Mid and high-end offerings.

IDC expects telecom server spending to increase at a 5.4% compound annual growth rate (CAGR) from almost \$7.2 billion in 2006 to nearly \$9.4 billion in 2011. This growth rate is more than double the 2.2% CAGR IDC expects for the server market as a whole. This telecom server spending represents 12.9% of total server market revenue in 2006, growing to 15% by 2011. Network equipment providers (NEPs) are expected to purchase servers in support of their own IT operations at a rate slightly higher than some other industries. Server spending in this segment is expected to increase at a 9.9% CAGR through 2011. Server spending by network service providers (NSPs) will grow at almost twice the rate of the overall market, with internal IT growing close to typical market rates.

Netra T5440 server (4RU), will be based on the UltraSPARC T2 Plus processor. It will leverage its technology from Maramba 2U server (Sparc Enterprise T5240) Netra T5440 and Netra X4450 (X64 version) will leverage a common chassis design and strategy allowing for high-density storage and I/O balanced with compute horsepower. The common chassis is expected to be a multi-generational system design that will allow for quick market delivery of future memory, drive, compute scaling performance. Both servers will also run either Solaris or leading Linux offerings enabling full choice and easy transition for any customer.

The Sun Netra T5440 carrier grade server utilizes the UltraSPARC T2 Plus processor, second generation of Sun's Chip Multi-threaded Technology. This system is optimized for the enterprise data center, targeted primarily at multi-threaded commercial and technical workloads.

The Sun Netra T5440 system has been designed to enable organizations to securely and efficiently serve millions of new users while providing significant cost savings by solving specific customer challenges:

- Creating virtualized and eco-efficient data centers
- Securing enterprise applications at speed
- Offer high performance system for telco applications

The Sun Netra T5440 systems provide a notable improvement in throughput, performance per unit of power, and density over the competition, as well as over prior offerings from Sun including the T2000 and Netra T5220 systems.

The Netra T5440 is 4 rack units (4RU). This server utilizes the same chassis as the Sun Netra X4450 server (Intel based Netra system). This chassis architecture is common across much of Sun's volume product line, including SPARC, and Intel-based servers.

The UltraSPARC T2 and T2 Plus processors are a generational improvement over the UltraSPARC T1 processor used in the Netra T2000 platform, with integrated PCI-Express features and PCI-X, 8 SPARC cores with the ability to concurrently run 8 threads per core, a separate floating point unit for each core, L2 cache, memory access crossbar, and 2-4 independent, dual channel memory controllers featuring the introduction of new technology memory in the form of fully buffered DDR2 based memory DIMMs, commonly known as FB-

DIMMs. The two integrated 10 gigabit ethernet ports (XAUI ports) included on the UltraSPARC T2 processor were removed from the UltraSPARC T2 Plus design to allow for the addition of a coherency link that enables multi-processor implementations.

1. Netra T5440 will allow for extreme network element consolidation
2. It will provide high-density NEBS storage and file-systems for delivery of next generation multimedia content.
3. It will offer choice – Solaris and Market leading Linux offerings
4. Performance upgrade for existing Netra 1280/1290 and 440 customers or any other Netra server based on migration strategy.
5. Netra T5440 will be the highest performing packet processing Netra offering for data-plane application services when running NDPS software. It will also be the best in breed Solaris 10 offering in the 4RU family.

Additionally, the Netra T5440 server comes with Integrated Lights Out Management (ILOM) enabling simple remote monitoring and management from anywhere on the network.

As with other Netra servers, the Netra T5440 is a NEBS Level 3 certified and ETSI compliant server making it ideal for the most demanding applications in the toughest environments.

Key Features Summary

The Netra T5440 is a 4U high rack-mountable server which is based on the two Victoria Falls SPARC processor. The Victoria Falls processor contains either 4,6, or 8 SPARC cores each of which can run 8 threads concurrently. Each VF processor contains a 4MB L2 cache, memory access crossbar, 2x FBD DDR2 memory controllers, 1 FPU, a PCIe channel IO interface, one 10GB ethernet ports and a new coherency link to interconnect multiple Victoria Falls CPUs. The processor is optimized for highly threaded transactional processing whereby the core utilization is maximized due to the minimization of the time waiting on memory accesses.

Sun Netra T5440 Feature Summary

- One Maramba Motherboard 17" x 12"
- 4U 20" Chassis

Two Victoria Falls CMT SPARC processors with a coherency link to interconnect multiple Victoria Falls CPUs running at (est) 1.25Ghz or 1.4GHz with 6 or 8 cores. 1.4 Ghz has been available since May 2009.

- Total 32 FB DIMMs memory slots, 16 Fully Buffered Dual Inline Memory Module (FB-DIMM) slots that support 2, 4, and 8(when available) Gigabyte FB-DIMM memory modules on the MB and 16 additional expandable memory slots (maximum capacity of 256 GB of system memory) one PCI mezzanine #1 board is designed on top of Netra T5440 MB and all the PCI slots and XAUI slots are located on the PCI mezzanine board. One PCI mezzanine #2 board is designed with PCI-E and PCI-X slots to support full length and full

height cards.

- Two x16 PCI-Express connector slots with x8 pairs PCIe differential signals . They supports two x1, x2 ,x4 and x8 full size PCI Express cards
- Six x8 PCI -Express slots which support four x1, x2 ,x4 and x8 low profile PCI express cards. Two x8 PCI-
- Two Combination PCI-Express (low profile) x4/x8 lane/XAUI slots. They can support either two XAUI (10Gb ethernet) card or one x4 PCIe card and x8 PCIe card
- Two 133MHz,3.3V PCI-X slots and support full length and full size PCI-X cards
- A Neptune 10Gb ethernet chip is integrated on the MB to interface with two XAUI cards to provide four ethernet ports accessing. Two 10Gb ethernet ports and two 1Gb ethernet ports
- Four 10/100/1000 Ethernet RJ45 based ports are activated if the 10Gb XAUI cards are not used.
- Two USB 2.0 capable ports in the rear
- Two USB 2.0 capable ports in the front
- Up to Twelve SAS HDD 2.5” drives
- One DVD/RW drive
- One DB9 serial port
- Next Generation Service Processor software implementation on PowerPC based Service Processor hardware, supporting both RJ45 serial interface and 10/100 based Ethernet access
- 2 pair of 650W Hot-plug/hot-swap high efficiency AC/DC power supplies. Each pair of AC/DC PSUs supplies 1300W to the system and they are redundancy by pair.
- Telco alarm card
- System cooling fans and HDD cooling fans inside the system.
- NEBS Level 3 certified

Key Messages

World Record Throughput with Ground-Breaking Energy and Space Efficiency

- Multi-socket servers to support a multi-core, multi-thread (CMT) Server on a Chip (SoC) design, integrating multiple cores, threads, I/O and cryptographic acceleration onto each processor, thereby greatly increasing performance and reliability, while reducing power, cost and components
- SMP servers to increase performance by scaling with threads, rather than frequency, thereby minimizing power and space consumption.
- Massive memory expandability. Memory capacity will be doubled again with the availability of 8GB DIMMs, increasing Netra T5440 to 256GB of RAM.
- Great internal storage expansion with up to 12 internal disks. Greater internal disk expansion directly translates to lower costs, lower power and lower space as it avoids the need to add disk arrays for local data storage.

- UltraSPARC T2 and T2 Plus based servers are the first to incorporate unique power management features at both core and memory levels of the processor, including the ability to reduce instruction issue rates, parking of idle threads, disabling cores and ability to turn off clocks in both cores and memory to reduce power consumption by up to 35%

Integrated, Flexible, Open Source and No Cost for Virtualization Capabilities

- Using Solaris Containers and Logical Domains (LDoms), Sun offers a choice of open-source, no-cost virtualization technologies. Customers can consolidate hundreds of applications onto a single T5440 system, to better utilize server capacity while greatly reducing energy, space and cooling requirements, and simplifying management
- With Solaris (Containers, ZFS, Predictive Self Healing, etc.), Logical Domains, and Sun Servers with CMT design, Sun can tackle customer pain points with a compelling virtualization solution.
- Customers can use the Netra T5440 to consolidate their data centers: higher levels of performance in smaller power and space footprints than the legacy systems they are replacing
- Solaris Containers can provide hundreds of autonomous, isolated zones on just one OS instance (TBD)
- Using Logical Domains (LDoms) customers have the flexibility to deploy multiple isolated operating systems simultaneously on a T5440 server - up to 128 isolated OS instances with granularity as low as a single thread
- LDoms support multi-OS types, including different Solaris updates and Linux distributions, providing maximum customer flexibility.
- With common x64 virtual machines (e.g. VMware, Xen, etc.), the entire system will reboot when the primary domain (Dom0) reboots. With LDoms 1.0.2, any domain, whether a guest domain or a primary domain, is an independent virtual machine which can be configured, started or stopped independently without requiring a power-cycle/reboot of the server. The customer benefits from higher reliability and availability.
- Using a combination of the 2 x 10GbE interfaces integrated directly on the motherboards of the T5440 server, customers can cost effectively accelerate the network performance of virtualized environments.
- The combination of Sun's multithreaded networking technology and Solaris network virtualization technology makes it possible to virtualize and consolidate network infrastructure by binding specific CPU threads to network threads, creating many, custom, virtual network cards from just a single, physical, network interface.

High Reliability, High Uptime

- Greater processor and system integration reduces part counts, which directly reduces service interruptions due to component failure.
- High RAS:
 - RAID 0 & 1 as standard, not an expensive option.

- Ability to off-line individual threads, with no impact to adjacent threads, cores or sockets
- Lower power consumption and higher performance per watt reduce the heat load on each data centre.
- Predictive Self Healing features of Solaris 10 which result in reliability improvements of up to 50%. PSH automatically and transparently diagnoses, isolates, and recovers from many hardware and application faults. As a result, business-critical applications and essential system services can continue uninterrupted in the event of software failures, major hardware component failures, and even software mis-configuration problems.
- Sun Cluster, the most integrated high availability clustering solution supports all major third party and open source applications available for SPARC and x86/x64-based systems. It significantly increases availability with automated diagnosis and recovery and repair, fail/restart functionality, application isolation and automated failover.

Securing the Enterprise at Speed:

- For the first time, Zero Cost Security is a reality – FAST and FREE. The Netra T5440 support 10 industry standard, including NSA approved, security ciphers available via the on-chip, integrated cryptographic accelerators of the UltraSPARC T2 Plus processor. There are no additional costs, and minimal impact to performance.
- No need to send plain text on the network or store plain text in your storage systems – encrypt everything to ensure high security and privacy and ensure business compliance. Implement secure connections with customers and partners, to bring more services on-line, with the highest levels of confidence in security and confidentiality. Store data and information securely by encrypting data out to storage arrays.
- Domain minimization support included with the latest release of LDoms serves to minimize/reduce Solaris installation for higher security and ease of maintenance.
- Keep up and running 24x7 by taking advantage of Solaris 10's advanced security, business continuity and availability features.
 - Solaris 10 provides security features previously only found in Sun's military-grade Trusted Solaris OS.
 - Solaris 10's User and Process Rights Management feature works in conjunction with Solaris Containers to let you securely host thousands of applications and multiple customers on the same system.
 - Solaris Trusted Extensions, an extension of the existing Solaris 10 security policy, allows Solaris 10 customers who have specific regulatory or information protection requirements to take advantage of labeling features previously only available in highly specialized operating systems or appliances.

Accelerate TTM, Simplify Management:

- Implementation of common Integrated Lights Out Management (iLOM) tools enables the management of both CoolThreads and x64 platforms from Sun with the same tool set. iLOM's use of industry standard protocols, including SNMP and IPMI, also enables T5440

servers to be easily integrated and managed by other Enterprise Management Frameworks. This enables organizations to decrease installation time, improve time to market, and increase agility as well as reducing management overhead for on-going maintenance and patching.

- ILOM, working with xVM Ops Center, helps customers provision, monitor, patch, and manage Sun systems, providing an easy-to-setup, easy-to-use single point of integrated hardware and software management for Sun x64 and SPARC rack and blade systems.
- To preserve existing investment in SPARC Service Processor skills and training, ILOM offers an ALOM compatibility mode thus ensuring existing operators and administrators can be productive immediately.

Open Platform

- The industry's most open servers, packaging the only 64-bit processor and virtualization hypervisor offered under the GPL, along with a choice of open source Operating Systems and pre-installed Sun Java Enterprise System middleware.
- Solaris is free, open and everywhere, offering proven enterprise-class, indemnified features and led by community innovation. Solaris is the only open source UNIX OS to run on over 900 platforms on multiple x86 and SPARC processors, more than RHEL 3 or 4. Solaris 10 offers the best levels of ISV enthusiasm with support for over 5,300 shipping applications (6,400 committed) from over 3,000 ISVs - 2x more than AIX 5L and 11x more than Red Hat 5 (Oct 2007 Solaris 10 Adoption Update)
- The choice of Solaris and multiple Ubuntu Linux distributions certified on UltraSPARC T2 processors presents customers with greater choice to select the best technologies to meet business challenges.
- With Sun's expertise, migration to Solaris can be smooth and easy. Sun offers Solaris migration, upgrade, and adoption services to put customers on the fast track to leveraging the industry's most open platform.

The Sun Netra T5440 Server– Key Product Features, Functions, and Benefits

Feature	Function	Benefit
<ul style="list-style-type: none"> • Two UltraSPARC T2 Plus processors equipped with up to 8 cores per processor with 8 threads per core 	<ul style="list-style-type: none"> • Support for up to 128 simultaneous threads per server, with 16 threads executed per clock cycle 	<ul style="list-style-type: none"> • Dramatically improves throughput and utilization while using less power and dissipating less heat than conventional processor designs
<ul style="list-style-type: none"> • True System on a Chip 	<ul style="list-style-type: none"> • Scaling performance with threads instead of frequency • Integrates I/O and security capability for highly threaded workloads 	<ul style="list-style-type: none"> • Optimizes processors to exploit application parallelism • Provides rich availability feature set

- Integrated, On-Chip Crypto Accelerators
- Crypto processing at close to wirespeed, no card or co-processor requirement
- Support for 10 industry standard security ciphers
- Minimal impact to system performance and no additional costs
- Support for 10 industry standard security ciphers – secure your systems and your services
- Up to 8 floating point units (FPUs) per processor (one per core), full VIS instruction set
- Extends proven CMT benefits from commercial to technical workloads
- Enables standardization of data center servers, reducing cost and complexity
- Protects investments as future workloads emerge
- Ultra low part count at the system level
- Redundancy of key parts + high MTBF of components
- CMT Integration reduces part counts and Service Interruptions by nearly 3X
- Offline individual threads and cores, without reboot
- Cores connected through a 268.8GB/s crossbar switch (per processor), and sockets connected through on-chip coherency units
- Very fast communication between cores
- Higher performance through low latency
- High-bandwidth 16-way set associative 4-MB Level-2 cache
- Optimum sized cache for multithreaded processors
- Reduces processor cost and complexity, ensuring a balance is achieved between high throughput and low cost/complexity
- Integrated Lights Out Management (ILOM) -based system controller, built into the server, that enables you to remotely manage and administer the server
- ILOM enables you to monitor and control your server over an Ethernet connection (supports SSH), or by using a dedicated serial port for connection to a terminal or terminal server
- ILOM can be used to remotely administer geographically distributed or physically inaccessible machines. In addition, ILOM enables you to run diagnostics remotely that would otherwise require physical proximity to the server's serial port.
- Upper spec limit processor power consumption of 103 watts (1.2GHz) delivering 64 simultaneous threads
- Keeps the performance to power ratio very low while reducing heat dissipation
- Helps reduce cost, improve reliability, and ensure customers can grow within current data center power and thermal limitations
- LDoms for hardware virtualization, up to 128 OS instances
- Virtualization solution for a flexible infrastructure that is Open Source with no fee
- Driving up utilization & agility while reducing costs
- Up to 128 GB memory with 32x 4GB FBDIMMs in the Netra T5440.
Total 32 FB DIMMs memory slots (max capacity of 256 GB of system memory)
- Support for larger workloads
- Enhanced performance and throughput, growth and investment protection. Customers have the ability to deploy and host larger workloads supporting more users and more transactions. Improved response times.
- 16 on board 16 with memory expander tray

- ECC and parity protection on the processor's internal cache memory. The internal L2 cache has parity protection on the tags, and ECC protection on the data
- Hardware RAID 1 (mirroring) and hardware RAID 0 (striping) configurations for any pair of internal hard drives
- Advanced ECC, corrects up to 4 bits in error on nibble boundaries, as long as they are all in the same DRAM
- Four hot-swappable, redundant, highly efficient power supplies
- Four onboard 10/100/1000-Mbps Ethernet RJ45 ports. Are activated if 10Gb XAUI cards are not used
- **10 PCI slots: 8 PCIe** (6x PCI-Express slots for MD2 low profile cards ; 2x PCI-Express slots for full-height, full-length cards) and **2 PCI-X** slots (133MHz, 3.3V, FL/FH); four USB and one DB9 serial port
- Solaris 10 U6
- Legacy application support and Solaris Binary Compatibility Guarantee
- Maintenance of data integrity across on-chip memory
- Supports either two-disk RAID 1 (Integrated Mirror) volumes, or two-, three-, or four-disk RAID 0 (Integrated Stripe) volumes
- Is used to detect failing DRAM; DRAM channel is then mapped away from failing DRAM through sparing
- Nominal power is 650 W . that is power supply rating, not power consumption.
- Exceptional I/O performance and increased network reliability by providing redundancy
- Integration and connectivity
- With features such as LDOMs, Solaris Containers, predictive self-healing, Solaris Dynamic Tracing and support for the latest UltraSPARC platforms, Solaris 10 Update 6 OS (or later) sets entirely new standards for performance, efficiency, availability and security
- Software applications written to the Solaris ABI can run on the new UltraSPARC T2 Plus CPU-based systems with no modification required.
- Mainframe class processor RAS with features unique to volume, commodity processors, enhancing system uptime
- Provides data redundancy and increased performance at no additional cost.
- Extreme levels of main memory reliability and availability, enhancing system uptime by allowing the system to keep running in the event of a memory DRAM failure
- Lower operating costs, higher compute capacity, improved performance per watt and reliability
- Increases network efficiency, flexibility, and availability
- Cost-effective means to provide network and storage connectivity. Allows for fast deployment into an IT environment
- Innovations in the Solaris 10 U6 OS save customers significant and measurable time and money when deploying, operating, and managing their IT infrastructure
- No need to migrate OS or to port applications to take advantage of new hardware features, providing unrivaled investment protection

- Lights out – remote management
- Sun Integrated Light Out Manager (ILOM): Remote management with full keyboard, Mouse, video, storage (KVMS), remote media capability (floppy, CD etc); full DMTF CLI, browserUI for control of the system through a graphical interface. IPMI 2.0 compliant for management and control SNMP v1, v2c, v3 for system monitoring. Monitor and report system and components status on all FRUs
- All management which doesn't require physically touching the system can be performed remotely. Easily integrated into customer's existing management environment by supporting industry standards ILOM as a core part of the system, there is no additional cost for this functionality as with the competition

Product Family Placement

This product is a new entry in the Netra 4U product line.

- The Sun netra T5440 server is one of the first servers to incorporate the UltraSPARC T2 Plus processor, after the Sun SPARC Enterprise T5X40.
- Building on the success of the UltraSPARC T1 and UltraSPARC T2, the UltraSPARC T2 Plus takes Sun's Cool Threads technology into multi-processor systems. The Sun Netra T5440 server is designed to be complementary to Sun's existing line of SPARC, Opteron, and Intel processor-based servers.

Overall platform positioning can be summarized as follows:

- **Sun Netra CoolThreads server** for highly threaded telco applications
- **Sun SPARC Enterprise CoolThreads servers** for highly threaded web, application tier, middleware, HPC and OLTP workloads requiring the highest levels of power and space efficiency
- **Sun Fire x64 servers** for most demanding FP performance and compute-intensive workloads and for environments that are already standardized on x64 or Linux/Windows-based applications.
- **Sun Fire V490 to E25K and SPARC Enterprise M4000 to M9000 servers** for workload consolidation and highly scalable, mission-critical workloads requiring the highest levels of isolated domains and RAS

Feature Comparison of Sun Netra T5440 and Sun Netra T5220 Server

Feature	Sun Netra T5220 Server (2U)	Sun Netra T5440 Server (4U)
CPUs	4, 8 core 1.2 GHz UltraSPARC T2, with 1 processor per system.	4, 6 and 8 core 1.2 GHz and 8 core 1.4GHz UltraSPARC T2 Plus, with 2 processor per system.
Threads		

Max. memory	4x 2 GB FBDIMM min 16x 2, or 4GB FBDIMM max 64 max (later 128GB)	8x 2 GB FBDIMM min 32x 2GB or 4GB FBDIMM max 128max (now 256GB with 8GB DIMM)
Max. internal disk drives	Up to 4	Up to 12, depending on config
HDD size/	2.5", 146 GB SAS drives and 300GB	2.5", 146 GB SAS drives and 300GB
I/O Ports	Two USB 2.0 ports (rear) One RJ-45 serial management port One 10/100 Mbps ethernet network management port One DB-9 serial port	Four USB 2.0 ports (front; rear) One RJ-45 serial management port One 10/100 Mbps ethernet network management port One DB-9 serial port
PCI-Express	Total of Six expansion slots- Two PCI-X and 4 PCIe.	Total of ten expansion slots – Two PCI-X and 8 PCIe.
Ethernet	4x 10/100/1000 Mbps	4x 10/100/1000 Mbps
Power supplies	N+1 650W AC/DC	2xN+1 650W AC/DC
Fans	N/A	N/A
Form factor	2 RU	4 RU
Solaris OS version	Solaris 10	Solaris 10

Feature Comparison with Netra Other UltraSPARC CPU-based Servers

Feature	Netra 240	Netra T2000	Netra 1290	Netra T5440	Netra 440
Processors (Chips or Sockets)	1 to 2	1	12	2	4
Processor Type	US IIIi	T1	US IV+	T2 Plus	UltraSPARC IIIi
Cores and Speeds Available	1.28GHz/1,5Ghz	4, 6 @1.0GHz and 8 cores @ 1.2	Up to 4,8 or 12 dual core @ 1.5 GHz,	4U: 4, 6 and 8 cores @ 1.2 GHz, and 8C 1.4GHz	
Max. memory	Up to 8 GB	Up to 64 GB	Up to 192 GB	128GB	Up to 32 GB
Disk Drives supported	Up to 2x 73 and 146 GB SCSI , 15 Krpm	Up to 4x146 GB SAS, 10 Krpm (w/o DVDRW)	2x 146 GB SCSI, 15Krpm	12X 146 GB SAS 10Krpm	Up to four 146GB 15K Ultra320 SCSI
Removable media	Slimline DVD or DVD-RW	Slimline DVD+/-RW	DVD+/- RW	Slimline DVD+/- RW	DVD-R/W
Serial Interfaces	RS-232/DB-9	RS-232/DB-9, two USB 1.1	RS-232/DB-9	RS-232/DB-9, Four USB 2.0	Dual serial, Four USB, One SCSI, 1 x 10MB/s Ethernet
PCIe slots, low profile	None	1	None	8 including 2x 10 GbE	None
PCI-X slots, low profile	3 PCI-x	3 PCI-x	6 short PCI-x	2 Pci-x 133 Mhz, FH/FL	6 PCI slots(2x FL/FH)

Ethernet	N/A	N/A	N/A	2 x 10 GbE + 2 x GbE or 4 x GbE	Two on-board Gigabit ports
Form Factors (Rack Units)	2 RU	2 RU	12 RU	4RU/ 20.94	5RU / 17.32"/ 19.5"
Reliability/ Availability Features	Hot-plug disks, ECC and parity on cache and TLB and register files	Hot-plug disks, redundant, hot- swap power supplies and fans, RAID 0, 1	Hot-plug disks, redundant, hot- swap power supplies and fans, RAID 0, 1	Hot-plug disks, redundant, hot-swap power supplies and fans, RAID 0, 1	RAID 0, 1
Solaris O/S version, minimum	Solaris 10 8, 9, 10	Solaris 10	Solaris 8, 9, 10	Solaris 10 U5	Solaris 8, 9 and 10

Target Users

Target users are found in the following market areas:

Network equipment providers, including wireless and wireline telecommunications infrastructures

Service providers deploying data centers, POPs, or metropolitan area networks

Government and military installations

Manufacturing / Utilities

Competitive Positioning

The Netra T5440

The Netra T5440 server have unique competitive differentiators that cannot be matched by IBM, HP including:

- First multi-socket CMT system, delivering unprecedented compute density – over 5k threads per rack
- Delivers higher throughput in less space and power than any other server on the planet
- No compromise eco-efficiency, low power & high performance
- Great I/O scalability -
- Massive memory expandability
- First platform to deliver zero-cost security available via on-chip, integrated cryptographic accelerators
- On-Chip Integration of I/O and on-motherboard integration of 10GbE Networking

- Along with the UltraSPARC T2 servers, able to incorporate unique power management features at both core and memory levels of the processor, including the ability to reduce instruction issue rates, parking of idle threads, disabling cores and the ability to turn off clocks in both cores and memory to reduce power consumption by up to 35%
 - Unique binary compatibility guarantee
 - open platform
 - advanced OS
- The SPARC / Solaris open source architecture uniquely guarantees binary compatibility across generations, so customer application investments are preserved more effectively than any other platform – enabling customers to enjoy all the benefits of CMT innovation, without having to re-write or port their code.
 - The Sun Netra T5440 server offer the most flexible, open and lowest cost virtualization and consolidation capability in class. Logical Domains support up to 128 isolated open source OS instances on a single platform, coupled with thousands of isolated application instances through Solaris Containers, enabling customers to achieve dramatic levels of server compression and data center efficiency, all via the implementation of open source and no-cost technologies
 - Solaris, LDomS and Solaris Containers are all bundled with the price of the server. Virtualization and an OS both add to the cost of many competitive servers – especially Windows, HP-UX or AIX based systems. Multiple copies of Solaris 10 running under LDomS are also available at no extra charge, thereby providing a further competitive advantage.
 - The four on-board memory controllers allow the UltraSPARC T2 Plus processor to perform superbly on applications that move data with many small threads and high memory bandwidth.
 - The Sun Netra T5440 server is part of the fifth-generation CMT design (UltraSPARC IV, UltraSPARC IV+, UltraSPARC T1, UltraSPARC T2), while the competition is only on their second generation design.

Competitive Positioning :

Competitive Positioning	
HP competitive offerings : Rackmount Servers	
cx2620	<p>The Netra T5440 has multiple strengths.. its memory capacity can reach up to 128 GB today. It can support more than 1TB of total disk capacity in a 4-RU form factor. It has 4 Gbe ports on the system and can support a combination of 10 PCIe and PCI-X slots. The Netra T5220 supports full-height and full-length PCI-X and PCI-E cards allowing the use of legacy telecommunication cards.</p> <p>However, the current HP carrier-grade server only offer up to 24GB of memory max with only a max storage capacity of 900GB . Likewise, it only offers 2 GbE ports on-board and 0 PCIe slots within the system.</p>

Competitive Positioning

It is not anticipated that HP will upgrade their 4U carrier-grade offering in the near future making their current product very uncompetitive moving forward.

HP is also offering to NEBS certify their commercial servers if there is a business case

HP offers Eco-friendly products and services to help customers manage their power consumption of their data centers. With each product HP also provides documentation for use by end-of-life recyclers or treatment facilities. It provides the basic instructions for the disassembly of HP products to remove components and materials requiring selective treatment, as defined by EU directive 202/96/EC, Waste Electrical and Electronic Equipment (WEE).

Products → Features ↓	Sun Netra T5440	HP CX 2620
Size RU/BW	4U	4U
Depth	20"	20"
CPU Type	Victoria Falls)UST2 Plus	Itanium2
Number of CPUs	2	2
Mem Type	FB DIMM	DDR1 SDRAM
Max Memory	128GB 256Gb (with 8GB DIMMS)	24GB
Disk Drive size	146GB	73GB-300GB 15Krpm
Disk Drive Protocol	SAS	UltraSCSI 320
Disk count	12	3
Max Internal Disk	1752GB	900GB
Hot pluggable Disk	Yes	Yes
Optical Media	DVDRW	DVDR/DVDRW
Ethernet	Quad GbE	Dual GbE
O/S support	Solaris 10, Suse, Redhat, WS	Linux, HP UX
PCI-X Slots	4	4 (FL)
PCI-E slots	8	N/A
PCI-E Lanes	4x8, 4x4	N/A
Max # PSU	4	2
Max PSU Power/PSU	650W	700W max
NEBS Level 3 Certified	Yes	Yes

How to Beat Your Competition:

Visit <http://competitive.central> (or MySales > Systems > Competitive) for a broad range of tools available to counter competitive claims.

Selling Highlights

Market Value Proposition

The Netra T5440 server combines the proven ruggedness and reliability of Sun Netra servers with industry-leading performance, efficiency, and expandability to deliver an optimal platform for consolidation. This four-socket 4RU CMT carrier-grade server supports UltraSPARC T2 Plus processor and is ideal to meet the needs of tomorrows network infrastructures.

Do More With Less: High performing carrier-grade server helps to maximize Return On Investment.

More Headroom to Grow: More expandable in memory, storage and networking connectivity.

Cut IT operating expenses: More power efficient that results in power consumption and cooling cost.

Improve Service Levels: High availability features such as hot swappable and redundant power supplies and disks lead to higher uptime. Ruggedized packaging provides a high level of system reliability which helps ensure that the Netra T5440 server continue to operate under the extremes of environmental conditions.

Investment Protection: Standardize on one hardware platform for all major operating systems in the network infrastructure. Support for full-height and full-length PCI-X and PCI-E cards allowing the use of legacy telecommunication cards. Reaffirms Sun's commitment to customers who invested in the Netra product line by offering a product that delivers enhanced performance/throughput, consistent form, fit, and function.

Availability

This product has been shipping since August 2008.

The SWaP Metric

With the explosion of wireless devices, voice and data convergence and the increasing use of web applications, data centers are under pressure to deliver more services, transactions and data to more devices. And it's just the beginning. Demand for these new services is growing exponentially.

Evaluating a new server for your data center is no longer simply a matter of measuring raw performance. With today's increasing web scale and virtualization demands, you also need to consider how much power, air conditioning and space a server consumes. While traditional metrics are good for calculating throughput, they don't consider these new power and space demands in the equation.

That's why Sun created SWaP--the Space, Watts and Performance (SWaP) metric.

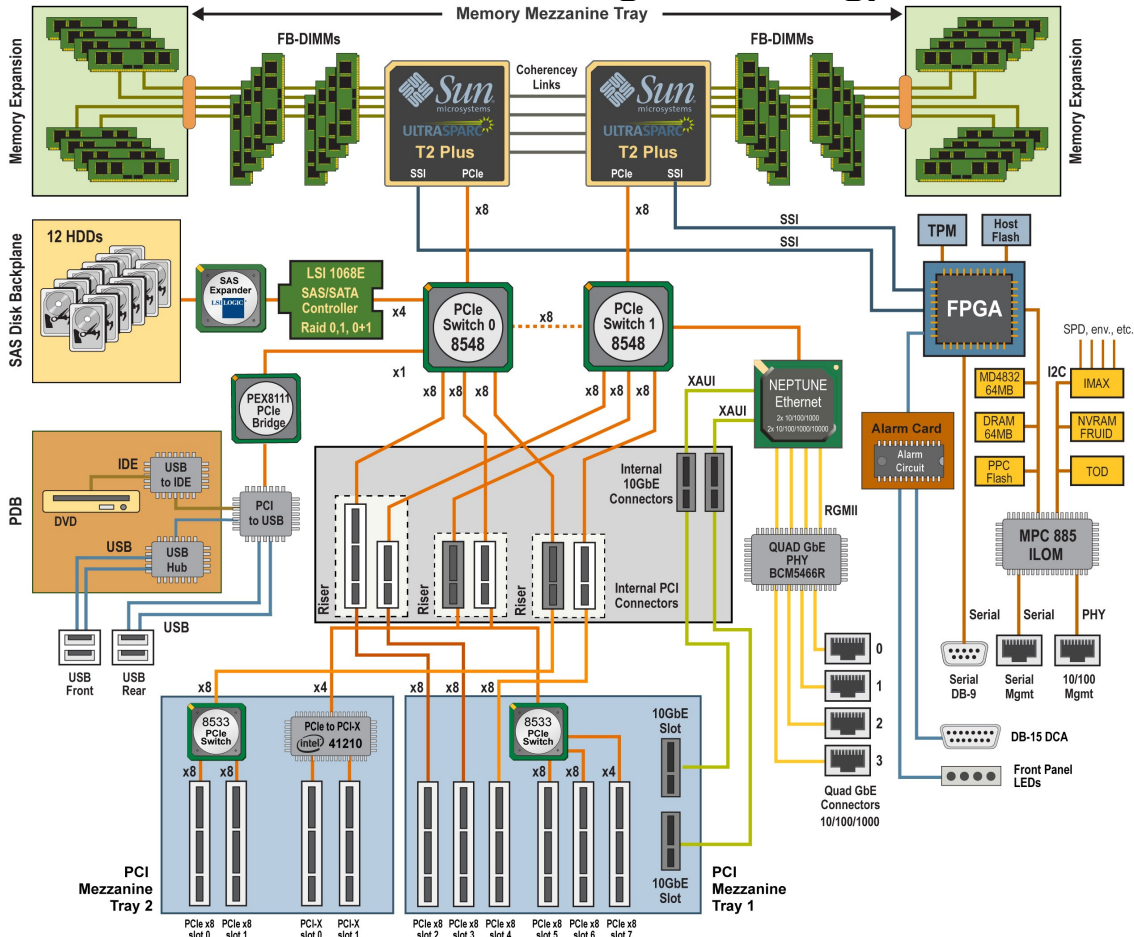
$$\text{SWaP} = \text{Performance} / (\text{Space} * \text{Power Consumption})$$

Performance is measured by industry-standard, audited benchmarks (such as Subcontracted2004 and SPECweb2005).

Space refers to the height of the server, measured in rack units (RU).

Power is measured by watts used by the system. This is either measured during actual benchmark runs or is taken from vendors site planning guides.

Enabling Technology



Sun Netra™ T5440 server block diagram

The UltraSPARC T2 Plus CMT Processor

The UltraSPARC® T2 Plus multi-core, multi-thread processor enhances the capabilities of the previously announced UltraSPARC T2 processor by providing support for multi-processor systems.

Objectives of the UltraSPARC T2 and T2 Plus Processors

- Optimization for throughput and application parallelism
 - Most important commercial server applications are heavily threaded
 - Parallelism through aggregation (multi-instance, multi-process)
 - Virtualized server environments (e.g. Logical Domains)
- Attack the memory wall
 - Commercial workloads exhibit poor memory locality
 - For a single thread, memory latency is the bottleneck to improving performance
 - Diminishing returns with increased cache sizes in terms of both performance and die area efficiency

Netra T5440 Server Just the Facts

Sun Internal and Authorized Partner Use Only

- Trade off thread latency for thread Throughput
 - For a single thread, only modest throughput speedup is possible by reducing compute time (increased frequency, ILP)
- Architected as core-centric designs to maximize thread count within die area limits
 - Relatively high thread count per core
 - Many cores imply small cores and associated L1 caches
 - Modest capacity shared outermost cache (L2\$)
- Managing high concurrency at all levels of the design is the major scaling challenge

The key features of the UltraSPARC T2 Plus processor include:

- 8 SPARC V9 cores @ 1.2 or 1.4GHz (1.4GHz)
- 8 threads per core
- 8 stage in-order pipeline
- 2 execution pipelines per core
 - 1 instruction/cycle per pipeline
- 1 Floating point unit (FPU) per core – 11 Gflops/sec. VIS 2.0
- 1 crypto (SPU) per core
- 4 MB, 16-way, 8-bank L2\$
- Integrated memory controllers
- 2.5 GHz, x8 PCI-Express interface
- Technology: TI 65nm

The main differences in the UltraSPARC T2 Plus (vs. the UltraSPARC T2) are:

- 2 - 4 socket SMP-enabled
- Coherency Link: 4.8Gb/s @ 1.4GHz, 4.0Gb/s @ 1.2GHz
- 2 FB-DIMM DRAM controllers vs. 4 in T2, each still with 1 branch of 2 channels
 - 128 GB capacity
- Additional memory features, such as memory-mirroring capability (not implemented on T5440 servers) and FBDIMM single link fail-over
- Relaxed DMA ordering, a feature also planned for successor UltraSPARC processor(s)
- No integrated XAUI/ 10 Gb Ethernet ports
- Die size: 348 mm²
- Max power: 103W for 1.2GHz, 132W for 1.4GHz
 - Compares to T2 processor max power of 91W for 1.2GHz, 123W for 1.4GHz

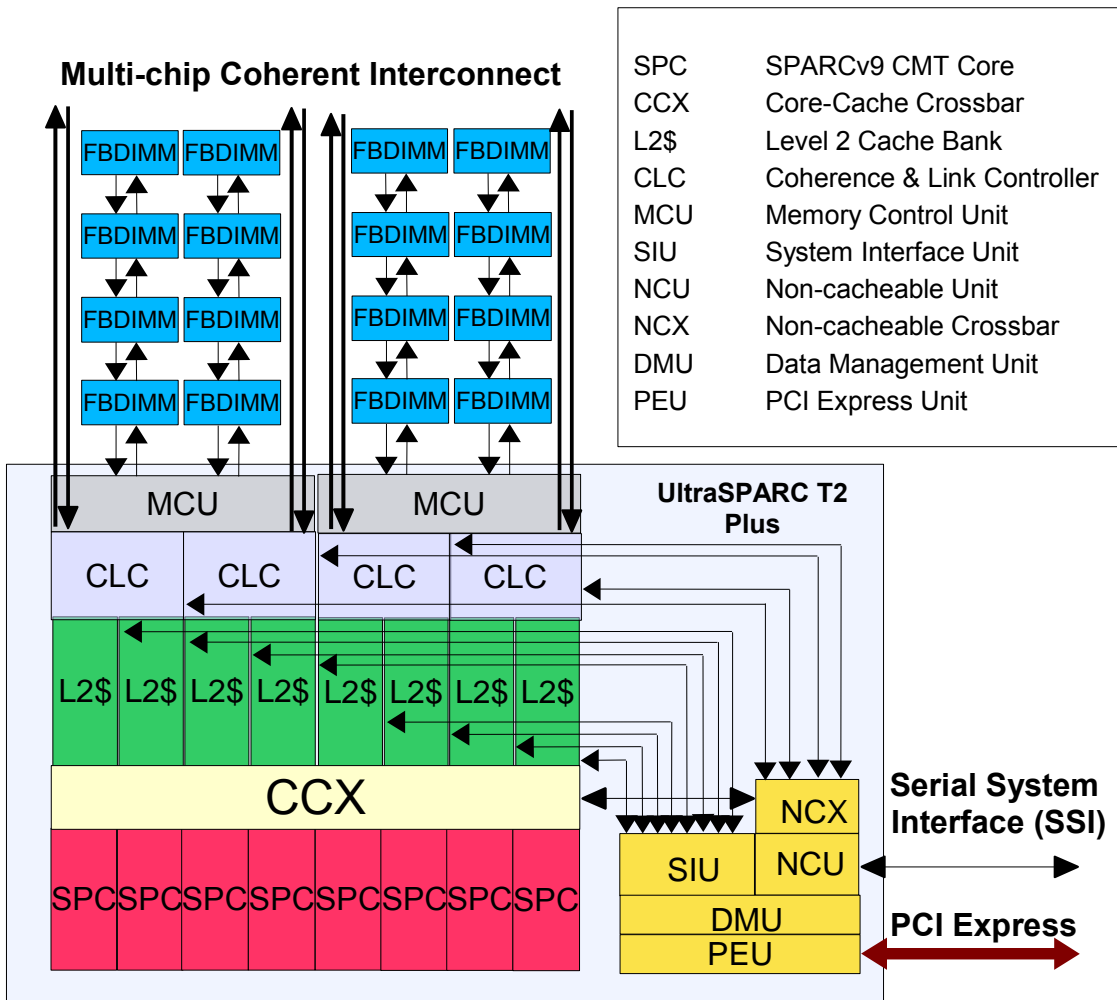


Figure 3 – UltraSPARC T2 Plus Block Diagram

Hardware-Assisted Cryptography

The UltraSPARC T2 Plus CMT processor provides hardware-assisted acceleration of DES, 3DES, AES, RC4, SHA1, SHA256, MD5, RSA to 2048 key, ECC, CRC32 cryptographic operations. The Solaris 10 Operating Environment provides the multithreaded device driver that supports hardware-assisted cryptography. Both PKCS#11 and OpenSSL libraries provide access to end-user applications wishing to use these ciphers.

Customers wishing to enable IPsec cryptographic operations must obtain and install a separate activation file due to export restrictions on this functionality. In some cases (per country-specific U.S. export rules), the file may need to be ordered on a CD, or may not be available at all. Please see <http://www.sun.com/ipsec> for more information.

System Architecture

Design Approach

Serviceability was a key concern in this common chassis design. Some key features include a radical reduction in system cabling, mounting the motherboard on a protective tray that easily installs into a chassis, and diagnostic LEDs that provide the ability to locate any FBDIMM that is in need of replacement, even with the main power disconnected.

Product Upgrade Path

The Sun Netra T5440 accommodates a variety of upgrade possibilities. Upgrades to the memory system will be easy to achieve, with 16 FBDIMM sockets on the motherboard with adequate power distribution capability and cooling to support all legal memory configurations regardless of the original system configuration.

Processor speed upgrades would require a motherboard replacement, as the CPUs are soldered to the motherboard. Therefore, processor upgrades in the field are not supported.

Environmental Controls

The Sun Netra T5440 continues the strong capabilities to adapt and trade off operational power levels versus performance. This ability to sense the operating point of the system in conjunction with the ability to regulate fan speed in addition to control of UltraSPARC T2 Plus' power throttling capability has the potential of offering a new level of environmental control that is unique to the industry.

The Sun Netra T5440 servers feature an environmental monitoring subsystem that protects the server and its components against:

- Extreme temperatures
- Lack of adequate airflow through the system
- Power supply failures
- Hardware faults

Temperature sensors are located throughout the system to monitor the ambient temperature of the system and internal components. The software and hardware ensure that the temperatures within the enclosure do not exceed predetermined safe operation ranges. If the temperature observed by a sensor falls below a low-temperature threshold or rises above a high-temperature threshold, the monitoring subsystem software will generate an alert indicating a temperature warning. If the temperature condition persists and reaches a critical threshold, the monitoring subsystem lights the amber Service Required LEDs on the front and back panel and initiates a system shutdown. Required LEDs remain lit after an automatic system shutdown to aid in problem diagnosis. The power subsystem is monitored in a similar fashion by monitoring power supplies and reporting any fault in the front and rear panel LEDs.

Electrical Subsystems

The major physical components of the system include the circuit boards, the system interconnect, and

the power supplies. The system block diagram, covering both the T5440, is shown below.

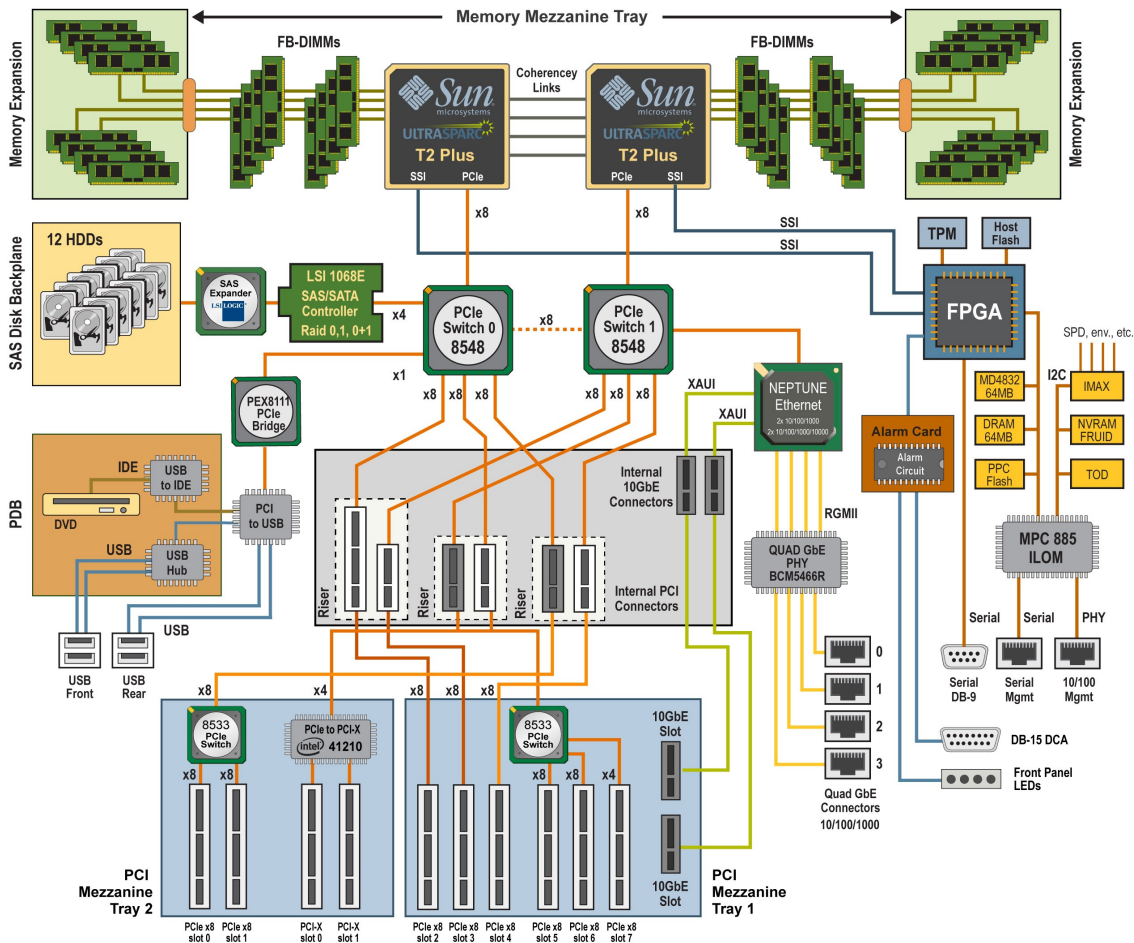


Figure 4 – System Block Diagram for Netra T5440

The Sun Netra T5440 System Motherboard

The system motherboard is a 20 layer, 17" x 12" Printed Circuit Board (PCB) with a thickness of .103", glass to glass. It contains 2x UltraSPARC T2 Plus processors, 16x FBDIMM sockets for main memory, the service processor, disk controller, and an IO Subsystem consisting of USB, DVD control, Ethernet (10/100/1000 Mbps and 10Gbps), and PLX PCIe expansion chips branching out to three sets of connectors into which riser cards are inserted to accept a wide range of horizontally installed third party low profile PCIe add-in cards.

Main Memory

The UltraSPARC T2 Plus processor communicates directly to FBDIMM memory through high speed serial links. With a memory clock of 667MHz DDR, its two, dual channel FBDIMM memory controllers per processor

can transfer data at an aggregate rate of ~ 63GB/s for two processors.

On 11/11/08 Netra T5440 moved from 1.8V FB DIMMS to 1.5V FB DIMMS

There are 16x FBDIMM sockets on the motherboard. The memory capacity may be expanded by installing the Memory Mezzanine Kit, which plugs into the motherboard and provides 16 additional FBDIMM sockets for a total of 32.

I/O Subsystem--

Each UltraSPARC T2 Plus incorporates a single, 8 lane PCIe port capable of operating at 2GB/s in either direction. This port natively interfaces to the Sun Netra T5440 system Input/Output (IO) devices through PLX Technology PCIe expander chips, connecting either to PCIe card slots or to bridge devices that interface with PCIe, such as those listed below.

GbE and 10GbE

One eight lane PCIe port connects to the Sun Neptune ASIC, which provides four 10/100/1000Mbps Ethernet connections out of the rear of the box. The Neptune ASIC also provides 10GbE via the 2 XAUI slots. Because the controller is shared, use of a XAUI slot will disable a 10/100/1000 Mbps port. Installing a XAUI card in slot 0 disables onboard network port 1 (NET1). Installing a XAUI card in slot 1 disables onboard network port 0 (NET0).

USB and DVD

A one bit lane PCIe port connects to a PLX PEX8112 PCI bridge device. A second bridge chip, a NEC UPD720101, converts the 32 bit, 33MHz PCI bus into multiple USB 2.0 ports. The Sun Netra T5440 system USB interconnect is driven from these ports. In addition, the DVD is driven from yet another bridge chip that interfaces one of the USB ports to its required format.

Front USB Panel Card

The 501-7698 Front USB Panel Card inserts directly into the disk backplane, adjacent to the DVD drive. It provides two USB 2.0 connections to the front of the box.

Discreet System Interconnect

A majority of the system signal and power connection is accomplished though directly interconnected PCB infrastructure boards. All system connections requiring discrete cables and/or bus bars are described below.

Bus Bars

Bus bars are used to route high current 12 volt DC power (plus ground) from board to board. The horizontal PDB in either chassis type requires a set of bus bars to be able to distribute 12 Volt DC power to the motherboard.

Motherboard to PDB Ribbon Cable

All PDB power supply control, status, and 3.3 Volt standby power are carried via a single ribbon cable to the motherboard. This same cable connection, common to either chassis, provides an intermediate path for

motherboard system I2C, DVD data, and USB signals to be routed across the PDB over to the Connector Board on their way to their final destinations.

Main Power Supplies

The Sun Netra T5440 main system power supply modules provide the chassis with 12 Volts DC at current levels ranging from 50 to 80 Amperes and a modest amount of 3.3 Volt standby power.

When four power supply bays are populated, the output current will be shared. Thus, some amount of system power will be delivered by each supply. The combined utilization level will be at an equivalent level of 50% or less of their combined maximum capacity.

The system support AC and DC power supplies.

Enclosure

Common Features

The Sun Netra T5440 server continues the use of the common 4U chassis from the Netra X4450 (Intel based Netra server).

- Hard disk drives – front-access, hot-swap, 2.5”, using the Marlin bracket
- An optical DVD+/-RW drive (SATA)– front-access, slim form factor, slot-load
- USB ports – front and rear access
- Serviceability LED indicators and push-buttons - front- and rear-access
- Fan modules – top-access, hot-swap, providing front-to-back system airflow
- Power supplies – rear-access, hot-swap
- Infrastructure boards and interconnect, leveraged across platforms
- A platform-unique motherboard.

Front Service indicators

At the front of the system is the standard set of serviceability LED indicators and push-buttons as defined in the VITA 40-2003 and Sun status indicator standards. The actual LEDs and push-buttons are contained on boards within the chassis, and are viewed and/or actuated through light pipes reaching to the front of the system. The following are implemented:

- White **Locator** indicator with integrated momentary **Locator push-button**
- Yellow **Service Required** indicator
- Green **Power/Activity** indicator
- Momentary **Power** push-button
- Yellow **Over Temperature** indicator
- Yellow **Fan Fail** indicator

- Yellow **Power Supply Fail** indicators.

Rear Service indicators

At the rear of the system are power and I/O connections, including:

- 2 power supplies, each with an AC input power connector
- White **Locator** indicator with integrated momentary push-button
- Yellow **Service Required** indicator
- Green **Power/Activity** indicator (but no push-button)
- Service processor RJ45 serial port and RJ45 Ethernet connectors
- Four host RJ45 Ethernet connectors
- Two USB connectors
- Single host DB9 serial port connector
- Horizontal openings for optional PCI Express / XAUI 10GbE expansion cards

T5440 Enclosure

The Netra T5440 system uses the common 4U enclosure. The T5440 supports up to 12 hard disk drives, depending on the backplane selected. Cooling is provided by up to six dual fan modules (depending on config), arranged in 2 rows, located between the disk backplane and the system motherboard. Each fan module includes two 60mm fans. Power is provided by up to two power supplies, located in the left rear corner of the chassis (viewed from the rear), arranged in a stacked configuration.

Figure 7 – T5440 Enclosure Front View (12 disk)

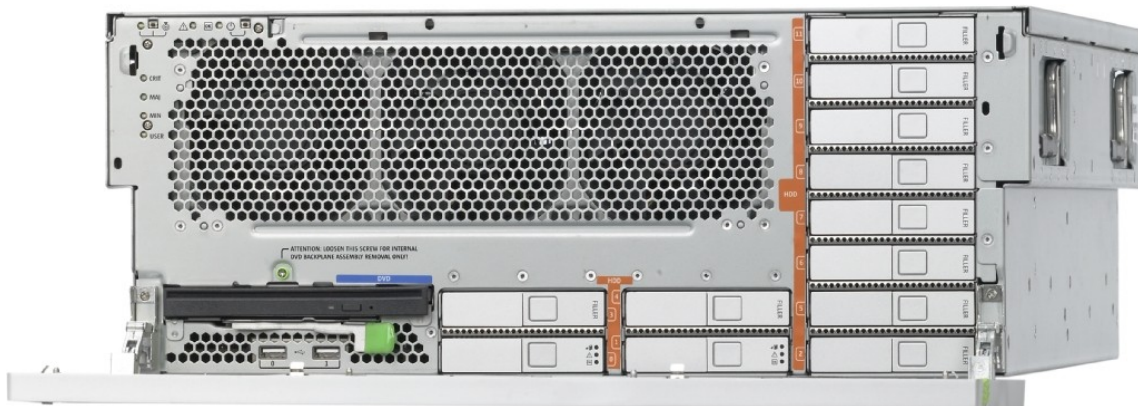
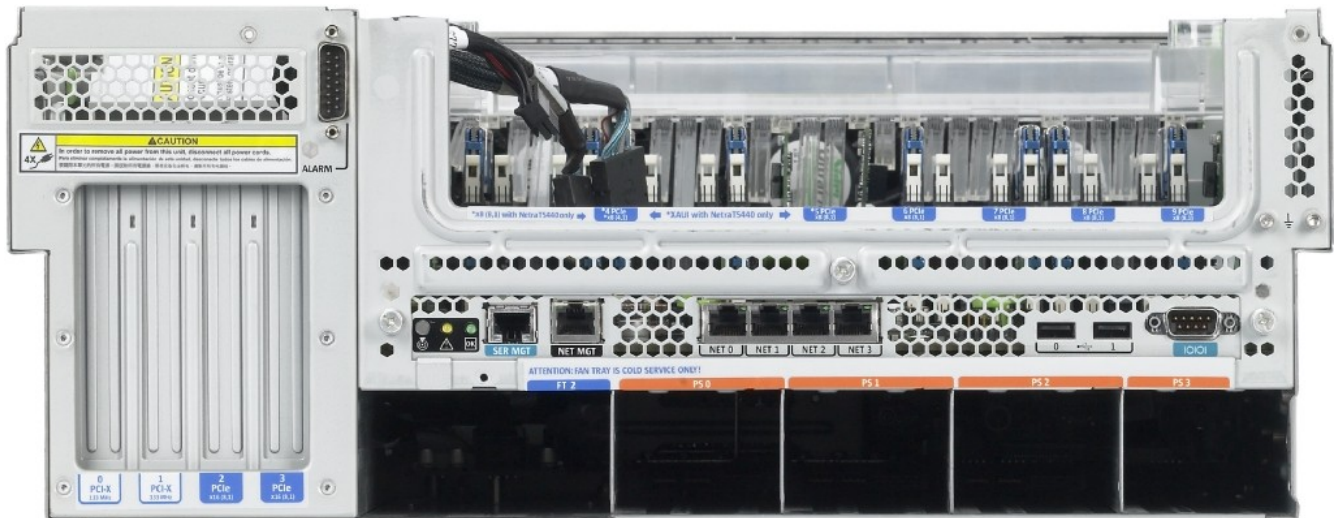


Figure 8 – T5440 Enclosure Rear View-



Support for RAID Storage Configurations

You can set up hardware RAID 1 (mirroring) and hardware RAID 0 (striping) configurations for any pair of internal hard drives, providing a high-performance solution for hard drive mirroring. By attaching one or more external storage devices to the Sun Netra T5440 servers, you can use a redundant array of independent drives (RAID) software application such as Solaris Volume Manager™ (SVM) or VERITAS Volume Manager to configure system drive storage in a variety of different RAID levels.

RAID 5 and 6 can be enabled using the Sun StorageTek SAS RAID Internal HBA (SG-(X)PCIESAS-R-INT-Z) and the required cable kit. This can be ordered as an Xoption, which requires installation by Sun Services due to the complexity of the cable routing.

High Levels of System Reliability, Availability, and Serviceability

Reliability, availability, and serviceability (RAS) are aspects of a system's design that affect its ability to operate continuously and to minimize the time necessary to service the system. Reliability refers to a system's ability to operate continuously without failures and to maintain data integrity. Availability refers to the ability of a system to recover to an operational state after a failure, with minimal impact. Serviceability relates to the time it takes to restore a system to service following a system failure. Together, reliability, availability, and serviceability features provide for near continuous system operation.

To deliver high levels of reliability, availability, and serviceability, the Sun NetraT5440 servers offer the following features, many of which are shared with the Netra T5440 by virtue of the common chassis and similar system architecture:

- Up to 2x fewer parts than competitive platforms, serving to improve reliability
- Ability to disable individual threads and cores without rebooting
- Lower heat generation reduces hardware failures
- Hot-pluggable hard drives
- Redundant, hot-swappable power supplies (two)

- Redundant hot-swappable fan modules
- Environmental monitoring
- Internal hardware drive mirroring (RAID 1)
- Error detection and correction for improved data integrity
- Easy access for most component replacements

Specifications-

Power Source Requirements

The Sun Netra T5440 server has four autoranging AC or DC power supplies. To ensure redundant operation of the power supplies, the four power inputs should be connected to separate power sources.

These are the electrical limits and ranges for the Netra T5440 server utilizing 650W power supplies.

Description	AC Specification	DC Specification
Operating input voltage range	100 to 240 VAC, 50 to 60 Hz	-48VDC or -60VDC (nominal) -40VDC to -75VDC (range)
Maximum operating input current for the PSU only	7.56A at 100 VAC (full output load 658W assuming min-efficiency at full load 87%)	18.75A at -40VDC (full output load 660W assuming min-efficiency at full load 88%)
Maximum heat dissipation	2581 BTU/hr.	2581 BTU/hr.

Description	Idle Power	100% Util Peak Power	50% Util Peak Power
Total Power of System (Watts) See configuration below	691W	955W	823W
Total Power of System (BTU/hr.) See configuration below	2357.8 BTU/hr.	3258.6 BTU/hr.	2808.2 BTU/hr.

Note the above power calculations assumed the following Netra T5440 configuration (Four Quad Core E7338 processors , 32x 4GB, DVD RW, twelve 146GB 10K RPM 2.5" SAS drive, 8-port internal SAS Host Bus Adapter, four AC PSUs.)

Environment Specifications

These are the environmental specifications for the Sun Netra™ T5440 server.

Specification	Operating	Non-Operating
Temperature	0°C to 40°C, (41°F to 104°F) Short Term -5°C to 55°C (23°F to 131°F)	-40°C to 70°C (-40°F to 158°F)
Relative Humidity	5% to 85% relative humidity, noncondensing Short term: 5% to 90% relative humidity, noncondensing, but not to exceed 0.024 kg water/kg dry air (0.053 lbs. water/2.205 lb. dry air)	Up to 93% relative humidity noncondensing, 40°C (104°F)
Altitude	Up to 3000 meters (9,850 feet) @40°C	Up to 12,000 meters (40,000 feet)

ETSI	EN 300 019-2-1,2,3, Class 1.2, 2.3, 3.1E - Except condensing humidity - Except rain
NEBS	NEBS Level 3 Certified by Telcordia
Seismic	GR-63-CORE requirements for earthquake zone 4

Acoustic Noise Emissions

These are the acoustic noise emissions of a Sun Netra T5440 server. Declared noise emissions are in accordance with ISO 9296 standards.

Description	Mode	Specification
LwAd (1 B = 10 dB)	Operating acoustic noise	7.2 B
	Idling acoustic noise	7.0 B

Agency Compliance Specifications

The Sun Netra T5440 server complies with the following specifications.

Category	Relevant Standards
Safety	UL/CSA-60950-1, EN60950-1, IEC60950-1 CB Scheme with all national differences, IEC825-1, 2, and CFR21 part 1040
RFI/EMC	EN55022/CISPR22 Class A, FCC CFR47 Part 15 Class A

Category	Relevant Standards
Immunity	EN55024/CISPR24, EN61000-3-2, EN61000-3-3
Telecommunications	EN300-386
Regulatory Markings	CE, FCC, ICES-003, C-tick, VCCI, GOST-R, MIC, UL/cUL, S-mark, BSMI, CCC
Other	Restriction of Hazardous Substances (RoHS) labeled, per WEEE (Waste Electrical and Electronics Equipment) directive (2002/95/EC)

Physical Specifications

Description	U.S.	International
Height	6.86 inches (4RU)	174.2 mm
Width (including bezel)	17.5 inches	445 mm
Depth (maximum to PSU handles)	20.87 inches	530 mm
Depth (to rear I/O)	19.88 inches	505 mm
Weight (fully configured without PCI cards)	72.6 lbs	33 kgs

Software and Firmware

PreInstalled Solaris Operating System

The Sun Netra T5440 Servers are pre-installed with the Solaris10 Operating System and offer the following Solaris features:

- Stability, high performance, scalability and precision of a mature 64-bit operating system
- Solaris 10 OS runs on a broad range of SPARC® and x86-based systems and compatibility with existing applications is guaranteed.
- Support for over 12,000 leading technical and business applications
- DTrace – A comprehensive dynamic tracing framework for tuning applications and troubleshooting systemic problems in real time. DTrace provides “always on” rapid evaluation and resolution of system problems and bottlenecks, reducing downtime and yielding dramatic performance improvements.
- Predictive Self-Healing – Capability that automatically diagnoses, isolates and recovers from many hardware and application faults. Provides new levels of application availability (see further details below).
- Security – Advanced security features designed to protect the enterprise at multiple levels
- Network Performance – Completely rewritten TCP/IP stack dramatically improves the performance and scalability of networked services
- Solaris Containers (also known as Zones) isolate software applications and services using flexible, software-defined boundaries. They enable as much as a four times increase in system utilization by making it possible to efficiently and securely support thousands of applications per system with no performance hit.
- Process rights management enables precise control of system privileges, significantly reducing exposure to system intrusion and limiting unauthorized access to administrative functions, sensitive data, and other critical system elements.
- ZFS (Zettabyte File System) – offers a dramatic advance in data management with an innovative approach to data integrity, tremendous performance improvements, and a welcome integration of file system and volume management capabilities.

Customers can use the pre-installed Solaris 10 image or re-install a supported version of the Solaris 10 from the network, a CD or downloaded copy. Refer to the Sun Netra T5440 *Product Notes* for information on the supported releases.

For customers, the Solaris 10 OS will drive significant and measurable cost savings through increased performance - allowing customers to do more with less (or to do more with what they already have) with increased simplicity and ease of administration.

Solaris 10 works to ensure that customer applications and platforms stay up and running giving them increased utilization of their IT assets. Improved security ensures that their IT assets are protected leading to ease of mind.

The Solaris 10 OS is free to use for any end user, requiring only a simple registration. For those who want enhanced support, access to fixes, and training, there are multiple support options available at competitive prices. Thus, the Solaris 10 software offers customers the ability and the flexibility to pay for only what they need, while making use of Solaris' advanced technologies.

In short, Solaris 10's ground-breaking innovations save customers significant and measurable time and money when deploying, operating, and managing their IT infrastructure.

The Solaris 10 OS has been optimized for CoolThreads. Below are some of the many features to take advantage of this technology:

- CMT-smart scheduler balances load
- Highly-threaded kernel and device drivers
- Fast, efficient thread implementation
- Virtualization and resource management
- Large page support throughput
- New IP network stack architecture, CMT-aware device drivers
- Optimized encryption framework and implementation
- Enhancements in UltraSPARC T2 / T2 Plus for crypto, networking, load balancing, scheduling and caching

Fault Management and Predictive Self Healing

The Sun Netra T5440 servers provide the latest fault management technologies. The Solaris 10 OS architecture provides a means for building and deploying systems and services capable of *predictive self-healing*. Self healing technology enables systems to accurately predict component failures and mitigate many serious problems before they actually occur. This technology is incorporated into both the hardware and software of the Sun Netra T5440 Server.

At the heart of the predictive self-healing capabilities is the Solaris™ Fault Manager Architecture (FMA), a service that receives data relating to hardware and software errors, and automatically diagnoses the underlying problem. Once a problem is diagnosed, a set of agents automatically responds by logging the event, and if necessary, takes the faulty component offline. By automatically diagnosing problems, business-critical applications and essential system services can continue uninterrupted in the event of software failures, or major hardware component failures.

Support for Virtualization Through Logical Domains (LDoms)

The Sun Netra T5440 servers support the use of Logical Domains (LDoms) technology. Through the use of the Solaris 10 OS, the built-in server firmware, and the Logical Domains Manager software (pre-installed), customers can virtualize the compute services that run on the customer's server.

A *logical domain* is a discrete, logical grouping with its own operating system, resources, and identity within a single computer system. Each logical domain can be created, destroyed, reconfigured, and rebooted independently, without requiring a power cycle of the server.

Customers can run a variety of applications software in different logical domains and keep them

independent for performance and security purposes.

Each logical domain can be managed as an entirely independent machine with its own resources, such as:

- Kernel, patches, and tuning parameters
- User accounts and administrators
- Disks
- Network interfaces, MAC addresses, and IP addresses

Each logical domain can interact only with those server resources made available to it, and the configuration is controlled using the Logical Domains Manager.

The maximum number of virtual machines created on a single platform relies upon the capabilities of the hypervisor as opposed to the number of physical hardware devices installed in the system. For example, Sun servers with a single Sun UltraSPARC® T1 processor support up to 32 logical domains; Sun Netra T5220 servers can support up to 64 logical domains; and Sun Netra T5440 server can support up to 128 logical domains. Each individual logical domain is a separate virtual machine and can run a unique instance of the operating system.

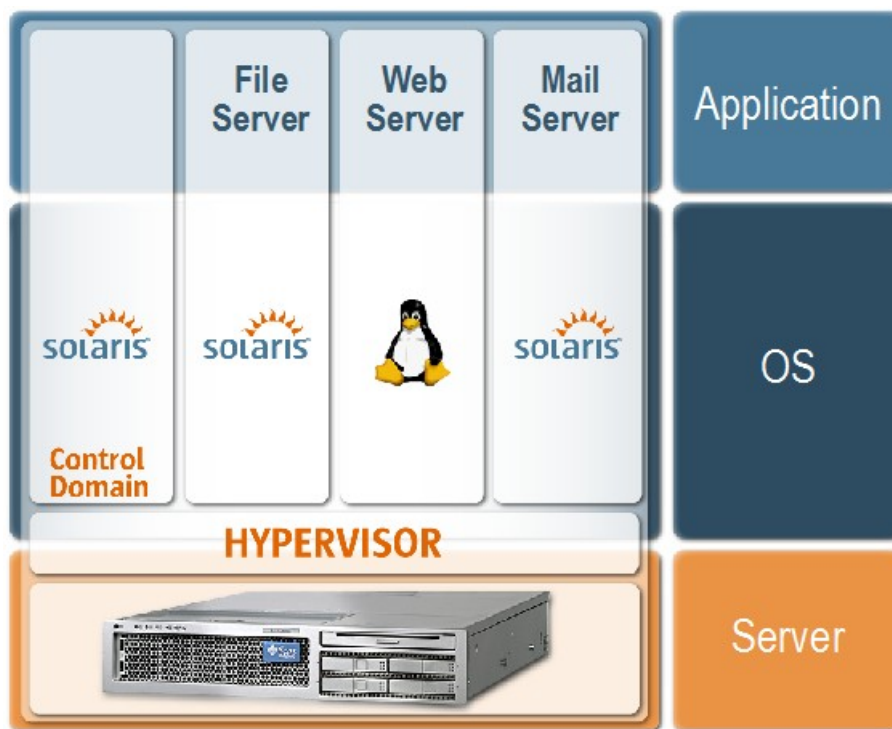


Figure 9 – Logical Domains (LDoms)

By taking advantage of logical domains, organizations gain the flexibility to deploy multiple operating systems simultaneously on a single platform. In addition, administrators can leverage virtual device capabilities to transport an entire software stack hosted on a logical domain from one physical

machine to another. Logical domains can also host Solaris Containers to capture the isolation, flexibility, and manageability features of both technologies. By deeply integrating logical domains with both the industry-leading chip multithreading (CMT) capability of the Sun UltraSPARC® T1, T2, and T2 Plus processors and the Solaris 10 OS, logical domains technology increases flexibility, isolates workload processing, and improves the potential for maximum server utilization.

Logical Domains Architecture

The following key architectural components work together to accomplish the partitioning and isolation capabilities of logical domains.

- Hypervisor — A small firmware layer that provides a set of hardware-specific support functions to operating systems through a stable interface, known as the sun4v architecture. The hypervisor creates virtual machines by subdividing physical devices across multiple logical domains, exposing some resources to a specific partition and hiding others. In addition, the hypervisor creates communication channels, logical domain channels, between logical domains to provide a conduit for services, such as networks and shared devices.

Figure 10 – LDoms Architecture

- Virtual devices — Physical system hardware, including CPU, memory, and I/O devices, that are abstracted by the hypervisor and presented to logical domains within the platform.
- Logical Domains Manager — Software that communicates with the hypervisor and logical domains to sequence changes, such as the removal of resources or creation of a logical domain. The Logical Domains Manager provides an administrative interface and keeps track of the mapping between the physical and virtual devices in a system.
- Guest operating system — An operating system that understands both the sun4v platform and the virtual devices presented by the hypervisor.

There are several different roles for logical domains, and these are mainly defined by context; their usage defines them. A domain may have one or more of these roles, such as combining the functions of an I/O and service domain:

- Control domain — Executes Logical Domains Manager software to govern logical domain creation and assignment of physical resources.
- Service domain — Interfaces with the hypervisor on behalf of a guest domain to manage access to hardware resources, such as CPU, memory, network, disk, console, and cryptographic units.
- I/O domain — Controls direct, physical access to input/output devices, such as PCI Express cards, storage units, and network devices.
- Guest domain — Utilizes virtual devices offered by service and I/O domains and operates under the management of the control domain.

Logical Domains Manager

The Logical Domains Manager (and associated daemon processes) execute within the control domain to accomplish communication and configuration tasks. The control domain communicates with the

hypervisor to create and manage all logical domain configurations within a server platform. At system startup or during a reconfiguration operation, the Logical Domains Manager reads the physical resource inventory, performs constraint-based device mapping, and passes reconfiguration instructions to the sequencer. In this manner, Logical Domains Manager takes locality of hardware into account and intelligently maps logical domains to physical resources, working to minimize latency and increase throughput of each logical domain.

Logical Domains Manager is required for all logical domain creation and reconfiguration tasks. In fact, without access to the Logical Domains Manager all logical domain resource levels remain static. Administrators interact with the Logical Domains Manager using a command-line user interface. Sun continues to invest in logical domains technology and intends to also provide an optional browser user interface and graphical user interface in the future.

Logical Domains Manager is pre-installed on the T5440 server. The minimum supported software version is Logical Domains Manager 1.0.2.

Logical Domains MIB

The Logical Domains (LDoms) Management Information Base (MIB) enables third party system management applications to perform remote monitoring of and starting and stopping logical domains using the Simple Network Management Protocol (SNMP).

The LDoms MIB software runs on the control domain only, and only one instance of the LDoms MIB can be run. The LDoms MIB is pre-installed on the Netra T5440 server. The minimum supported software version is LDoms MIB 1.0.1 U1.

System Management

ILOM

Although the service processor (SP) hardware is functionally equivalent to the T2000 implementation, the software stack which runs on top of the hardware in the Sun Netra T5440 has been changed from ALOM to ILOM – the Integrated Lights Out Manager.

The ILOM application is built on a Linux kernel, it is a SPARC port of the ILOM Service Processor application used on Sun x86 server platforms. The Sun Netra T5440 servers is supported by ILOM 2.0, which combines features and code from ILOM, ALOM (used on T2000 platform) and ULOM. The following list highlights some key ILOM features:

- User CLI over asynchronous serial and Ethernet (SSH) interfaces
- ALOM-CMT CLI
- ILOM DMTF CLP CLI
- LDAP support
- RADIUS support
- Browser-based interfaces (BUI)
- Public SNMPv1/v2c/v3 interface for remote monitoring and control
- Managed system (host) interface to system status data
- Enclosure (environmental) monitoring and control
- Fan speed control
- OS (Solaris) watchdog, boot time-outs and Automatic Server Restart (ASR)
- Managed system (host) firmware download, from the SP and from the host
- Dynamic FRUID support
- Event and console logging
- Event notifications (SNMP, email, CLI)

- Power state control
- IPMI support
- Pre-configured for "out of box" operation
- Service Processor Power On Self Test (POST)
- Fault Monitoring

The following list highlights some specific items not supported by ILOM on SPARC:

- Telnet access (was supported by ALOM, not supported by ILOM)
- KVMS support (since KVMS is not supported by the hardware)
- LDom management (other than setting the factory default LDom configuration)

ILOM enables you to monitor and control your server over an Ethernet connection (supports SSH), or by using a dedicated serial port for connection to a terminal or terminal server. ILOM provides a command-line interface, a browser-based interface, IPMI interface and SNMP interface that you can use to remotely administer geographically distributed or physically inaccessible machines. In addition, ILOM enables you to remotely change server state (power on, power off, etc), configure the server to run diagnostics (such as POST) and allows users to connect to a read/write server console stream where users can view execution of POST, OBP and booting OS.

ILOM maintains an event log where important server events (i.e. server state changes, failures, etc.) and ILOM events are recorded. In addition, ILOM can be configured to send some or all of these events via email if desired. The ILOM circuitry runs independently of the server, using the server's standby power. Therefore, ILOM continues to function when the server operating system goes offline or when the server is powered off. ILOM monitors the following server conditions:

- CPU temperature conditions
- Hard drive status
- Enclosure thermal conditions
- Fan speed and status
- Power supply status
- Voltage conditions
- System faults

In addition to the ILOM CLI and BUI, you can set up ILOM to use an ALOM CMT compatibility CLI. The ALOM CLI provides commands that approximate the ALOM system controller interface used on some previous Sun servers.

Sun Management Center

The Sun Management Center software platform is an element management solution that is based on open standards such as SNMP. The software allows for a rich set of features that enables the complete modeling of Sun hardware and software solutions. It provides the most comprehensive instrumentation and administrative knowledge for Sun environments, and open interfaces that enable information to be shared with other management platforms. The net result is systems management becomes easier, and the overall cost of operations lower.

Support for hardware monitoring within the Sun Management Center environment is achieved through the use of appropriate hardware platform module add-on software called configuration reader (config-reader), which presents hardware-configuration and fault-reporting information to the Sun

Management Center management server and console.

To download the software, please check the Sun Download Center (<http://www.sun.com/download>) for the Sun Management Center 4.0 Version 3.

Sun SNMP Management Agent

The Sun SNMP Management Agent enables access to system inventory and monitoring and provides support for alarms, using the industry standard management protocol Simple Network Management Protocol (SNMP). The agent supports SNMPv1, SNMPv2c and SNMPv3 to enable interoperability with all common management applications. The provision of SNMPv3 enables management accesses to be fully authenticated and secured.

The agent provides a management model SUN-PLATFORM-MIB which is based on the standard ENTITY-MIB, and is augmented by extensions that provide further information dependent on the component being represented. These extensions are based on the generic network information model (NIM) presented in ITU-T M.3100 with further extensions taken from attributes defined by the common information model (CIM) v2.5 schema. These MIBs are supported on other platforms, enabling common management solutions to be developed.

To download the software, please check the Sun Download Center (<http://www.sun.com/download>) for the version beginning with SNMP Management Agent 1.5.4.

Ordering Information--

Standard Configurations (PTOs)

Standard configurations offer popularly configured systems as a single line item for the convenience of customers, sales, and operation/manufacturing. Sun Microsystems generally maintains an inventory of these systems to minimize delivery times.

Netra T5440 changed from 1.8V FB DIMMS to 1.5V FB DIMMS .Mixing of 1.8V and 1.5V DIMMS is NOT ALLOWED.

All PTO configs (Standard configurations) will be EOL'ed on 4/13/2010 (LOD 10/13/2010), LSD 4/13/2011), and be replaced by ATO only.

To any standard configuration, X-options may be added. However, they will not be integrated by the factory.

Note: Not all X-options are available as ATO options for factory integration.

Part Number	
NT544-26120-82JBDD	(6c (x2)1.2GHz, 16GB (8x2GB), 2*146GB HDD, DVD, DC) S10, RoHS 6 compliant EOL in 10/2009, LOD 5/2010
NT544-26120-82JBDA	(6c (x2)1.2GHz, 16GB (8x2GB), 2*146GB HDD, DVD, AC) S10, RoHS 6 compliant EOL in 10/2009, LOD 5/2010
NT544-28120-B2JCDD	(8c (x2)1.2GHz, 32GB (16x2GB), 4*146GB HDD, DVD, DC) S10, RoHS 6 -compliant EOL in 10/2009, LOD 5/2010
NT544-28120-B2JCDA	(8c (x2)1.2GHz, 32GB (16x2GB), 4*146GB HDD, DVD, AC) S10, RoHS 6 compliant EOL in 10/2009, LOD 5/2010
NT544-28120-B4JEDD	(8c (x2)1.2GHz, 64GB (16x4GB), 8*146GB HDD, DVD, DC) S10, RoHS 6 compliant EOL in 10/2009, LOD 5/2010
NT544-28120-B4JEDA	(8c (x2)1.2GHz, 64GB (16x4GB), 8*146GB HDD,DVD, AC), S10, RoHS 6 compliant EOL in 10/2009, LOD 5/2010
NT544-26120-82BED	(6c (x2)1.2GHz, 16GB (8x2GB), 2*146GB HDD, DVD, DC) S10, RoHS 6 compliant Will EOL on 4/13/2010
NT544-26120-82BEA	(6c (x2)1.2GHz, 16GB (8x2GB), 2*146GB HDD, DVD, AC) S10, RoHS 6 compliant Will EOL on 4/13/2010
NT544-28120-B2CED	(8c (x2)1.2GHz, 32GB (16x2GB), 4*146GB HDD, DVD, DC) S10, RoHS 6 -compliant Will EOL on 4/13/2010
NT544-28120-B2CEA	(8c (x2)1.2GHz, 32GB (16x2GB), 4*146GB HDD, DVD, AC) S10, RoHS 6 -compliant Will EOL on 4/13/2010

Part Number	
NT544-28120-B4EED	(8c (x2)1.2GHz, 64GB (16x4GB), 8*146GB HDD, DVD, DC) S10, RoHS 6 compliant Will EOL on 4/13/2010
NT544-28120-B4EEA	(8c (x2)1.2GHz, 64GB (16x4GB), 8*146GB HDD, DVD, AC) S10, RoHS 6 compliant Will EOL on 4/13/2010

Standard features for these PTO configurations include:

- 2 UltraSPARC T2 Plus Processors (1.2GHz 4 core, 1.2GHz 6 core, 1.2GHz 8 core. TBD-1.4GHz 8core)
- 4 Gbps (10/100/1000Mbps) Ethernet ports
- Integrated Lights Out Manager (ILOM) based SP with dedicated 100Base-T (10/100Mbps) Ethernet port and serial management port.
- 1 Slimline slot loaded DVD read /write drive
- 10 PCI slots
- Use of a XAUI slot will disable an on-board 1Gbps Enet port
- 4 USB ports, 2 back/2 rear
- 1 DB9 Serial port
- 4 redundant AC or DC Power Supplies
- Redundant Hot plug fans (N+1)
- Up to 12x 146 GB SAS disk to accommodate the Operating System and mirroring
- Pre-loaded with the latest Solaris 10 update (S10U5), Logical Domains Manager 1.0.2, Ldoms MIB 1.0.1 U1, Java Enterprise System release 5 update 1, Sun Studio 12, GCC for SPARC systems, CMT Developer Tools
- 1 year, Next Business Day on-site replacement Warranty for the Hardware.
- 1 standard (tools required) rack mount kit with cable management arm
- No charge line item for one power cord for each power supply must be ordered

ATO (Assemble-to-Order) Configurations

ATO provides custom configurations that have been pre-assembled and pre-tested within the factory. Certain limitations apply, and configuration rules will be enforced by the configurator.

The ATO system sales order must include:

- One Base Configuration, 4U (includes chassis, dvd, motherboard with 2x CPUs)
- Memory: Min 8 DIMMs (4 sets containing 2 DIMMs per set)
- Min One Hard Disk Drive
- One Operating System/software pre-install
- Min One Power Supply
- One power cord for each power supply (no charge Xoption)

The optional items that may be specified with an ATO order include:

- Additional memory
- Memory Mezzanine Kit for expanded memory capacity
- Additional disks
- Rackmount kit

ATO Configuration Process Steps

1. Specify the ATO base configuration:

Each ATO base config includes chassis, motherboard, dvd, infrastructure boards, and other common components.

ATO Option		Comments
NT5440-AA-BD	Netra T5440 AC Base Chassis, supporting 12 HDD slots, 1 DVD, 4 AC PSU, RoHS-6 compliant	EOL 10/2009
NT5440-AD-BD	Netra T5440 DC Base Chassis, supporting 12 HDD slots, 1 DVD, 4 DC PSU, RoHS-6 compliant	EOL 10/2009
NT5440-AA-BF	Netra T5440 AC Base Chassis, supporting 12 HDD slots, 1 DVD bay, 4 AC PSU, RoHS-6 compliant	
NT5440-AD-BF	Netra T5440 DC Base Chassis, supporting 12 HDD slots, 1 DVD bay, 4 DC PSU, RoHS-6 compliant	
T5440-24120	UltraSPARC VF Processor 1.2GHz, 4 core	
T5440-26120	UltraSPARC VF Processor 1.2GHz, 6 core	
T5440-28120	UltraSPARC VF Processor 1.2GHz, 8 core	
T5440-28140	UltraSPARC VF Processor 1.4GHz, 8 core	

2. Select memory:

Netra T5440 changed from 1.8V DIMMS memory to 1.5V memory DIMMS. Mixing of 1.8V and 1.5V DIMMS is NOT ALLOWED (11/2008)

- Customer must choose a DIMM capacity of 16 or 32 slots. A DIMM capacity of 32 slots will require the memory mezzanine.
- Memory is added in sets containing 2 DIMMs each.
- The minimum number of DIMMs is 8 (4 sets containing 2 DIMMs per set).

- Configuration rules will not allow the mixing of DIMM sizes.
- Options are , 2GB, 4GB FBDIMMs.
- Each unused FBDIMM slot must be filled with an FBDIMM filler panel. These will be added automatically by the configurator.

ATO Option	Description	Comments
SESY2B3Z	4-GB memory expansion kit (2 x 2GB),1.5V	Common with Maramba
SESY2C3Z	8-GB memory expansion kit 2x4GB,1.5V	Common with Maramba
SESY2D3Z	16GB memory expansion kit (2x8GB) 1.5V	Commn with Maramba
3100A	Memory Mezzanine Kit – adds 16 FBDIMM slots CAN be used with 1.5V memory ONLY	For Netra T5440 ONLY
SESY2B1Z	4GB memory expansion, 2X2GB 1.8v,	EOL 11/2008
SESY2C1Z	8GB memory expansion, 2X4GB 1.8v,	EOL 11/2008

4. Select at least one disk drive:

- Minimum of one disk drive, up to the maximum number supported by the selected disk backplane.
- SAS and SATA (when available) drives may not be mixed within a system.
- Each unused HDD slot must be filled with a disk filler panel. These will be added automatically by the configurator.

ATO Option	Description	Comments
RA-SS2ND-146G10K	HDD, 146GB 10K RPM 2.5" SAS	Common with Netra servers- EOL 05/12/2009
RB-SS2ND-146G10K	HDD, 146GB 10K RPM 2.5" SAS	Common with Netra servers- will EOL 04/13/2010
4354A-Z	Hard Disk Drive Filler Panel	Common for Netra Servers
RA-SS2ND-300G10K	300 GB 10K rpm 2.5" SAS	Common for Netra servers
4358A-Z	SATA DVD RW- New	Common for Netra servers

5. Select an operating system and pre-install software stack (TBD)

- Only one option will be available at RR, and will be equivalent to the PTO pre-install stack.
- Additional options may be added as new Solaris 10 updates become available.

ATO Option	Description	Comments

6. Select optional components: --- TBD

- Items below are not required, but are offered as configured options (installed in the factory). Minimum qty for all below options is zero.
- Filler panels will be added automatically by the configurator as needed.
- Maximum quantities will be enforced by the configurator.

ATO Option	Description	Max qty
4059A	600x600mm rack kit	1
4061A	19"4 post slide kit supports Sun rack (XATO)	1
X4076A	23" 2 post rackmount kit	1

8. Select Power Cords:

- Select one power cord per power supply.
- Include as a separate, no charge, line item on the order.

Power cords for T5440

<i>Model Number</i>	<i>Description</i>
X311L	AC Power Cord U.S./Asia
X312L	AC Power Cord Continental Europe
X312E	AC Power Cord China
X386L	AC Power Cord Australia
X312F	AC Power Cord Argentina
X317L	AC Power Cord U.K
X314L	AC Power Cord Switzerland
X384L	AC Power Cord Italy
X383L	AC Power Cord Denmark
X312G	AC Power Cord Korea

<i>Model Number</i>	<i>Description</i>
X332A	AC Power Cord Taiwan

X-options

X-options should be used to order components for field installation, especially post-system sale, not factory integration.

NOT ALL CARDS LISTED BELOW ARE SUPPORTED, AS ONGOING QUALIFICATIONS ARE HAPPENING.PLEASE CHECK WITH PM FOR SUPPORT unless NOTED BELOW

Netra T5440 changed from 1.8V DIMMS memory to 1.5V memory DIMMS .Mixing of 1.8V and 1.5V DIMMS is NOT ALLOWED

Option	Description	Comments
Memory		
SESX2B1Z	2X2GB 1.8v,	EOL 11/2008
SESX2C1Z	2X4GB 1.8v,	EOL 11/2008
SESX2B3Z	4-GB memory expansion kit (2 x 2GB),1.5V	Common with Maramba
SESX2C3Z	8-GB memory expansion kit 2x4GB,1.5V	Common with Maramba
SESX2D3Z	16GB memory expansion kit (2x8GB), 1.5V	Common with Maramba
X3100A	Memory expansion Kit, 16 additional DIMM slots NO Memory included FOR USE WITH 1.5V memory ONLY	For Netra T5440 only introduced 11/11/08
Disk Drives		
XRA-SS2ND-146G10K	146 GB 10K rpm 2.5" SAS	Common for Netra products – EOL 5/12/2009
XRБ-SS2ND-146G10K	146 GB 10K rpm 2.5" SAS	Common for Netra products – EOL 4/13/2010
XRA-SS2ND-300G10K	300 GB 10K rpm 2.5" SAS	
X4358A-Z	SATA DVD RW- New	
Removable Media/DVD		
X4356A-Z	DVD+/-RW Drive, 8x, slimline slot-load	Common with Netra RackServers Limit 1 per system

Rackmount kits and Cable Management			
X4059A	600x600mm rack kit		
X4061A	19"4 post slide kit supports Sun rack		
X4076A	23" 2 post rackmount kit		
PCI Adapters – for latest information, reference updated PCI support matrix at http://wikis.sun.com/display/PlatformIoSupport/Home			
		Max qty	
Storage Interfaces			
SG-XPCI2FC-QF4	(Pyramid) Qlogic, 4Gb PCIe single port	2	Supported
SG-XPCIE2FC-QF4	(Summit) Qlogic, 4Gb PCIe dual port	4	Supported
SG-XPCIE2FC-EM4	(Summit-E) Emulex, 4Gb PCIe dual port	2	Supported
SG-XPCI2FC-EM4-Z	(Pyramid-E) Emulex, Dual-port 4Gb's FC	2	Supported
SG-XPCIE2SCSIU320Z	(Rhea) U320 SCSI, PCIe dual port	4	Supported
SGXPCI2SCSILM320-Z	(Jasper 320)PCI dual Ultra 320 SCSI adapter- PCI-X	2	Supported
SG-XPCIE8SAS-E-Z	(Pandora)SAS, 8 port, PCIe	4	Supported
SG-XPCIE2FC-QF8-Z	Palene Qlogic 8Gigabit/Sec PCI-E Dual FC host adapter	4	Supported
SG-XPCIE2FC-EM8Z	Palene Emulex 8Gigabit/sec PCI-E dual FC host adapter	4	Supported
RAID			
SGXPCIESAS-R-EXT-Z	(Prometheus) SAS 8 port RAID controller (external) –	2	Supported
SGXPCIESAS-R-INT-Z	(Cougar) SAS Eight Port , RAID PCI-Express HBA	2	Supported
Networking Interfaces			
X7280A-2	(Northstar) Dual Port GigE UTP Low-profile	4	Supported
X7281A-2	Sun PCI-E low profile Dual GbE (Intel) MMF	4	Supported
X1236A-Z	(Mellanox) IB HBA Dual Port 4x IB host channel adapter – low-profile	TBD	N/A
X4447A-Z	(Atlas) PCIe quad port GigE (copper)	4	Supported
X1355A-2	Quad High Speed Serial	2	Supported
Crypto			
X6000A	Sun Crypto Accelerator 6000	1	Supported
Graphics			
X3000A	XVR-300 PCIe x8 graphics accelerator	1	Supported

X7295A	XVR-2500, Graphics Accelerator, 24-bit color, high resolution 2D&3D graphics accelerator w/ 256MB texture memory, PCI-Express . RoHS-6. And configurator Note: not NEBS supported, but only supported by P-team and configurator.	1	Supported
XAUI cards			
SESX7XA1Z	XAUI single port 10GigE adapter card, fiber – requires one of the following 2 transceivers	2	Supported
SESX7XT1Z	Tranceiver for XAUI – 10GbE SR XFP tranceiver for short reach (20 to 300 meters)		N/A
SESX7XT2Z	Tranceiver for XAUI – 10GbE LR XFP tranceiver for long reach (2 to 10 kilometers)		N/A

Customers are required to order one of the SunSpectrum In-Warranty Upgrade (IWU) parts for the **T5440** in the following table:

ALW-05-N-T5440	Description: FROM: Older Qualified, Sun Servers TO: Netra T5440 (Qualified Configurations) Order UG-RMA with this allowance code. Customer must return complete functioning Sun system.
ALW-05-N-Z1-T5440	Description: FROM: Older Qualified, Non-Sun Servers TO:Netra T5440 (Qualified Configurations) Order UG-RMA with this allowance code. Customer must return complete functioning Sun system.
ALW-10-N-T5440	FROM: Older Qualified, Sun Servers TO:Netra T5440 (Qualified Configurations) Order UG-RMA with this allowance code. Customer must return complete functioning Sun system.
ALW-10-N-Z2-T5440	Description: FROM: Older Qualified, Non- Sun Servers TO:Netra T5440 (Qualified Configurations) Order UG-RMA with this allowance code. Customer must return complete functioning Sun system.
ALW-15-N-T5440	Description: FROM: Newer, qualified Sun Systems TO:Netra T5440 (Qualified Configurations) Order UG-RMA with this allowance code. Customer must return complete functioning Sun system.

Upgrade Program

The Sun Netra T5440 server is eligible for the Sun Upgrade Advantage Program (UAP). Through this program customers can trade-up their current Sun or non-Sun servers for a new Sun Netra T5440 server and receive a trade-in allowance that is applied as a percentage off of the list price on the new Netra T5440 server. Customers can trade-in their old systems in on a 1 for 1 server basis or consolidate many servers

Sun Upgrade Allowance Program (Sun UAP)

Sun has offered customers a simple, flexible, and easy-to-understand way of ordering server, storage or Desktop upgrades. The Sun UAP program has a percentage-based upgrades model. This new model simplifies the upgrades process by providing a trade-in value as a percentage allowance. This percentage allowance can then be applied to the list price of a regular Sun system configuration.

Trade-in allowance percentages are dependant on what is being traded in and what is being purchased. To find the exact trade-in allowance associated with your specific upgrade go to

<http://ibb.eng/>.

Upgrade Ordering Notes

The ALW code is applied the system part number. Applying the allowance code will calculate the trade-in allowance percentage off of the list price of the new Netra T5440 server. This trade-in allowance is used in addition to the customers VEU discount. For a complete list of eligible trade-in products you can go to <http://www.sun.com/ibb>. The customer must order an RMA kit with each upgrade and the customer will be required to trade-in their old servers within ninety days of shipment of the new server. The allowance codes are not applicable to products in CAT D.

Service and Support

Warranty

The Sun Netra T5440 server features a 1 year warranty providing a next business day response time with replacement parts delivered on-site or via parts exchange as applicable for all components designated as Customer Replaceable Units (CRUs):

- Duration: 1 year
- HW coverage hours: Business hours
- HW response times: Next business day
- Delivery Method: Next business day on-site or parts exchange for Customer Replaceable Units (CRUs)
- HW phone coverage: Business hours
- HW phone response time: 8 hours
- Operating system support: 90-day Warranty provided for defective media replacement only.

Sun Service Offering Overview

Sun Services offers a full range of services to assist customers who deploy the Sun Netra T5220 server. Whether it is architecture services, implementation services, or services to help customers manage the servers once released to production, Sun has the right services during every phase of the project's life cycle. For a complete list, see:

<http://www.sun.com/service/support>

Why the Warranty Isn't Enough

While computer system warranties provide business customers with some assurance of product quality, they do not provide many essential system services or operating system support. In addition, warranties provide default repair times and coverage hours which may not suit customer needs. It's just that a warranty and a Service Plan are two very different things with two very different objectives. Break/fix is no way to live - make sure your customers have service plan coverage on all their active Sun systems. For more information on the warranties offered and how they compare to Service Plan coverage go to: <http://www.sun.com/service/serviceplans/sunspectrum/hardwarerepair.xml>

SunSpectrum Service Plans

SunSpectrum Service Plans provide integrated hardware and Solaris™ Operating System support for Sun systems as well as comprehensive storage system support. For each Sun system, customers can choose the service plan that best fits their needs.

SunSpectrum Service Plan highlights include:

- Integrated whole-system support, *including the operating system*
 - All the essentials for one great price

Netra T5440 Server Just the Facts

Sun Internal and Authorized Partner Use Only

- Priority service
- No “per incident” limits
- Includes Solaris™ Operating System releases and updates
- Resources for proactive system management
- A choice of four simple plans
- Proven return on investment¹

More information is available at:

<http://www.sun.com/service/serviceplans/sunspectrum/index.xml>

Also check the Presto Announcement for the DC version of the Netra T5440 (EZ Launch 8570) for a list of the Service plan IWU part numbers.

Custom Services for OEMs

The ability to offer prompt, reliable product support can make or break a partner's ability to compete. So, Sun offers the following services to help OEM partners support their customers and keep current on the Sun Netra technology and best practices.

- Hardware Support
- Software Support
- Hardware + OS Support
- Production Service Plan - (support for production software)
- Integrated Development & Production Support (development and production software support for one annual fee)

Since one of the primary causes of system failure is incorrect installation and configuration, Sun also offers OEM partners free membership in its Enterprise Installation Service program. Members receive all up-to-date builds, the latest technical and product information, alert notices and access to documentation and best practices information to ensure they can do "Sun-standard" installations.

[Learn More at http://www.sun.com/oem/support/index.html](http://www.sun.com/oem/support/index.html)

Installation Service for Sun Netra T5440 Server

Sun's exceptional support for server installation is also available for the Sun Netra T5440 server. This service can be purchased at the time of the server sale. Use the following part numbers to order the installation service.

Part Number	Description
EIS-2WAYWGS-E	Install 2-way Workgroup Server
EIS-2WAYWGS-E-AH	Install 2-way Workgroup Server-AH
EIS-2WAYWGS-5-E	Install 5 2-way Workgroup Servers
EIS-2WAYWGS-5-E-AH	Install 5 2-way Workgroup Servers-AH
EIS-2WAYWGS-10-E	Install 10 2-way Workgroup Servers
EIS-2WAYWGS-10-E-AH	Install 10 2-way Workgroup Servers - AH

1

For additional information about the server installation service see:

<http://www.sun.com/service/support/install/entrylevel-server.html>

<http://sunweb.germany/EIS/Web/index.html>

SunSpectrum Member Support Center (formerly Online Support Center)

The transition to Sun's new online support experience exclusively for SunSpectrum contract customers is under way. This enhanced support portal is called the SunSpectrum Member Support Center and is going live in February 2008. It will replace the Online Support Center (OSC) and a portion of SunSolve. In the past, these destinations were used for separate support needs: the OSC for contract information and SunSolve for contracted patch downloads and knowledge.

Now, we're merging these sites into a powerful new tool that will enable customers to:

- View install base products and contracts
- Submit and track service requests
- Download patches
- Access support services and entitlement information
- Customize their home pages to display the Services support resources that meet their needs.

More information:

<http://wikis.sun.com/pages/viewpage.action?pageId=5309082>

Professional Services

Internal resources can be found at: <http://mymarketing/professionalservices>

Or

<https://onestop.sfbay.sun.com/sunps/pss-catalog-overview.html>

Key Services for Consideration with the Sun Netra T5440 systems

Sun offers a number of key services above and beyond typical break-fix support to help your customers get the most of their new systems.

Enterprise Migration Suite

The **Enterprise Migration Suite** is a suite of services designed for customers who are migrating from competitive platforms to Sun environments, **or** from legacy Solaris to Solaris 10. These services address mainframe rehosting, HP migration, AIX migrations, UNIX and Windows infrastructure application migrations and Solaris upgrades. The Enterprise Migration Suite include:

-Solaris(SM) 10 Evaluation Service – Two-day workshop that helps customers evaluate the

benefits, costs and risks of upgrading to Solaris 10.

-Sun(SM) Enterprise Migration Justification Review Service – Sun engineers help customer define project scope, select the best migration strategy and create a business case for migration.

-Sun(SM) Enterprise Migration Architecture Service – Sun engineers assess current IT infrastructure and identify any potential risks prior to implementation.

-Sun(SM) Enterprise Migration Implementation Service – Sun engineers implement the agreed-upon migration plan, including porting, migration or re-architecture of applications and data, optimization and testing of future systems and network architecture and testing of the pre-production environment.

-Sun(SM) Application Migration Service – Sun engineers port custom UNIX applications and/or upgrade an older Solaris application to Solaris 10, and optimize system for maximum performance.

See: <http://www.sun.com/service/migration/ems.xml> for more information.

Or <http://mymarketing.central.sun.com:81/myMarketing/Portal/NonLeaf?FunctionalCatId=1656&CategoryId=6047>

Solaris 8 Containers and Solaris 9 Containers

For customers who may need more time to make the move to Solaris 10, Sun offers services to help them 'extend the life' of Solaris 8 or Solaris 9. **Solaris 8 Containers and Solaris 9 Containers** (formally know as Solaris 8/9 Migration Assistant using Project Etude) is a combined solution of technology and services which enable Solaris 8 or 9 applications to run within a Solaris 10 container. This solution still encourages (and requires) Solaris 10 but can be positioned to address concerns about a 'forced' migration and allows more time for a longer term transition to Solaris 10.

<http://www.sun.com/software/solaris/migrationassistant/index.jsp>

Virtualization and Consolidation Services

Customers interested in consolidating systems and potentially reducing the subscription cost of a single or first subscriber (often of interest for carriers and NEPs) could benefit from **Sun's Virtualization Suite of Services** (<http://www.sun.com/service/virtualization/index.jsp>) which includes a workshop, justification, proposed architecture and implementation aide.

And don't forget to offer Enterprise Consolidation Services to customers who are interested in consolidation options using virtualization and Sun X64 systems.

See: <http://www.sun.com/datacenter/consolidation/x86.jsp> for more information.

Sun Eco Services Suite

Sun Eco Services can help your customers achieve cost savings on heating and cooling to supplement their savings on new energy efficient CMT servers and low power X64 systems. See <http://www.sun.com/service/eco>) for more information.

Identity Management Suite

Provides customers the right skill sets and the right technologies to implement their identity management solution quickly, effectively and predictably, while reducing their project risk and deployment cost..

<http://mymarketing.central.sun.com:81/myMarketing/Portal/NonLeaf?FunctionalCatId=1656&CategoryId=6790>

Performance Analysis & Capacity Planning Service

Includes collection of a variety of data points in customer systems (e.g., CPU utilization, memory utilization and swap rates, disk I/O rates, wait time) and analysis of data, evaluating ways to improve server performance using the customer's existing hardware configurations, making recommendations if additional hardware is required.

<http://mymarketing.central.sun.com:81/myMarketing/Portal/NonLeaf?FunctionalCatId=1656&CategoryId=5895>

<http://www.sun.com/service/performance/index.xml>

Dynamic Infrastructure Suite

A complete set of technology and services that assist in the creation of an agile and secure web services environment.

<http://mymarketing.central.sun.com:81/myMarketing/Portal/NonLeaf?FunctionalCatId=1656&CategoryId=7097>

Reference Implementation Service for Data Centers

Speeds ROI and maximizes availability, manageability and security of mission-critical systems by leveraging architecture design expertise, tested configurations, the latest technology features and best practices for implementation and integration of data center solutions.

<http://mymarketing.central.sun.com:81/myMarketing/Portal/NonLeaf?FunctionalCatId=1656&CategoryId=5272>

iRunBook Service

Creates a knowledge power-base for IT organizations, allowing systems administrators to find the vital information they need to manage the data center using the latest Sun preferred practice advice from a central source – accessed within seconds via a simple web interface.

<http://mymarketing.central.sun.com:81/myMarketing/Portal/NonLeaf?>

[FunctionalCatId=1656&CategoryId=3663](http://www.sun.com/service/sunconnection/index.jsp)

Connected Services

Provision new systems. Manage updates and configuration changes with Sun Connection, the Solaris and Linux life cycle management tool.

<http://www.sun.com/service/sunconnection/index.jsp>

Managed Services

Interim Operations Management

A short-term (3-12 months) customized service providing on-site management of data center's IT operations.

<http://www.sun.com/service/managedservices/interimops.xml>

Training Options

Sun Learning Services has a number of training options ranging from self paced web-based courses to instructor led training on site - or at a Sun facility. Courses cover topics such as LDOMS, Virtualization, Solaris 10 Certification. Visit <http://www.sun.com/training/index.xml> for a complete course listing and more information.

Glossary

100BASE-T	See Fast Ethernet
Adapter	A host bus adapter or interface which plugs into a PCI slot to provide connectivity, for example, to networks, storage, graphics or other I/O devices.
ASR	Automatic System Recovery. A RAS feature that initiates a system reboot sequence that bypasses failed system components or a software failure.
Chip Multithreaded Technology	A technology that speeds processing by dedicating silicon and threads to network tasks. Compute, packet processing, and switching tasks run concurrently, not sequentially as in single threaded systems, resulting in dramatic increases in performance and system utilization.
CMT	See Chip Multithreaded Technology
Controller	A microprocessor based device which is dedicated to a specific task, esp. I/O and is embedded within a host-bus adapter or external (storage) array. The term “controller” is often used synonymously with host-bus adapter.
DIMM	Dual in-line memory module. A memory unit that is available in a range of capacities
DIMM group	A group of four DIMMs
ECC	Error correcting code
eFUSE	A technology that combines software algorithms and microscopic electrical fuses to produce chips that can regulate and adapt their own actions in response to changing conditions and system demands.
Fast Ethernet	IEEE standard for 100 Mb/second Ethernet. This technology supports a data transfer rate of 100 megabits per second over special grades of twisted-pair wiring.
Fault resilience	Capability of a system to mask many individual errors, but not all. This approach generally requires redundancy of some components and additional software. An example would be the dual path capability and automatic failover for storage and networks. Another term for “high availability.”
Fault tolerance	Capability of a system to mask any individual point of failure. This type of system is typically implemented with redundancy of components and synchronization of clock signals to maintain each unit in “lock step” with its counterpart.
FBDIMM	Fully buffered dual in-line memory module
FC-AL	Fibre Channel arbitrated loop. A loop topology used with Fibre Channel
Fibre Channel	See FC-AL
I2C	A bus used for environmental monitoring

High availability	Capability of a system to mask many individual points of failure or to significantly compensate for them. This type of system is built upon standard components with limited hardware or software components to minimize the impact of failures. Generally, this type of system is less costly than a fault tolerant system.
Host-bus adapter	See Adapter
Hot-plug	A component that can be electrically safe to remove or add while the system is still running. Typically, the system must be rebooted before the hot-plug component is configured.
NFS	Network File System, a distributed computing file system
PCI	Peripheral component interconnect. An industry-standard for connecting peripherals such as disk drives, tape drives and other external devices.
PCI Express (PCIe)	Peripheral Component Interconnect Express. This implementation of the PCI computer bus that uses existing PCI programming concepts and communication standards, but bases it on a much faster serial communications system.
PCI-X	Peripheral Component Interconnect Extended. A computer bus technology that increases the speed that data can move within a computer from 66 MHz to 133 MHz.
Pre-configured system	Pre-configured systems that offer discounted prices in comparison to assemble-to-order (ATO) or custom configurations. It is also more convenient for both customers and sales as it assures that all necessary components for a functional system are included with a single line item on the order form.
PTO	See Pre-configured System
RAID	<u>Redundant Array of Independent Disks</u> . A set of disk drives that appear to be a single logical disk drive to an application such as a database or file system. Different RAID levels provide different capacity, performance, high availability, data protection and cost per unit of storage.
RAS	Reliability, availability, and serviceability, Three aspects of the design of a system contributing to continuous operation and minimizing system downtime for services. Together reliability, availability, and serviceability provide for near continuous system operation.
Redundancy	Duplication for the purpose of achieving fault tolerance. Refers to duplication or addition of components.
SAS	Serial Attached SCSI. The successor to the original SCSI technology with the ability to address up to 16,256 devices per port. It also has a more reliable point-to-point serial connection at speeds of up to 3 Gbps.
SATA	Serial Advanced Technology Attachment, or Serial ATA. The main advantages over the older parallel ATA interface are faster data transfer, ability to remove or add devices while operating (hot swapping), thinner cables that let air cooling work more efficiently, and more reliable operation with tighter data integrity checks.
SCSI	Small Computer Systems Interface. An ANSI standard for controlling peripheral devices by one or more host computers.
Standard configuration	A pre-configured systems (PTOs) which offers popular combinations of processors, memory and disks with accelerated delivery time

Materials Abstract

Collateral	Description	Purpose	Distribution	Token or COMAC
Product Literature <ul style="list-style-type: none"> Netra T5440 Server, Just the Facts Netra T5440 Data Sheet 	Reference Guide (this document) Data Sheet	Training Sales Tool Sales Tool	SunWIN, Reseller Web SunWIN, Reseller Web, COMAC	
Presentations Netra T5440 Server Customer/Sales Presentation (Gold Pitch) Netra T5440 Server Technical Presentation White Papers <ul style="list-style-type: none"> Netra T5440 Server Architecture Whitepaper 	Customer Presentation Customer Presentation White Paper	Sales Tool Sales Tool Sales Tool	SunWIN SunWIN SunWIN	
Solution Brief				
Related Materials <ul style="list-style-type: none"> Sun Netra T5220, Just the Facts Sun Netra T5220 Data Sheet 	Reference Guide Data Sheet	Training Sales Tool Sales Tool	SunWIN, Reseller Web SunWIN, Reseller Web, COMAC	
External Web Sites				

Collateral	Description	Purpose	Distribution	Token or COMAC
<ul style="list-style-type: none"> Sun Netra T5440 - 	Sun Netra T5440 server: http://sun.com/netrat5440			
<ul style="list-style-type: none"> Logical Domains (LDoms) 	Logical Domains (LDoms): http://sun.com/ldoms			