

Netra^(tm) T1 AC200/DC200 Server

White Paper



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Product Introduction

Product Overview

The Netra^(tm) T1 200 server is a second generation replacement for the Netra t1 100 servers, one of many Netra products from the Sun Network Service Provider Product Group. The Netra T1 200 servers share many common features of the Netra t1 100 product. Like its predecessor, the Netra T1 200 servers are robust servers based on scalable SPARC^(tm)/Solaris^(tm) platforms. The Netra T1 200 servers are ideal for the ISP and Telco markets as well as meeting the “general purpose” low cost server requirements. With its carrier-grade design and Lights Out Management (LOM) support, the Netra T1 200 servers allow service providers to leverage their SPARC/Solaris platform to low-end functions. The Netra T1 AC200 servers are designed to meet NEBS level 3 certification.

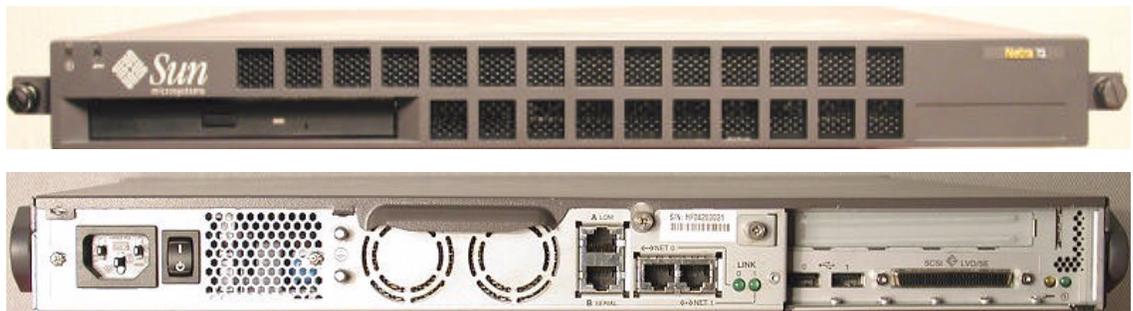


FIGURE 1-1 Netra T1 200 Server - Front & Rear Views

The Netra T1 200 servers consists of the AC200 and DC200. Both servers are identical except for the power input. The Netra T1 200 servers occupy 1U in a rack, which is one of the highest rack density servers in its class. For example, a standard 72” Sun rack can accommodate up to 32 Netra T1 200 servers.

The Netra T1 200 servers have the following features:

- 500MHz UltraSPARC^(tm) IIe Processor with 256KB Internal Cache
- 4 DIMM sockets supporting standard PC133 256MB or 512MB memory
- Pre-Installed Standard Solaris Operating Environment - Solaris 8
- Pre-Installed Lights Out Management (LOM) support for remote management
- Front-accessible, hot-swap disks for quick and ease of service and maintenance
- 1U form factor enable high density rack capacity
- Two USB ports for high speed peripherals interface
- System Configuration Card - Stores copy of system configuration information

Target Applications

The Netra T1 200 server is designed to meet service provider's requirements for compact size, reliability, and manageability as well as front-end server to support typical applications such as:

- Firewalls
- DNS
- Log processing
- Authentication
- Mail-relay
- Distributed SNMP
- web
- Front-end application hosting
- proxy caching

Designed for Simplicity

The Netra T1 200 servers enclosure has been redesigned to provide better cooling, but with similar look-and-feel of the Netra t1 100 server. The front bezel is removable for front access to the hot-swap disk drives and a System Configuration Card (SCC). The SCC is a card which contains a master copy of the system configuration, hostid, and the MAC address of the system. The SCC allows the user to swap a faulty server with a new replacement without any reconfiguration. The system configuration stored on the SCC can be moved from one server to another simply by removing the SCC and reinserting it into another server. All system configuration information is now transferred to the new server.

System Design

The Netra T1 200 server system motherboard has been designed to accept PC133 style DIMMs instead of the memory modules used in the Netra t1 100 server. The new motherboard accepts 4 PC133 style DIMMs, with a maximum capacity of 2GB. The memory data path is 72-bit wide including ECC bits. Other changes on the motherboard including relocation of various components for better cooling as well as providing improved interconnection between components.

Another system design improvement is easier access to the PCI card. The PCI card can be installed into the Netra T1 200 servers without any interference from internal cables as in the Netra t1 100 server. In addition, several FRUs such as cooling fan unit, power supply unit have been defined for the Netra T1 200 server so the system can be repaired easily on-site to improve the MTTR (Mean Time To Repair).

System Interface Connectors

Cooling Fans

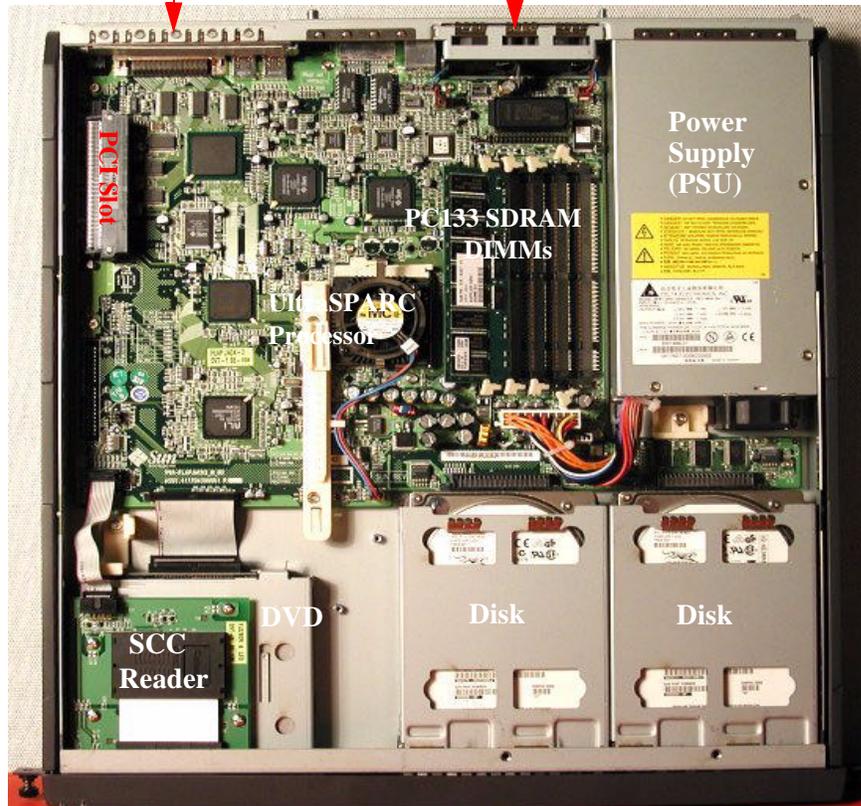


FIGURE 1-2 Internal view of the Netra T1 200 Server

System Architecture

The Netra T1 200 utilizes a 500MHz UltraSPARC IIe high performance processor with impressive system performance. The system memory consists of industry standard PC133 DIMMs with a 72-bit data path (including ECC bits), and can address up to 2GB of memory space.

The 66MHz PCI bus is generated by an advanced PCI bridge which provides one external PCI slot, and internal PCI interfaces. A dual-wide (16-bit) 80MB/second Ultra2SCSI controller provides the interfaces for two Internal SCSI disks and a IDE CDROM as well as an external SCSI port to support external SCSI devices. The Ultra2SCSI is compatible with SCSI-3 Fast-40 and can support both LVD and SE SCSI devices.

External I/O devices include two 10BaseT/100BaseTX auto-negotiating Ethernet ports. Two USB ports with individual OHCI controllers. Two asynchronous CISCO compatible RJ45 serial ports, and a combined console and LOMlite2 port for "lights-out-management".

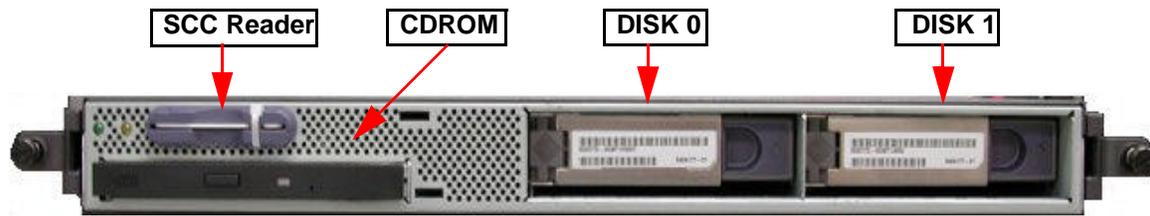


FIGURE 1-3 Front-View With Bezel Removed

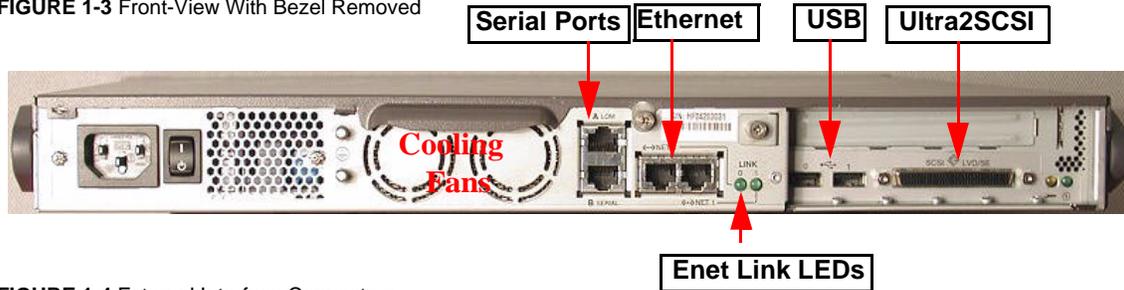


FIGURE 1-4 External Interface Connectors

Internal I/O including a wide Ultra2SCSI bus, an UltraDMA66 ATA bus, and a SMBus for the System Configuration Card interface.

Other internal devices built-in are 1MB flash PROM to house the Open Boot PROM (system firmware), OBDiag (internal diag), and the Power-on Self-Test. The real-time clock has 8KB Non-volatile RAM and a FRU ID PROM to store information regarding that FRU such as its part number and revision.

The service processor provides the interface for LOM operation, power state management, environmental (enclosure) management and host status management.

Motherboard

The Netra T1 200 server motherboard is show below.

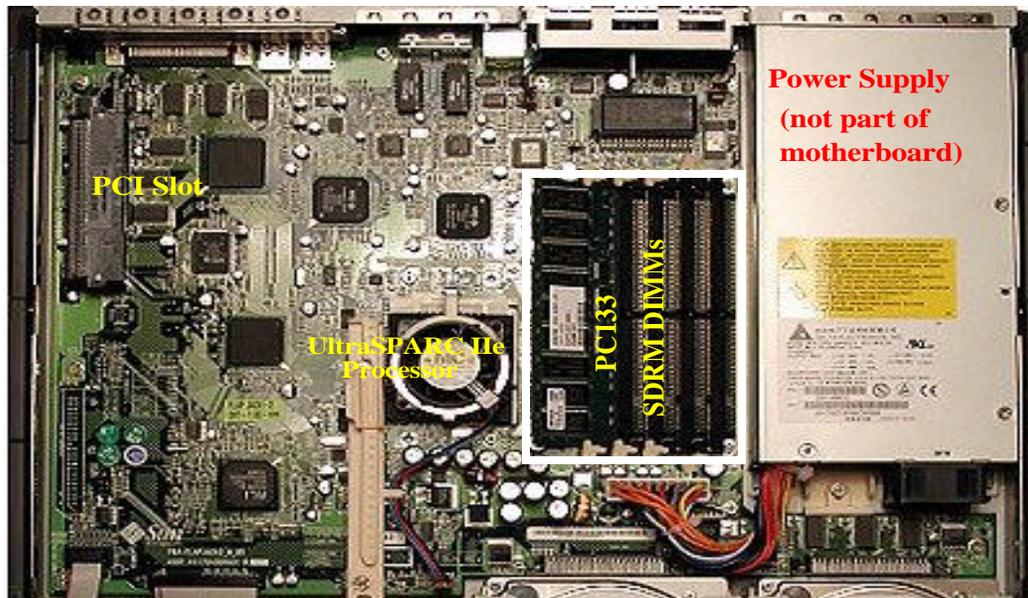


FIGURE 1-5 Netra T1 200 Server Motherboard

System Configuration Card (SCC)

The System Configuration Card keeps a master copy, non-volatile storage of system configuration information and system identity readily available to the user.

The function of the SCC is to facilitate easy transfer of the system configuration from system to system without reconfiguration. The SCC meets the ISO 7816 specifications for physical characteristics and for dimension and location of contacts. The SCC has the following characteristics:

- ❑ ID 1 type card
- ❑ Dimension - 85.6mm x 53.98mm x 0.76mm
- ❑ Memory chip in card - 24C64



FIGURE 1-7 System Configuration Card

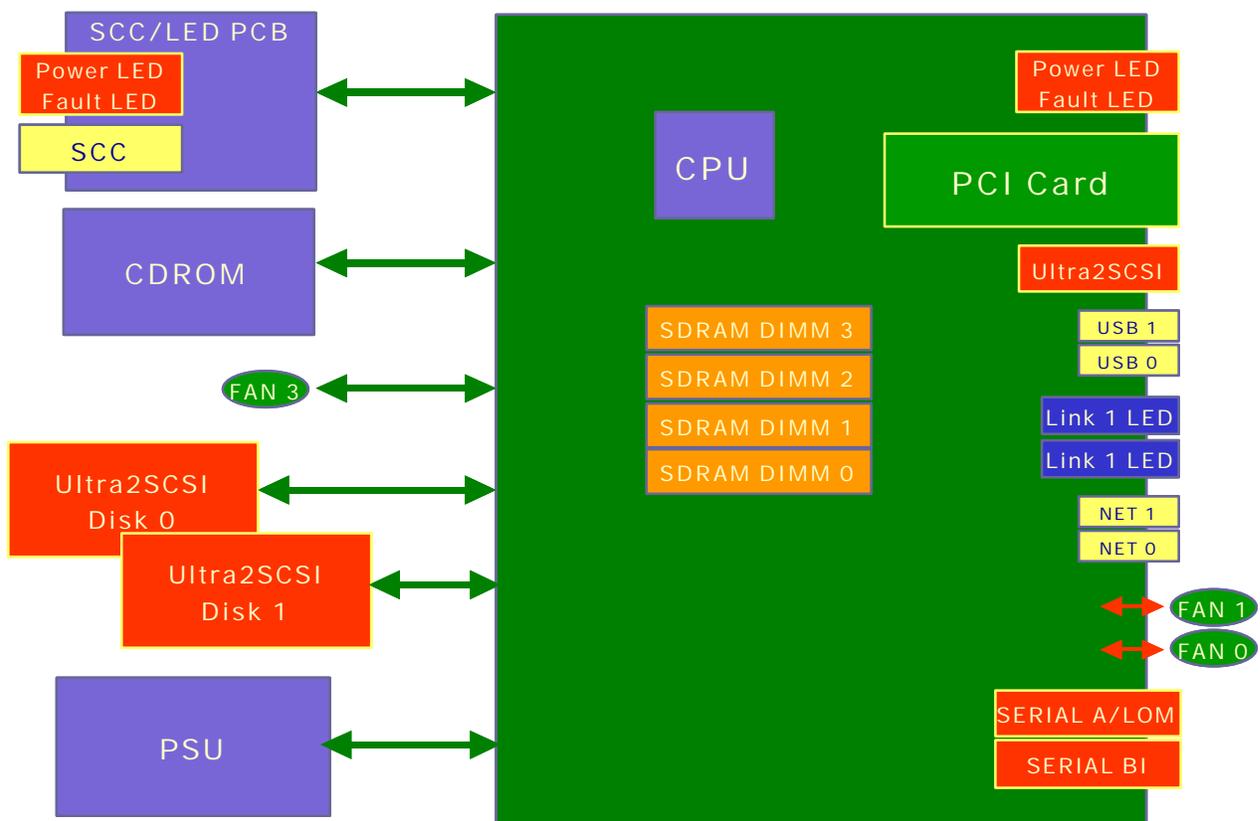


FIGURE 1-8 System Components

Lights-Out-Management (LOMlite2)

The LOMlite2 is an enhanced version of LOM which provide support for remote system management. Following are the LOMlite2 capabilities supported in the Netra T1 200 Servers:

- Enclosure (environmental) monitoring and Control
- Host Status Monitoring
- Power Control
- Automatic Server Restart (ASR)
- Soft Alarms
- Console-accessible Serial Management Interface

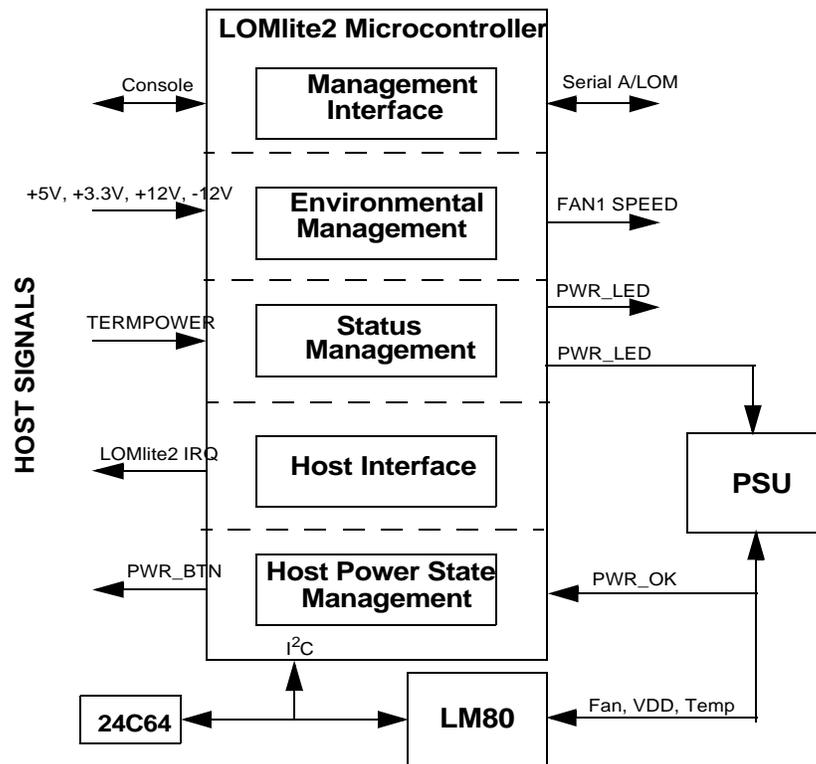


FIGURE 1-9 LOMlite2 Functional Block Diagram

LOMlite2 is an autonomous service processor providing features such as system monitoring and control functions. The EBus (8-bit Bus) provides a host interface between Solaris and the LOMlite2 firmware.

LOMlite2 is designed to support deployment in environments where remote management or environmental system monitoring is advantageous. LOMlite2 is an embedded Flash microcontroller module which is incorporated into the motherboard with the following interfaces:

- Host Parallel Interface via EBUS
- Host Watchdog, with optional ASR (Automatic Server Restart)
- Host Interrupt
- Host Reset
- Host Abort (XIR)

LOMlite2 is available remotely through the LOM serial port. For example, one can gain access from a modem, terminal server, PC, Palm Pilot or Sun Workstation and have full control of the server including remotely powering on and off the server.

Supported Peripherals

Following are the supported peripherals for the Netra T1 200 Servers:

- Drive Options
 - X5237A - 18GB, 10000 RPM Hot Swappable Disk
 - X7088A - IDE CDROM
- Storage Expansion
 - Netra st D130 Disk Array (1U form factor - 3 x 36GB disks)
 - Netra st D1000/A1000 Disk Array (12 x 18GB disks)
 - Sun StorEdge T3 Network Storage Array
- PCI cards
 - X1032A - 10/100BaseT F/W UltraSCSI Combo
 - X1033A - 10/100BaseT Ethernet
 - X1034A - Quad Fast Ethernet (QFE)
 - X1141A - Gigabit Ethernet
 - X1155A - HSI/P (High Speed Interface)
 - X1158A - ATM-155MMF (Multi-Mode Fibre)
 - X1157A - ATM-155UTP (Unshielded Twisted Pair)
 - X2069A - GBE/FCAL Combo (Gigabit Ethernet & FCAL)
 - X2156A - SAI/P (Serial Asynchronous Interface)
 - X6541A - Dual Channel Differential UltraSCSI
 - X6729A - ISP 2100F FCAL
- Netra E1 PCI System Expander
 - Net Gain of 3 PCI slots
 - Supports 1 32-bit, 33MHz, 5V full length PCI cards
 - AC or DC power option

The 1U form factor Disk Array and PCI board expansion unit were designed to occupy minimum spacing which allowing additional peripherals depending on application requirements. In addition, the uniform form factor provides a clean racking and cable management environment.

Availability

Following options are typically deployed:

- Horizontal Scaling using a load balancer switch or software
 - Service is not interrupted if one of the servers are not available
 - Allows upgrade as performance and capacity increases
 - Typically used for Tier 1 ISP applications or to build server farms
- HA configuration using SunCluster
 - Accomplished by utilizing a pair of Netra T1 and Netra st D130 disk array

Serviceability

- Whole system replacement
 - Transfer System Configuration Card to new system
 - No re-configuration of new system is required
 - Transfer boot disks
- All FRUs designed for easy replacement
 - F370-4278 Internal CDROM (including cabling and paddle board)
 - F540-4177 18GB hard disk drive
 - F370-4237 256MB DIMM
 - F370-4281 512MB DIMM
 - F375-0132 System Board (include CPU and fan)
 - F370-4290 Memory card reader (for SCC)
 - F300-1488 AC power supply
 - F300-1489 DC power supply
 - F370-4284 Rear fan subassembly (containing fans 1 and 2)
 - F370-4285 System Configuration Card
 - F370-4352 Fan 3 (CPU fan)
 - F100-6889 NVRAM chip (including carrier)
- Diagnostics available
 - POST - System Power-On Self-Test
 - OBP - Open Boot PROM diag (simple single word commands)
- External diagnostics
 - SunVTS (Sun Verification Test Suite) - Test and exercise FRUs
 - SNMP - (MIBS-II compliant) - Hardware and software traps
 - SunMC - (Sun Management Center) - Ease of system and network management
 - LOMlite2 - Remote management
 - ASR - Automatic Server Restart in case of OS hang situation

Physical Dimension

	Height	O/A Width	Depth Including Bezel	System Weight	Shipping Weight
Metric	43.6mm	436.7mm	477.6mm	10kg	18.0kg
Imperial	1.72"	17.19"	18.80"	22 lbs	39.6 lbs

TABLE 1-1 Physical Dimension

Power Management

The following power budget allows an estimated figure for power consumption for system configuration purposes. The current ratings shown in table are in milliampere.

Assembly	+5V Rail	+3.3V Rail	+12V Rail	-12V Rail	+5VSB Rail	Power (W)
Motherboard	260	3410			40	8.383 (nominal)
CPU (500MHz)	TBD	TBD				10.4 (nominal)
Memory		303				6.11 (nominal)
HDD	640		800			6.7 (nominal)
CDROM	500					2.59 (nominal)
SCC	1					0.01 (nominal)
Encl Fans (2)			60 x3			2.16 (nominal)
External USB	500 x2					5.0 (nominal)
Sun PCI card	variable	variable	variable	variable		3.68 (nominal)

TABLE 1-2 System Power Budget

Power Supply Unit Output Rails

There are two PSU variants, one for the AC system and one for the DC system. The two designs vary only in their input circuitry. Following is a table of the PSU output rails:

Rail	Voltage Rating	Current Rating
+5VSB	+5V +/-5%	0.2A
+5V	+5V +/-2%	11.0A
+3.3V	+3.3V +/-3%	15.4A
+12V	+12 +/-2%	3.4A continuous 4.5A short-term (30s)
-12V	-12V +/-5%	0.1A

TABLE 1-3 Power Supply Unit Outputs Rails

Power Consumption

The table below lists the actual power consumption for a fully configured server.

Inlet Voltage	110V/60Hz	230V/50Hz	-48VDC	-60VDC
Inlet Power (W)	98.15	97.14	99.47	99.00
Inlet Power (VA)	98.15	104.45		
Input Current	2A	1A	4A	4A
Thermal Dissipation (BTU)	335.73	331.73	339.70	338.09

TABLE 1-4 Input Power Requirements

Operating Power Limits and Ranges

Description	Netra T1 DC 200 Server	Netra T1 AC200 Server
Maximum operation current	4A @ -40 VDC	2A @ 90 VAC
Maximum in-rush current (cold start)	20A peak upon a restart performed 60 seconds or more after the removal of DC power	20A peak upon a restart performed 60 seconds or more after the removal of AC power
Maximum in-rush current (warm start)	40A peak upon a restart performed less than 60 seconds but more than 200 milliseconds after the removal of DC power	40A peak upon a restart performed less than 60 seconds but more than 200 milliseconds after the removal of AC power
Maximum in-rush current (hot start)	100A peak upon a restart performed less than 200 milliseconds after the removal of DC power	100A peak upon a restart performed less than 200 milliseconds after the removal of AC power
Operating input voltage range	-40 to -75 VDC	90-264 V(rms)
Voltage frequency range	DC	47-63 Hz
Power factor	N/A	0.8 to 1.0
Max BTU rating	550 BTU	550 BTU

TABLE 1-5 Operating Power Limits and Ranges for Netra T1 Servers

Power States

There are three distinguishable system power states, determined by which power zones are active in the system.

Power State	+5VSB	+5V, +3.3V, +12V, -12V	Comment
OFF	Not Present	Not Present	No Inlet Power
STANDBY	Present	Not Present	Host Switched Off
ON	Present	Present	Host Switched On

TABLE 1-6 System Power States

LOM retains a memory of the host Power State in EEPROM. In the event that inlet power is lost by the system, the memory can resume the host to its previous power state. Under certain conditions resumption may be delayed or refused. Whether the system will return to OBP or boot to Solaris depends on the “auto-boot?” setting in the OBP.

System Cooling

The system is force-cooled by a total of 4 fans. One fan is mounted on top of the CPU. The PSU has its own built-in cooling fan. The remaining 2 fans are mounted on the rear of the enclosure. (see FIGURE 1-3, page 6).

To improve fan life and reduce acoustic noise, the 2 system cooling fans are not running at full speed when the ambient operating temperature does not justify maximum airflow. The fan speed is controlled by pulse-width modulation (PWM) by chopping the +12V supply to the fans. The system temperature sensor is mounted on the motherboard. The PSU fan runs at full speed at all times. The cooling path is from front to rear to accommodate multi-rack mounting units without the possibility of air flow interference.

Enclosure Temperature Monitoring

The enclosure temperature is monitored by a temperature sensor which is positioned in the main airflow path at the rear of the enclosure, close to Fan1 but biased towards the PCI card slot. System temperature status is reported via an I²C bus which interfaces to the internal PCI bus.

Enclosure temperature value reported is used to determine the speed of the two system fans (Fan1 and Fan2). The lower limit is set for 60% of full speed. As the enclosure temperature increases, the fan speed will increase at the rate 2% per degree C, but operating normally between 20°C and 40°C. LOMlite2 will issue a warning event if enclosure temperature exceeds a configurable threshold value. The event can also shutdown the system if required.

The CPU junction temperature is monitored by OBP via the SMBus. OBP may be configured to issue a warning if CPU temperature becomes excessive.

Rack Mounting

The Netra T1 200 Server chassis is compatible with current Netra T1 product rack mounts and slides which can be mounted into fixed racks. The chassis can be mounted into either 2 post relay racks or 4 post racks with depths ranging from 400mm to 900mm. The chassis includes a detachable sliding rack mount system suitable for all 4 post racks. The maximum number of servers can be mounted depending on the height and power inlets provided by the rack. For example, 32 Netra T1 200 Servers can be mounted into a Sun 72" standard rack. Other rack mounting options are:

- X6919A - 19" rack mount kit
- X6966A - 23" rack mount kit
- X6967A - 24" rack mount kit
- X6968A - 600mm Rack mount kit

The chassis is held into the rack with a minimum number of fixings in all cases. This reduces the time required to install and upgrade systems.



FIGURE 1-10 Standard 72" Sun Rack

Agency Compliances

The Netra T1 200 Servers are designed to meet the NEBS Level 3 and ETSI compliance. Other compliance including FCC Part 2, 15 subpart B as a Class B (USA); CSA C108.8 Class B (Canada), and VCCI Class 2 (Japan); GOST (Russia); BSMI (Taiwan); C-Tick (Australia).

For Safety compliance, the Netra T1 200 Servers are designed to

meet UL 1950 (USA); CSA C22.2 No. 950 (Canada); GS Mark EN60950 and ZH1/618(GS-VW-SG7 1/97); CB Scheme EN60950 and IEC950; ISO7779 or ISO9296.

Summary

Netra T1 200 is a SPARC/Solaris thin server designed specifically for Service Providers and Carriers with:

- Proven reliability
- Ease of management
- Rack-mount packaging
- Low entry price and performance

For further information on all Netra products go to <http://www.sun.com/netra>