Netra™ CT 900 Server Overview

Sun Microsystems, Inc.
www.sun.com

Part No. 819-1174-14
April 2009, Revision A

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Preface

The *Netra CT 900 Server Product Overview* describes the basic hardware components of the Netra™ CT 900 server. It is a companion to the *Netra CT 900 Server Installation Guide*, which describes how to install the Netra CT 900 server, and the *Netra CT 900 Server Service Manual*, which describes removing and replacing the server's field-replaceable units (FRUs).

This manual is intended for an experienced system administrator who has experience with the Solaris™ Operating System (Solaris OS). The reader should be comfortable with LAN fundamentals and with networking in general.

Before You Read This Book

The *Netra CT 900 Server Safety and Compliance Manual* specifies the environmental and electrical safety requirements for the product and contains compliance certification for various countries. Review the information in the *Netra CT 900 Server Safety and Compliance Manual* before proceeding with the instructions in this document.

How This Book Is Organized

Chapter 1 gives an introduction to the Netra CT 900 server.

Chapter 2 describes the shelf.

Chapter 3 describes the shelf alarm panel.

Chapter 4 describes the shelf management card.

Chapter 5 describes the switch.

Glossary is a list of words and phrases and their definitions.

Using UNIX Commands

This document might not contain information on basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices. Refer to the following for this information:

- Software documentation that you received with your system
- Solaris™ Operating System documentation, which is at

  `http://docs.sun.com`

Shell Prompts

Shell	Prompt
C shell	*machine-name*%
C shell superuser	*machine-name*#
Bourne shell and Korn shell	$
Bourne shell and Korn shell superuser	#

Typographic Conventions

Typeface*	Meaning	Examples
`AaBbCc123`	The names of commands, files, and directories; on-screen computer output	Edit your `.login` file. Use `ls -a` to list all files. `% You have mail.`
`AaBbCc123`	What you type, when contrasted with on-screen computer output	`%` **`su`** `Password:`
AaBbCc123	Book titles, new words or terms, words to be emphasized. Replace command-line variables with real names or values.	Read Chapter 6 in the *User's Guide*. These are called *class* options. You *must* be superuser to do this. To delete a file, type `rm` *filename*.

* The settings on your browser might differ from these settings.

Related Documentation

The Netra CT 900 server documentation is listed in the following table. Except for the *Important Safety Information for Sun Hardware Systems*, all the documents listed are available online at:

`http://docs.sun.com/app/docs/prod/n900.srvr#hic`

Title	Part Number
Netra CT 900 Server Getting Started Guide	819-1173-xx
Netra CT 900 Server Overview	819-1174-xx
Netra CT 900 Server Installation Guide	819-1175-xx
Netra CT 900 Server Service Manual	819-1176-xx
Netra CT 900 Server Administration and Reference Manual	819-1177-xx
Netra CP3140 Switch Software Reference Manual	819-3774-xx
Sun Netra CP3240 Switch Software Reference Manual	820-3253-xx
Netra CT 900 Software Developer's Guide	819-1178-xx
Netra CT 900 Server Safety and Compliance Guide	819-1179-xx
Netra CT 900 Server Product Notes	819-1180-xx
Important Safety Information for Sun Hardware Systems	816-7190-10

Documentation, Support, and Training

Sun Function	URL	Description
Documentation	`http://www.sun.com/documentation/`	Download PDF and HTML documents, and order printed documents
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Netra CT 900 Server Product Overview, part number 819-1174-14

CHAPTER 1

Introduction to the Netra CT 900 Server

This chapter provides an overview of the Netra CT 900 server's basic hardware components. The Netra CT 900 server is an Advanced Telecommunications Computing Architecture (AdvancedTCA® or ATCA) packet-switching, backplane-based, rack-mountable server.

Note – Reliability, Availability and Serviceability (RAS) metrics for the Netra CT 900 server are available through the Sun Sales office under a Non-Disclosure Agreement.

The Netra CT 900 server complies with the following specifications:

- PICMG® 3.0 Revision 2.0 AdvancedTCA specifications
- PICMG 3.1 Revision 1.0 AdvancedTCA specifications

The hardware components for the Netra CT 900 server can be broken down into four sections:

- The shelf—Chapter 2
- The shelf alarm panel—Chapter 3
- The shelf management card—Chapter 4
- The switch—Chapter 5

Two versions of the Netra CT 900 server are available: a 1GbE and a 10GbE version. For systems configured with Netra CP3240 switches functioning as 10GbE switches, the 10GbE server is required.

FIGURE 1-1 shows the components in a Netra CT 900 server 1GbE version from the front, and FIGURE 1-2 shows the components in a Netra CT 900 server 1GbE version from the back. To use the next generation node boards and advanced rear transition modules in the 1GbE chassis, fan trays must be upgraded to provide adequate cooling. (Refer to the *Netra CT 900 Server Upgrade Guide*, 820-3255)

FIGURE 1-3 shows the components in a Netra CT 900 server 10GbE version from the front, and FIGURE 1-4 shows the components in a Netra CT 900 server 10GbE version from the back. This chassis is designed for the next generation of switches, node boards, and advanced rear transition modules.

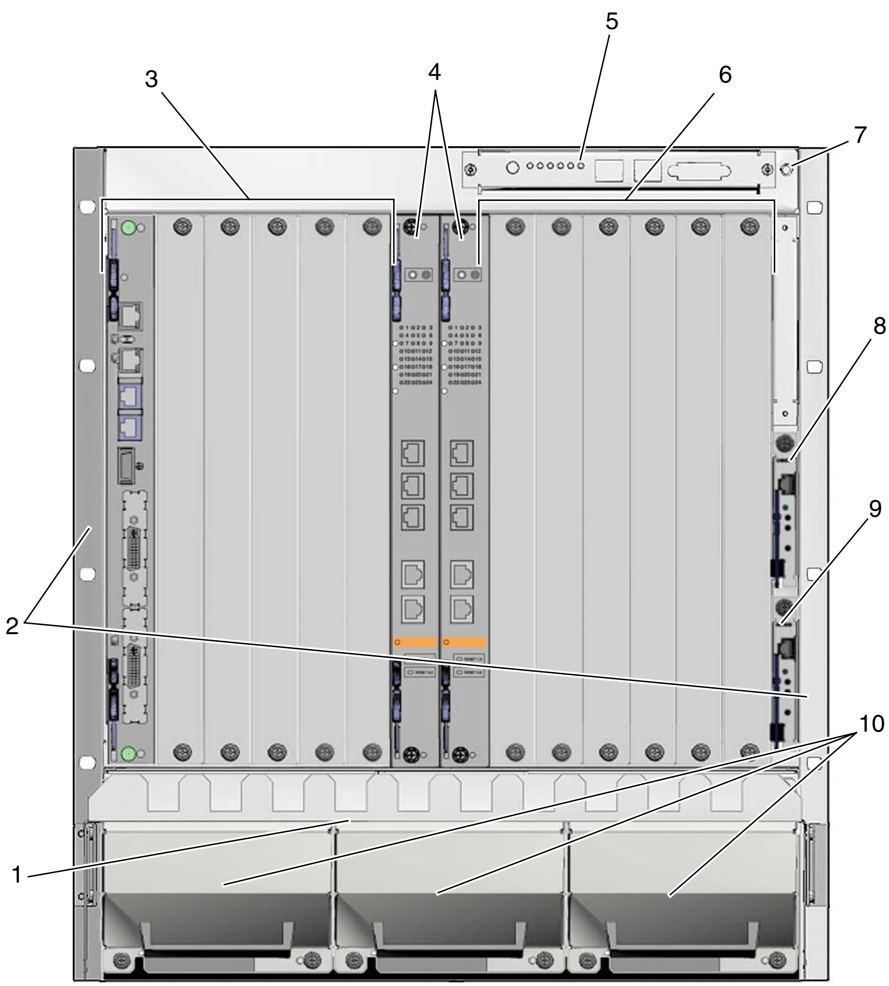

FIGURE 1-1 Netra CT 900 Server 1GbE Chassis Components (Front View)

TABLE 1-1 Legend for FIGURE 1-1

Callout	Description
1	Air filter (behind cable management bracket)
2	Rackmounting flanges
3	Node card slots (1-6)
4	Switch slots (7 and 8)
5	Shelf alarm panel (SAP)
6	Node card slots (9-14)
7	ESD ground jack
8	Primary shelf management card
9	Secondary shelf management card
10	Fan trays

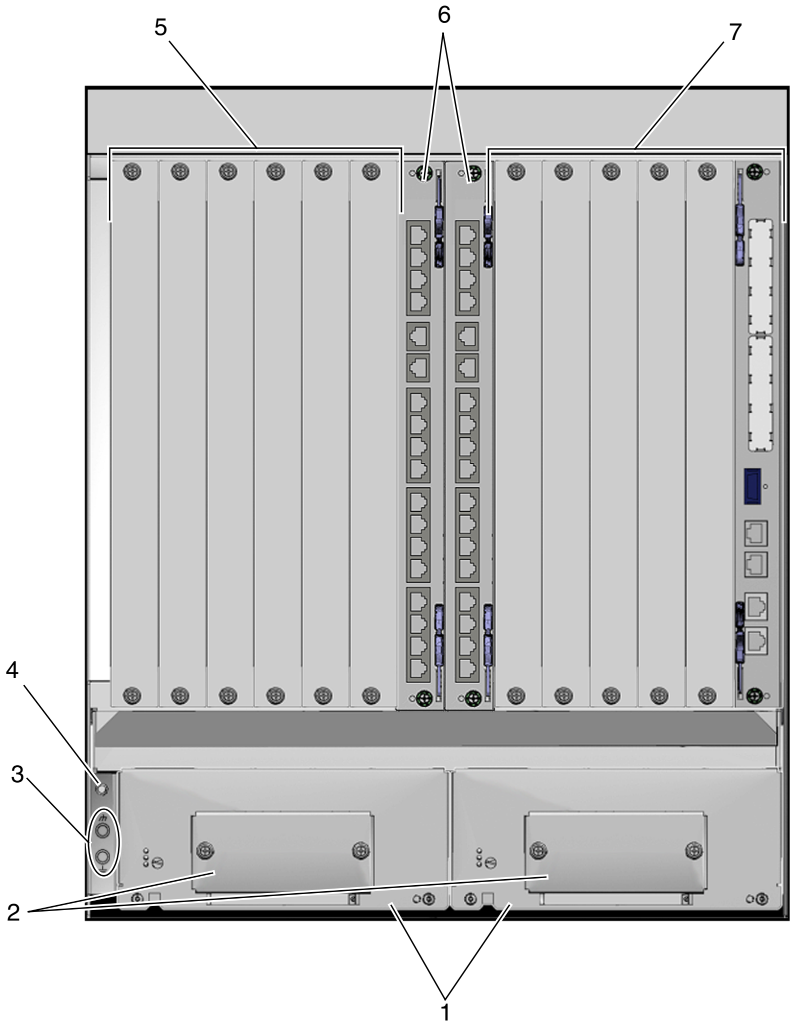

FIGURE 1-2 Netra CT 900 Server 1GbE Chassis Components (Back View)

TABLE 1-2 Legend for FIGURE 1-2

Callout	Description
1	Power entry modules
2	Power connectors (behind covers)
3	Chassis grounding posts
4	ESD ground jack

TABLE 1-2 Legend for FIGURE 1-2 *(Continued)*

Callout	Description
5	Node rear transition module slots (14-9)
6	Switch rear transition module slots (7 and 8)
7	Node rear transition module slots (6-1)

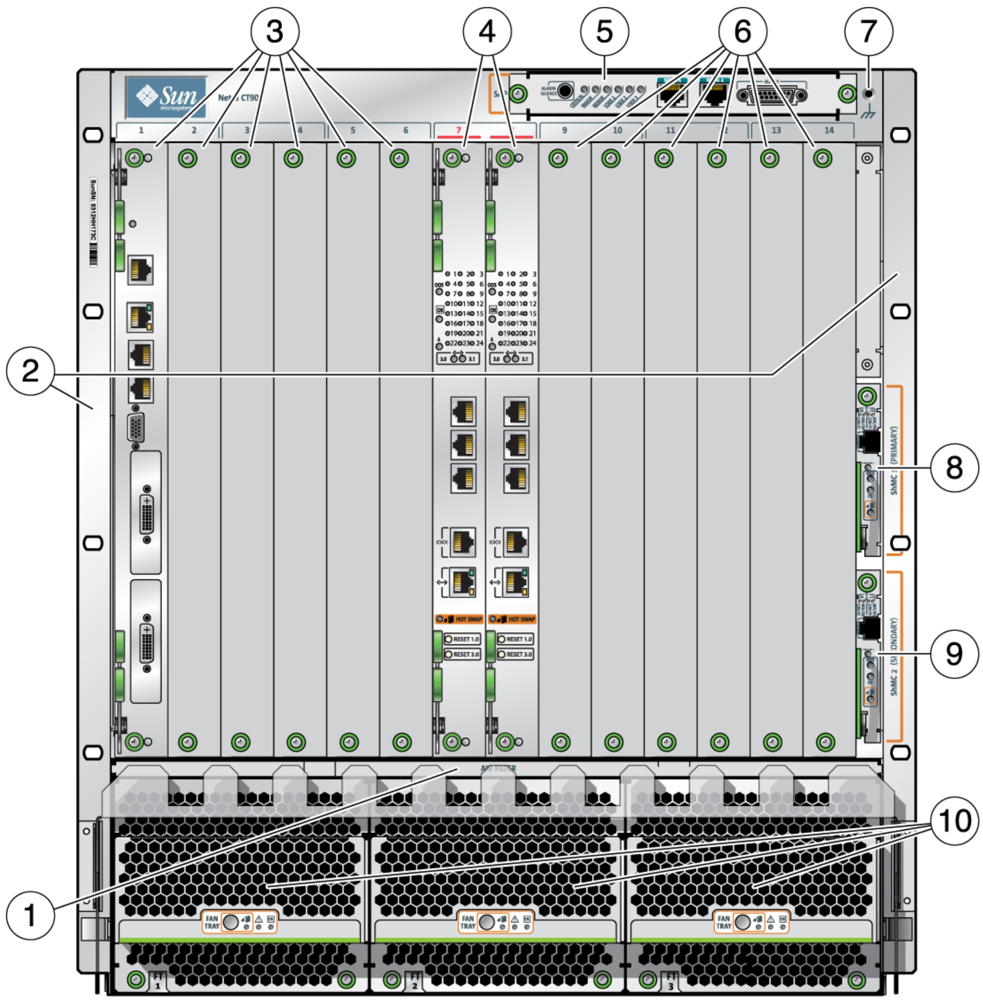

FIGURE 1-3 Netra CT 900 Server 10GbE Chassis Components (Front View)

TABLE 1-3 Legend for FIGURE 1-3

Callout	Description
1	Air filter (behind cable management tray)
2	Rackmounting flanges
3	Node card slots (1-6)
4	Switch slots (7 and 8)
5	Shelf alarm panel
6	Node card slots (9-14)
7	ESD ground jack
8	Primary shelf management card
9	Secondary shelf management card
10	Fan trays

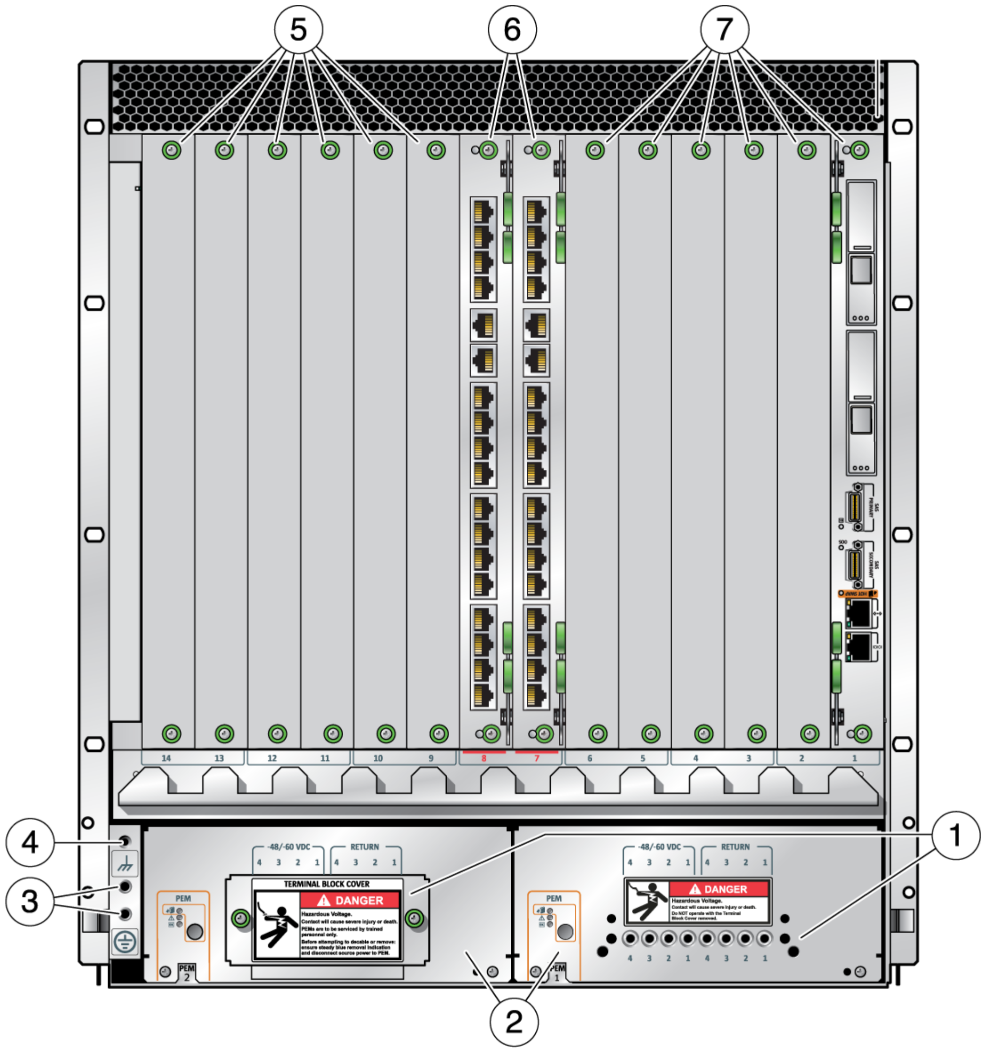

FIGURE 1-4 Netra CT 900 Server 10GbE Chassis Components (Back View)

TABLE 1-4 Legend for FIGURE 1-4

Callout	Description
1	Power entry modules (PEM)
2	Power connectors (behind covers)
3	Chassis grounding lugs
4	ESD ground jack
5	Node rear transition module slots (14-9)
6	Switch rear transition module slots (7 and 8)
7	Node rear transition module slots (6-1)

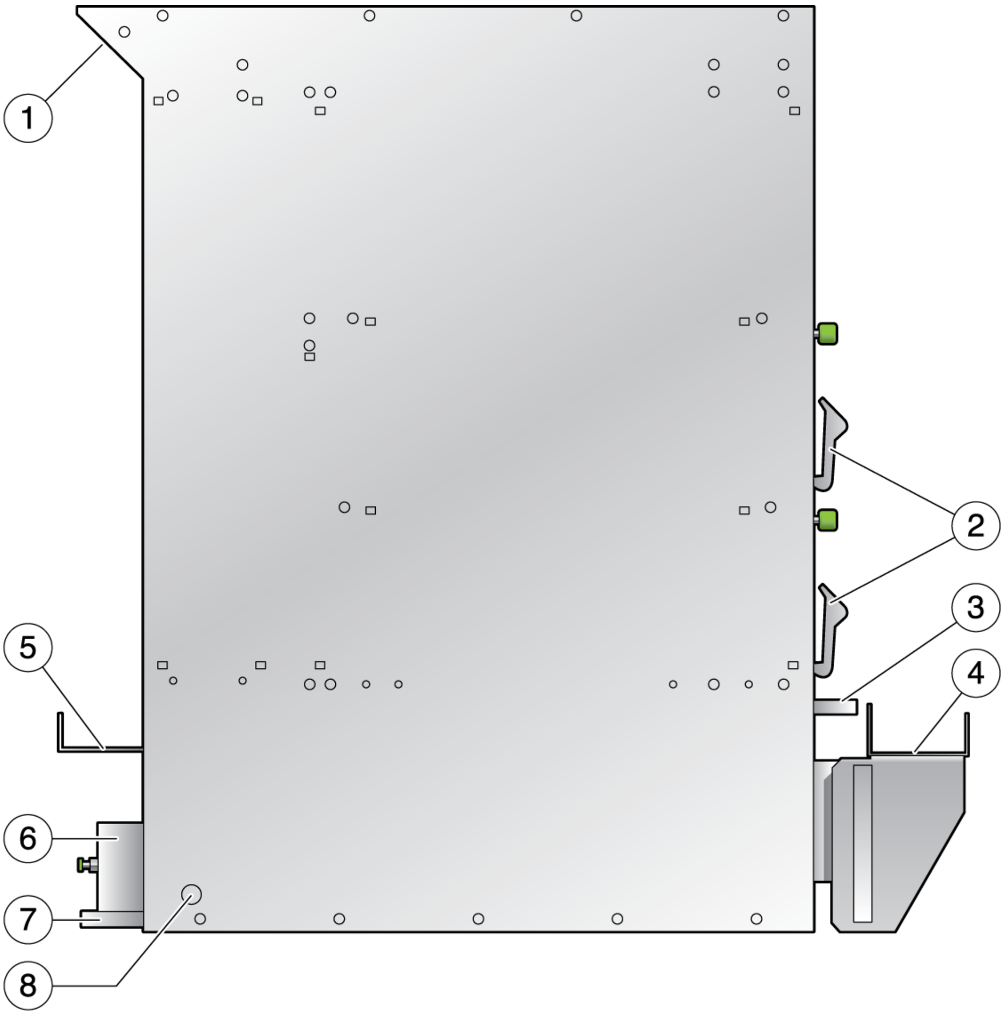

FIGURE 1-5 Netra CT 900 Server 10GbE Chassis Components (Left Side View)

TABLE 1-5 Legend for FIGURE 1-5

Callout	Description
1	Exhaust airflow plenum (upper left triangular area)
2	Primary and secondary shelf manager ejectors (small handles right side of illustration)
3	Filter tray hanle (below shelf manager handles above front cable management bracket
4	Front adjustable cable management bracket (lower right side of illustration)
5	Rear cable management bracket
6	Power entry module cover (shown with screw)
7	Power entry module handle (lowest rectangle at bottom left of illustration)
8	Chassis side mounting location (larger circle at the lower left)

CHAPTER 2

Shelf Description

The Netra CT 900 server provides OEM equipment designers with carrier-grade, standards-based, high-availability solutions built on the PCI Industrial Computer Manufacturers Group (PICMG) specification. (Sun ATCA products are currently based on PICMG 3.0 R2.0 AdvancedTCA Base Specification ECN-001 and ECN-002, May 26, 2006.) This high-capacity platform features twelve node board slots and a redundant infrastructure (switch, management, power, and cooling), making it ideal for carrier-grade telecom and Internet applications. Beyond its high-availability features, the Netra CT 900 server is highly modular, scalable, and serviceable.

Hot-swappable system components provide built-in redundancy to simplify replacement and minimize service time. Redundant shelf management cards enable customers to manage multiple processor boards and conduct shelf diagnostics remotely for enhanced system reliability. Two 8U slots are reserved for PICMG 3.0/3.1 switches. The Netra CT 900 server routes Ethernet signals across the midplane without the use of cables, saving time in setup, maintenance, and repair, and eliminating the thermal challenges of traditional cabling methods.

This chapter includes the following topics:

- "Shelf Features" on page 2-2
- "Shelf Physical Specifications" on page 2-3
- "ATCA Midplane Features" on page 2-4
- "Cooling Subsystem" on page 2-7
- "Power Distribution, Planning, and Protection" on page 2-9

2.1 Shelf Features

This product complies with PICMG® 3.0 Revision 1.0. Following are the features of the Netra CT 900 server:

- Twelve 8U node board slots, supporting any combination of the following:
  - Up to twelve node boards based on SPARC® technology
  - Up to twelve x64-based node boards
  - Up to twelve ATCA PICMG 3.0 Rev. 2.0 compliant node boards
- Two 8U switch slots
- Two hot-swappable shelf management cards
- Efficient front-to-back and bottom-to-top cooling:
  - Up to 200W power and cooling for each node board and switch slot
  - Up to 25W power and cooling for each advanced rear transition module (ARTM)
- Three hot-swappable fan trays for cooling
- Two hot-swappable, redundant -48 VDC power entry modules (PEMs)
- Quad power domain midplane, which isolates catastrophic power failures
- 10/100/1000BASE-T Base Interface
- 1000BASE BX Fabric interface, Dual Star topology
- Meets ETSI acoustic limits

2.2 Shelf Physical Specifications

TABLE 2-1 and FIGURE 2-1 give the physical specifications for the Netra CT 900 server.

TABLE 2-1 Physical Specifications, Netra CT 900 Server Shelf

	English	Metric
Width (including rackmounting flanges)	19 in.	482.6 mm
Depth, with front and rear cable management brackets	20.6 in.	524.04 mm
Depth, without front and rear cable management brackets (from PEM screw end to fan tray front edge)	17.9 in.	455 mm
Height	21 in.	532.6 mm
Weight, with packaging and no node boards or RTMs	110.2 lb	50 kg

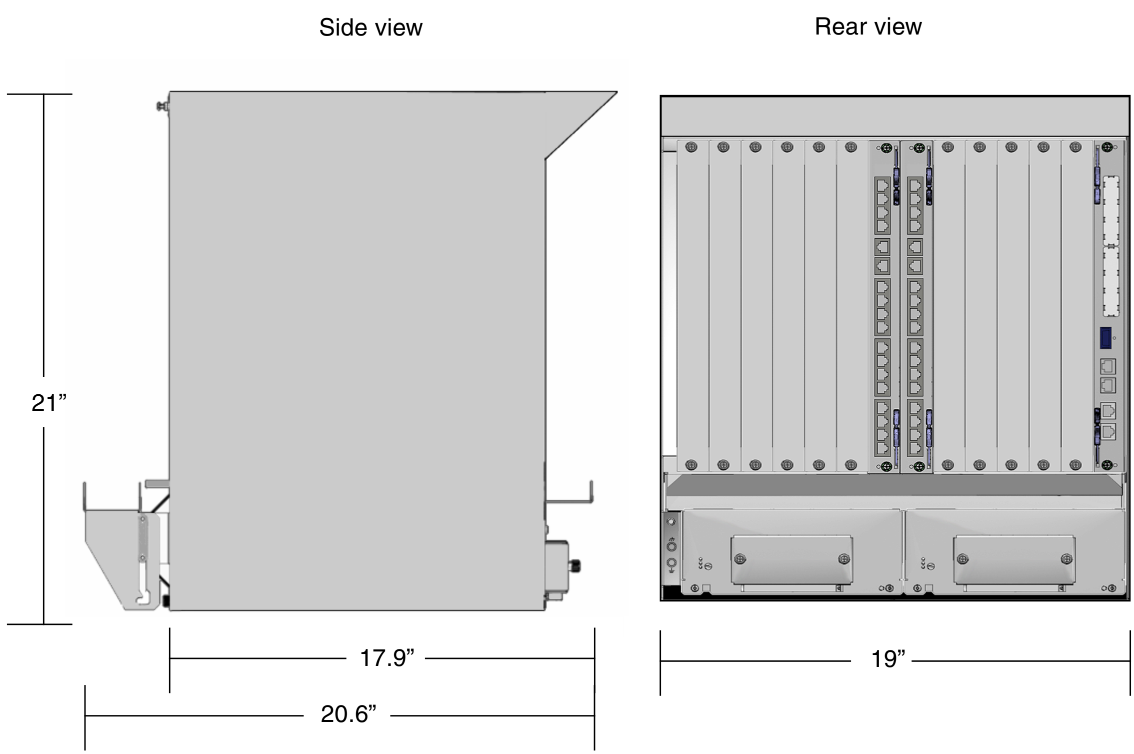

FIGURE 2-1 Physical Specifications, Netra CT 900 Server

2.3 ATCA Midplane Features

The PICMG 3.0 Revision 2.0 specifications define the ATCA system architecture. The Netra CT 900 server sends all Ethernet signals across the midplane. By moving system traffic from the shared bus architecture to a fault-tolerant switched midplane, overall system throughput can be vastly increased while retaining the reliability and hot-swap capability of ATCA.

The Netra CT 900 server incorporates a 14-slot ATCA monolithic midplane with two dedicated shelf management card slots, one shelf alarm panel (SAP) slot, three fan tray slots, and two power entry module (PEM) slots.

The Netra CT 900 server also accommodates dual redundant switches and twelve node boards. Following are definitions of the switches and the node boards:

- A switch links to each node board in a packet-switching shelf. In this way, every node board can communicate with every other node board, thereby forming a switching Fabric interface. The switches are linked to each other in a Netra CT 900 server. A switch can be used only in a switch slot.
- A node board links to the switch in a Netra CT 900 server. Each node board is linked to both switches, thereby providing redundant Fabric interfaces. Node boards can be used only in node slots.

2.3.1 Physical-to-Logical Slot Mapping

The physical slots are sequentially numbered from left to right. The logical slots are numbered from 1 through 14. Refer to TABLE 2-2 for the physical-to-logical slot mapping.

TABLE 2-2 Full Mesh and Dual Star Center 14-Slot ATCA Midplane Update Channels

	Node Slots						Switch Slots		Node Slots					
Physical Slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Logical Slot	13	11	9	7	5	3	1	2	4	6	8	10	12	14
HW-Address (Hex)	4D	4B	49	47	45	43	41	42	44	46	48	4A	4C	4E
IPMB-Address (Hex)	9A	96	92	8E	8A	86	82	84	88	8C	90	94	98	9C
Update Channel	O-------O		O-------O		O-------O		O-------O		O-------O		O-------O		O-------O	

2.3.2 Base Interface

Logical slots 1 and 2 (physical slots 7 and 8) are the switch slots for the Dual Star Base interface. Base interface channel 1 of logical slot 1 and 2 is cross-connected to both shelf management card slots on the midplane.

2.3.3 Fabric Interface

The Fabric interface in the midplane is wired as a Dual Star, supporting four ports per channel.

2.3.4 Synchronization Clocks

Synchronization clocks are bused between all fourteen ATCA slots and are terminated at both ends.

2.3.5 Update Channel Interface

The update channels are wired between adjacent midplane slots (see TABLE 2-2). The switches installed in physical slots 7 and 8 (logical slots 1 and 2) are interconnected with their update channel, which can be used to pass data or routing information between the switches. The update channel routing for the other slots is configured to support connections between single-slot ATCA boards.

2.3.6 IPMB Interface

The Intelligent Platform Management Bus (IPMB) interfaces are routed to the ATCA slots in a radial configuration. The IPMBs are wired redundantly. Every ATCA board is connected to an IPMB-A and IPMB-B interface, and they are routed to both dedicated shelf management card slots on the midplane.

2.3.7 Dedicated Shelf Management Card Slots

The two slots to the right of physical slot 14 are designed to accept the two shelf management cards. The dedicated shelf management card slots are wired to both IPMB buses, Base interface channel 1 of the switch slots, and to the fan tray connectors on the midplane. The dedicated shelf management card slots also have interconnected signals that allow the shelf management cards to run in a redundant configuration. The shelf management cards also connect to the shelf alarm panel to provide shelf-level serial I/O, telco alarms, and telco relay outputs. They also connect to the power entry modules to allow for the monitoring and hot-swapping of the power entry modules. See Chapter 4 for more information on the shelf management cards.

2.3.8 Shelf FRU SEEPROMs

The midplane incorporates two 24LC256 SEEPROMs that are used by the dedicated shelf management cards to store shelf FRU data. Both SEEPROMs are at I^2C address 0xa4, but they are on different inter-integrated circuit (I^2C) buses. I^2C bus Channel 1 of both shelf management cards is connected to SEEPROM1 (DM1) on the midplane, and I^2C bus Channel 2 is connected to SEEPROM2 (DM2) on the midplane. Only the active shelf management card has access to the SEEPROMs on the midplane.

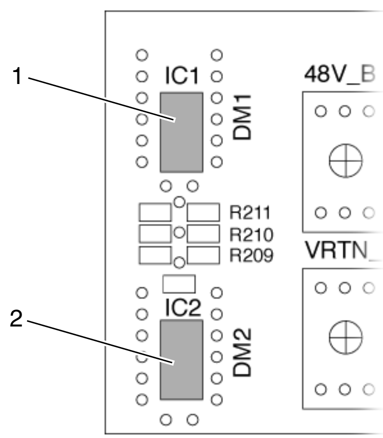

FIGURE 2-2 SEEPROM Location on the Midplane (Back View)

TABLE 2-3 Legend for FIGURE 2-2

Callout	Description
1	SEEPROM1
2	SEEPROM2

2.4 Cooling Subsystem

The Netra CT 900 server contains three front-pluggable fan trays. Each fan tray contains two fans for cooling the front boards and the rear transition module section of the shelf. Air is guided through cutouts in the midplane to provide cooling for the rear transition module section.

The fan speed is monitored by a tachometer signal sent from the fan trays to the shelf management card. The shelf management card regulates the fan speed with a DC voltage signal.

2.4.1 Removable Fan Trays

There are three modular fan trays at the front of the shelf. The display module at the front of each fan tray provides a blue Hot-Swap LED, a red Alarm LED, and a green Fan-Tray-Good LED, as well as a Hot-Swap push button. FIGURE 2-3 shows the location of these LEDs on the fan tray.

Note – Higher-speed fan trays are installed in the Netra CT 900 10GbE chassis at the factory. If you are upgrading a 1GbE chassis to install any of the next generation node boards, switches, and advanced rear transition modules, the higher-speed fan trays are required.

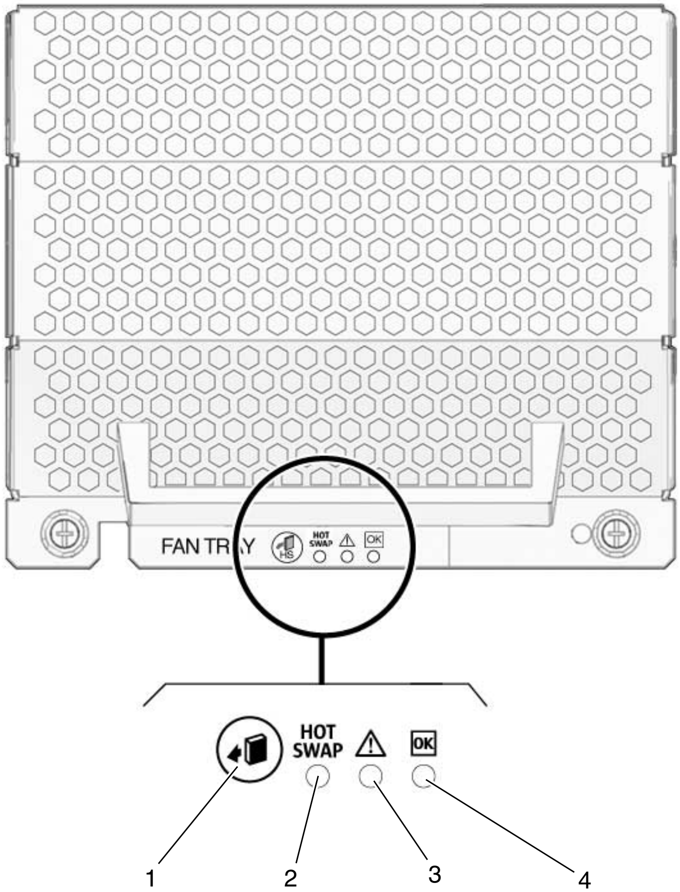

FIGURE 2-3 1Gbe Chassis Fan Tray LEDs

TABLE 2-4 Legend for FIGURE 2-3

Callout	Description
1	Hot-Swap push button
2	Hot-Swap LED
3	Alarm LED
4	Fan-Tray-Good LED

2.4.2 Fan Tray Temperature Sensor

The temperature sensors (LM75) in the fan trays measure the intake temperature of the shelf. The temperature sensors are connected to Channel 3 of the master-only I^2C-bus.

2.4.3 Fan Tray Control Board SEEPROM

The SEEPROM (Microchip 24LC256) on the fan tray control board stores the FRU data and is connected to Channel 3 of the master-only I^2C-bus.

2.5 Power Distribution, Planning, and Protection

2.5.1 Power Distribution

There are two hot-pluggable redundant power entry modules (PEMs) at the back of the shelf (FIGURE 2-4).

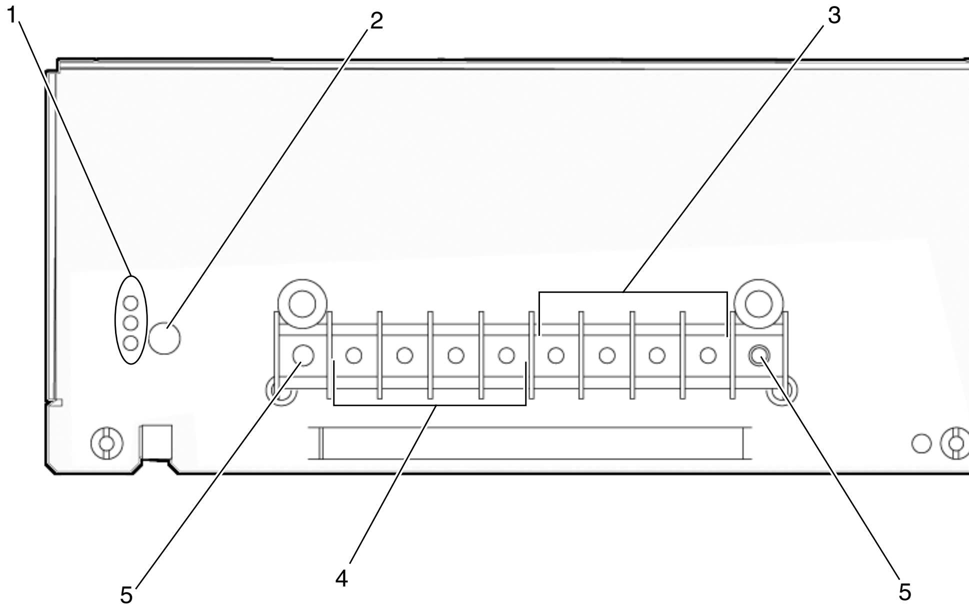

FIGURE 2-4 Power Entry Module Terminal Posts

TABLE 2-5 Legend for FIGURE 2-4

Callout	Description
1	LEDs
2	Hot-Swap button
3	RTN power terminals
4	-48V power terminals
5	Not used for electrical connections

Each power entry module provides four feeds with a capability of 28A each, of which 27.6 Amps is available per feed for use. There are two 28A fuses for each power feed at –48V and VRTN. Power filtering consists of filtered power terminals at the back panel of the power entry module, and a discrete line-filter is provided for each power input. The midplane is divided into four power segments. This topology is used to keep the maximum current per fuse lower than 28A.

Caution – Although there are fuses in the power entry circuit of the shelf, the power lines have to be protected on the rack level with 28A breakers.

The input voltage range for the shelf is from –40.5 VDC to -72 VDC. The shelf is capable of distributing:

- 225W to each slot (200W for ATCA boards and 25W for ARTMs)
- 30W to each shelf management card
- up to 200W to each fan tray

A signal from the shelf management card, which is grounded by a power entry module, indicates the presence of the power entry module in the shelf. A stud is provided at the back side of the shelf that is wired to the shelf ground.

Each of the four redundant power feeds supplies power to a separate zone of the midplane. FIGURE 2-5 illustrates how power is distributed within the Netra CT 900 server.

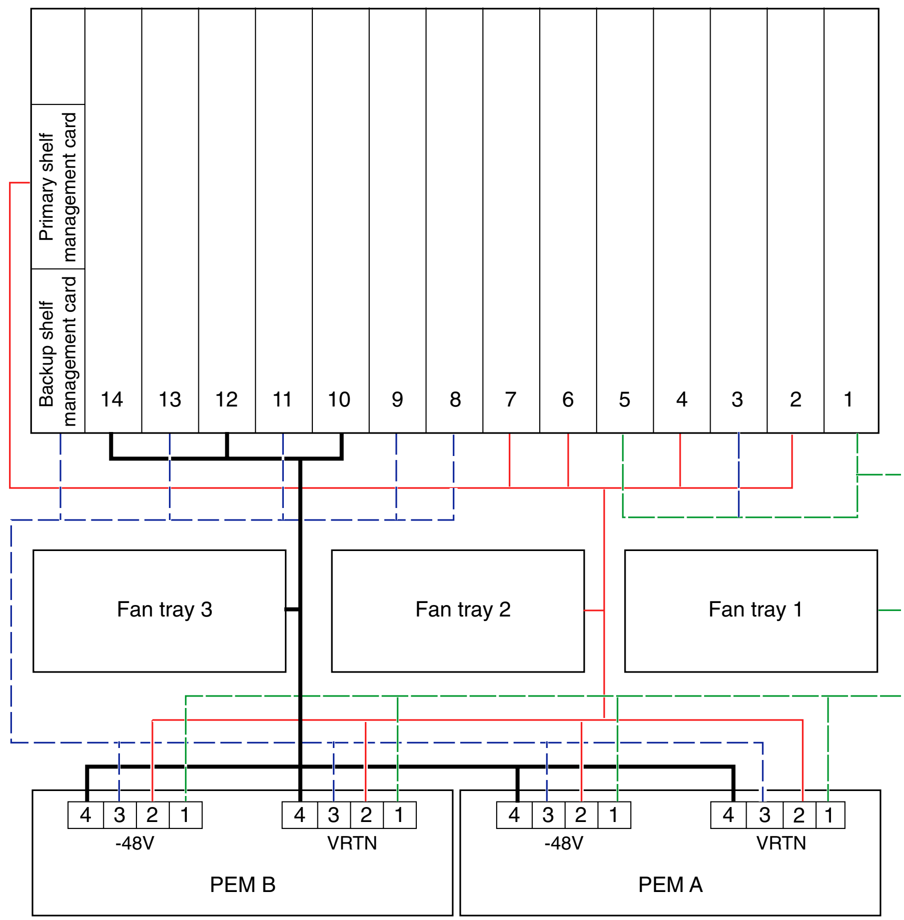

FIGURE 2-5 Power Distribution for Netra CT 900 Server (Rear View)

Note – You must connect power to all four power feeds in at least one of the two power entry modules to power up all the major components in the Netra CT 900 server. Certain components will not power up if you do not connect power to all four power feeds in at least one power entry module. For power redundancy, you must connect power to all four power feeds to both power entry modules, and the feeds to each power entry module must come from separate sources.

Note – It is possible to provide power and cooling for more than 200W for each front node card and 25W for each advanced rear transition module (ARTM), depending on the lowest input voltage required and the design of the node cards.

2.5.2 Power Planning

Node board power can be affected by CPU type, memory configuration, mezzanine cards (PMC or AMC), and ARTMs.

As the industry moves to multi-core CPUs, the number of cores can have an impact on power depending on the design. UltraSPARC T1 comes in four, six, and eight core. UltraSPARC T2 comes in six and eight core for ATCA blades. CPU workload represents a significant variable in power calculations. One of the significant advantages of the multi-core architecture is high memory utilization. In the past, single-core CPUs running memory stress programs would result in memory power data that was 30-50% higher than found with actual applications. This is not the case with UltraSPARC Core Multi Thread (CMT) architecture. Applications yield peak power data nearly the same as with memory stress tests. In UltraSPARC CMT designs, memory clocking is gated when accesses are idle. This results in a significant power delta between idle and full load.

Memory power is affected by configuration of a given DIMM. As memory technology matures, higher and higher density Integrated Circuits (ICs) become available. The higher the density, the fewer ICs are needed for a given size DIMM. The number of ICs used will determine the power. For example, 2GByte ECC DIMMs can be made with either 36 512Mbit DRAM ICs or 18 1Gbit DRAMs ICs. In this case, a 1GByte DIMM made with 512Mb will have a similar power demand as a 2GByte DIMM made with 1Gb ICs. Because node board power is limited, often the only way to accommodate a higher density DIMM configuration is when the memory technology progresses to the point where the power consumption is the same as the lower density.

Mezzanine cards are another variable in node board power, and most newer node board designs have moved to Advanced Mezzanine Card (AMC) designs. AMCs can support a wide variety of configurations from hard drives to Sonet interfaces. The challenge to power planners is that these cards are hot pluggable from the front and could be changed at some point. ARTMs are logically an AMC in a different form factor. In the case of the Sun CP32x0 ARTMs, they can house two SAS drives.

IPMC EKeying software verifies AMC and ARTM power and will not power on a node board if the sum of the components exceeds the maximum allowed. Power distribution planning is a primary end-user of power data, and, therefore we provide worse case numbers for a given configuration.

The ATCA specification requires the support of dual power feeds to all front boards (PICMG 3.0 section 4.1.1). Because of power density and typical central office wiring practices, the input power is divided into four power groups (zones). The word zone in this context might be a bit confusing because the midplane signals are grouped by connector and referred to as zones in the ATCA PICMG Specifications. Also, the term zone can refer to the grouping of node boards, fantrays, and ACBs.

Power to the node boards is distributed through Zone 1 connectors. All power zones are not equal, and zones 2 and 3 have three node boards, a switch, a fantray, and an ACB, as shown in FIGURE 2-5.

Central Office or Data Center power distribution provides DC power feeds that can vary from 15 to 50 AMPs per feed. The Netra CT 900 server has four 30A input feeds (derated to 28A for Safety) to the redundant Power Entry Modules (PEMs A and B). There is an additional loss through the PEMs, so the maximum current is 27.6A per feed.

The other variable is input voltage. ATCA PICMG 3.0 specifies a minimum input voltage to the shelf of -40.5VDC. The actual shutdown limit for the node boards shall be below -39.5VDC to provide for the drop across the midplane. For power planning, -40.5 VDC is used. Therefore, the worse case power-per-feed or zone is as follows:

- Power per feed = -40.5V x 27.6 A = 1,117 Watts/Feed
- Watts per server shelf = 4 x 1,117 = 4,471 Watts/Shelf

This calculation is the maximum power available under worst-case conditions, which occurs at minimum input voltage.

As stated previously, the loading of each of the four power feeds is different. Calculating the zones with the most load results in the following.

TABLE 2-6 Maximum Power Load for Zones 2 and 3

Component	Max Power
Node Board	200 Watts
ARTM	25 Watts

TABLE 2-6 Maximum Power Load for Zones 2 and 3

Component	Max Power
Switch	200 Watts
Fantray	200 Watts
ACB ShMM	10 Watts

TABLE 2-7 Example Maximum Power Calculations for a System

Component	Max Power
3 Node Boards	600 Watts
3 ARTMs	75 Watts
Switch	200 Watts
Fantray	200 Watts
ACB/ShMM	14 Watts
TOTAL	**1,089 Watts**

This calculation leaves almost 50W of margin for Zone 2 and 3, which have the most load.

The switch can consume 200 Watts of power. For example, the Netra CP3240 switch has three AMC slots plus it supports an optical ARTM with up to six 10G SFP+ transceivers.

TABLE 2-8 Example of Fully Loaded Shelf Power Calculations

Component	Max Power
12 Node Boards	2,400 Watts
12 ARTMs	300 Watts
2 Switches	400 Watts
3 Fantrays	600 Watts
2 ACB/ShMM	28 Watts
TOTAL	**3,728 Watts**

As you can see this result is under the total power feed capacity of 4,471 Watts.

For power distribution planning, it might not be practical to use different powers for different feeds. One approach would be to take the worst-case zone and multiply it by four.

Using the previous example: worst-case Zones 2 and 3 power is 1,089 x 4 = 4,356 Watts.

These numbers are worst-case numbers, and there are other node boards that either can be configured to less than 200watts or will be less, based on software applications running.

Note – Keep in mind these calculations are for example purposes and actual load values can change when other memory and peripherals become available.

2.5.3 Power Protection

The four feeds of each power supply are protected by a 28A fuse in the –48V path and a 28A fuse in the VRTN path. The fuses are inside each power entry module and can be replaced after removing the power entry module from the shelf.

FIGURE 2-6 shows the location of the fuses in the power entry modules.

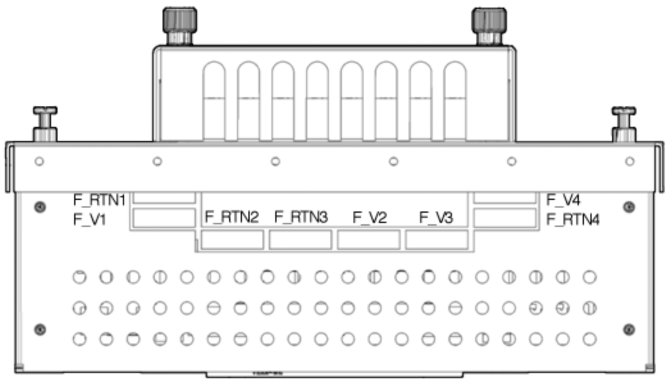

FIGURE 2-6 Fuses in the Power Entry Modules

CHAPTER 3

Shelf Alarm Panel Description

The shelf alarm panel (SAP) is a removable module mounted at the top right side of the shelf, above slots 9 through 14 in the shelf. It provides the connectors for the serial console interfaces of the shelf management cards, telco alarm connector, temperature sensors, Telco Alarm LEDs, user-definable LEDs, and Alarm Silence push button.

The I^2C-bus devices on the shelf alarm panel are connected to the master-only I^2C-bus of both shelf management cards. Only the active shelf management card has access to the shelf alarm panel.

FIGURE 3-1 shows the connection between the shelf management cards and the shelf alarm panel. FIGURE 3-2 shows the block diagram for the shelf alarm panel.

This chapter includes the following topics:

- "Shelf Alarm Panel Components" on page 3-4
- "Shelf Alarm Panel SEEPROM" on page 3-6
- "Shelf Alarm Panel Temperature Sensors" on page 3-6

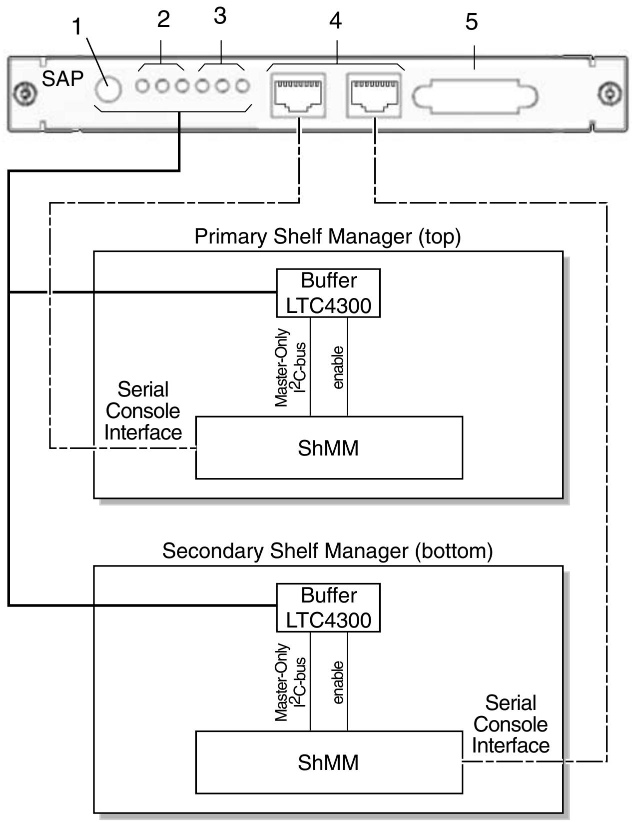

FIGURE 3-1 Connection Between Shelf Management Cards and Shelf Alarm Panel

TABLE 3-1 Legend for FIGURE 3-1

Callout	Description
1	Alarm Silence push button
2	Telco Alarm LEDs
3	User LEDs
4	Serial console connectors
5	Telco alarm connector

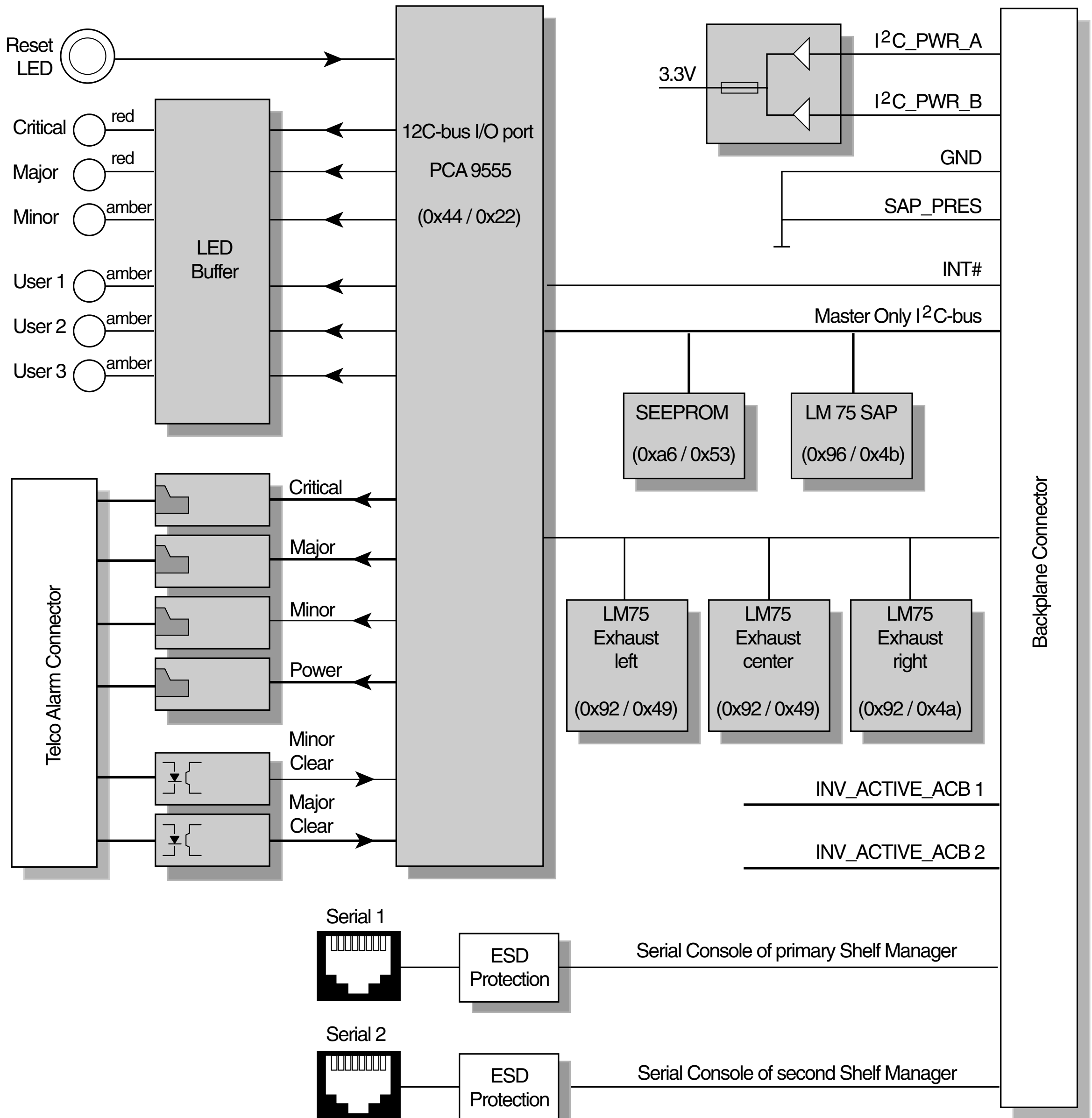

FIGURE 3-2 Shelf Alarm Panel Block Diagram

3.1 Shelf Alarm Panel Components

FIGURE 3-3 shows the components on the front panel of the shelf alarm panel.

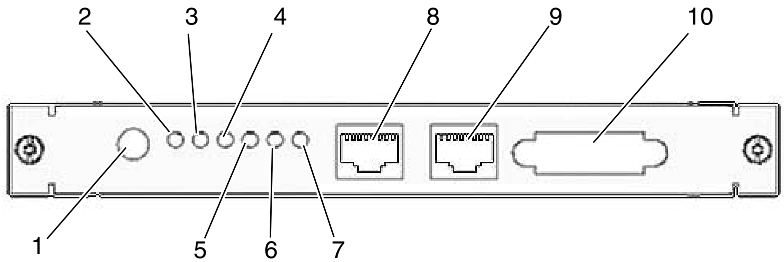

FIGURE 3-3 Shelf Alarm Panel Front Panel Components

TABLE 3-2 Legend for FIGURE 3-3

Callout	Description
1	Alarm Silence push button
2	Critical Telco Alarm LED
3	Major Telco Alarm LED
4	Minor Telco Alarm LED
5	User LED 1
6	User LED 2
7	User LED 3
8	Serial console connector for primary (top) shelf management card
9	Serial console connector for backup (lower) shelf management card
10	Telco alarm connector

The following sections give detailed descriptions of each of the shelf alarm panel components:

- "Alarm Silence Push Button" on page 3-5
- "Telco Alarm LEDs" on page 3-5
- "User LEDs" on page 3-5
- "Serial Console Connectors" on page 3-5
- "Telco Alarm Connector" on page 3-6

3.1.1 Alarm Silence Push Button

The Alarm Silence push button on the shelf alarm panel activates the alarm cutoff (ACO) state. When the alarm cutoff is activated, the active alarm LEDs blink and all of the alarm relays are deactivated.

Note – This button only activates the alarm cutoff state. It does not clear alarms completely.

3.1.2 Telco Alarm LEDs

The shelf alarm panel provides three Telco Alarm LEDs to indicate the presence of critical, major, and minor alarms. TABLE 3-3 describes the function of the Telco Alarm LEDs.

TABLE 3-3 Telco Alarm LEDs

LED State	Description
Off	No alarm triggered.
On	Alarm triggered.
Blinking	Alarm cutoff (ACO) is activated.

3.1.3 User LEDs

The User LEDs are user definable. They are connected to the I^2C-bus I/O port on the PCA 9555 on the shelf alarm panel.

3.1.4 Serial Console Connectors

The shelf alarm panel provides the following RS-232 serial console interface connectors:

- SERIAL 1—Serial console connector for the primary (top) shelf management card
- SERIAL 2—Serial console connector for the backup (lower) shelf management card

A full set of RS-232 signals, including modem control, is provided. The serial interface is implemented on the shelf management card.

Following is the default configuration for the serial console:

- 115200 baud
- No parity
- 8 data bits
- 1 stop bit

The serial console connectors are RJ-45 DTE serial ports. Refer to the *Netra CT 900 Server Service Manual* for the pinouts for these ports.

Note – You must use shielded cables when connecting to either of the serial ports on the shelf alarm panel.

3.1.5 Telco Alarm Connector

The shelf alarm panel provides a telco alarm connector on the front panel. The telco alarm connection relay circuits are capable of carrying 60 VDC or 30 VAC at 1A. The shelf alarm panel accepts timed pulse inputs for clearing minor and major alarm states (there is no reset for the critical state). Reset is accomplished by asserting a voltage differential from 3.3V to 48V for between 200 and 300 milliseconds. The acceptance voltage range is from 0 to 48 VDC continuous (handles up to 60 VDC at a 50 percent duty cycle). The current drawn by a reset input does not exceed 12mA.

The telco alarm connector is a standard DB-15 connector. Refer to the *Netra CT 900 Server Service Manual* for the pinouts for this port.

3.2 Shelf Alarm Panel SEEPROM

The SEEPROM is connected to the master-only I^2C-bus and is located at I^2C address 0xa6/0x53. It is a Microchip 24LC256 device.

3.3 Shelf Alarm Panel Temperature Sensors

Three LM75 temperature sensors for measuring the exhaust temperatures and one sensor for the board temperature are located on the shelf alarm panel PCB. The temperature sensors are connected to the master-only I^2C-bus.

CHAPTER 4

Shelf Management Card Description

The Netra CT 900 server has two dedicated slots for the shelf management cards. Each shelf management card is a 78 mm by 280 mm form factor board with a SODIMM socket for the shelf management mezzanine (ShMM) device. The Netra CT 900 server has IPMBs and is designed to work with two redundant shelf management cards. The shelf management card also contains the fan controller for the three hot-swappable fan trays, and provides individual Ethernet connections to both switches.

The dual-IPMB interface from the ShMM is connected to the dual IPMBs on an ATCA node board through radial connections in the Netra CT 900 server midplane. Each shelf management card has an Ethernet port that is *not* available to the user; instead, Ethernet traffic from the shelf management card is routed to the Ethernet ports on the switches. Serial and telco alarm traffic from the shelf management card are routed to the ports and LEDs on the shelf alarm panel.

The shelf management card includes several on-board devices that enable different aspects of shelf management based on the ShMM. These facilities include I^2C-based hardware monitoring and control and General Purpose Input/Output (GPIO) expander devices.

FIGURE 4-1 shows a shelf management card.

This chapter contains the following topics:

- "Ethernet Channels" on page 4-3
- "Master-Only I2C Bus" on page 4-4
- "Ports and LEDs" on page 4-6
- "Hardware Address" on page 4-9
- "Redundancy Control" on page 4-10

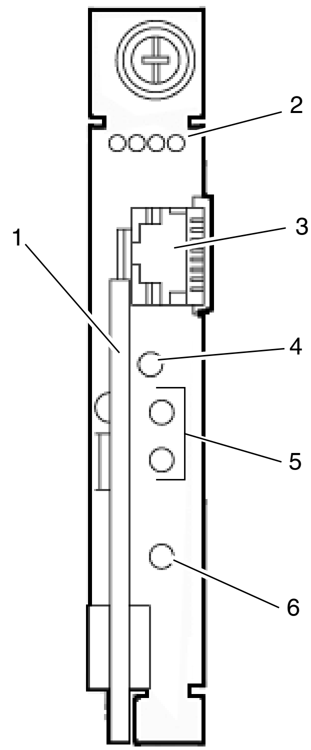

FIGURE 4-1 Shelf Management Card

TABLE 4-1 Legend for FIGURE 4-1

Callout	Description
1	Ejector lever
2	Ethernet LEDs
3	Ethernet port (not used)
4	Reset button
5	Status LEDs
6	Hot-Swap LED

4.1 Ethernet Channels

Each shelf management card provides two 10/100 Ethernet interfaces. The first Ethernet channel (ETH0) is routed to the J2 connector on the Netra CT 900 server midplane. The Netra CT 900 server midplane routes ETH0 from the J2 connector to the shelf management card port on the corresponding switch. The second Ethernet channel (ETH1) is routed to the other switch.

Both Ethernet ports support 10-Mb (10BASE-T) and 100-Mb (100BASE-TX) connections. The shelf management card also provides status LEDs for the two Ethernet channels. Refer to Chapter 5 for more information on the switch, and "Ports and LEDs" on page 4-6 for more information on the Ethernet LEDs.

FIGURE 4-2 shows the connections of the Ethernet channels in the Netra CT 900 server.

Note – Do not use the Ethernet ports at the front of the shelf management cards.

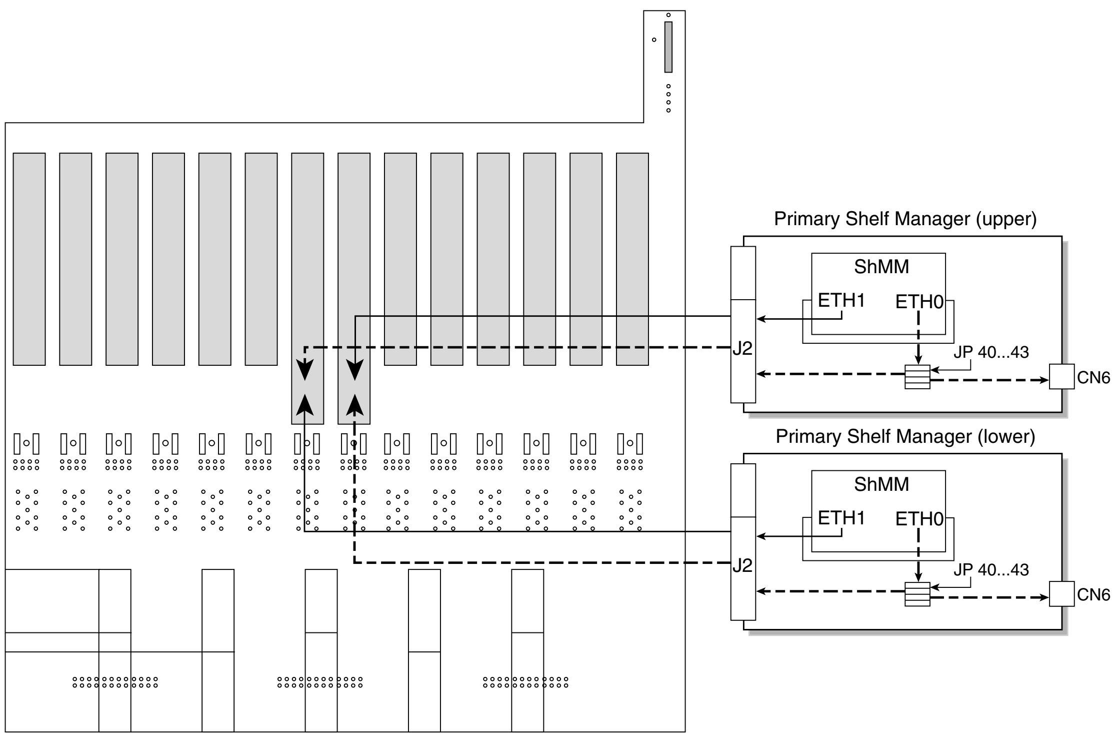

FIGURE 4-2 Ethernet Connections in the Netra CT 900 Server

4.2 Master-Only I²C Bus

The master-only I²C bus is used internally on the shelf management card for the rear transition module and SEEPROM devices. The shelf management card also has a number of on-board I²C devices connected to the master-only I²C bus. These devices read the slot hardware address, exchange the hardware status with the backup shelf management card, and communicate with the system management controller ADM1026.

The master-only I²C bus is fed to a 4-channel switch (PCA9545) and then routed through the J2 midplane connector to:

- The shelf FRU SEEPROMs on the midplane (Channel 1 and 2)
- The intake temperature sensors on the fan trays (Channel 3)
- The exhaust temperature sensors on the shelf alarm panel (Channel 3)
- The power entry modules (Channel 4)

The master only I²C-bus is buffered by a LTC4300 device and is then routed to the shelf alarm panel. The Active signal of the shelf management card is used to enable the I²C switch and the LTC4300 buffer so that only the active shelf management card has access to the shelf I²C-bus devices.

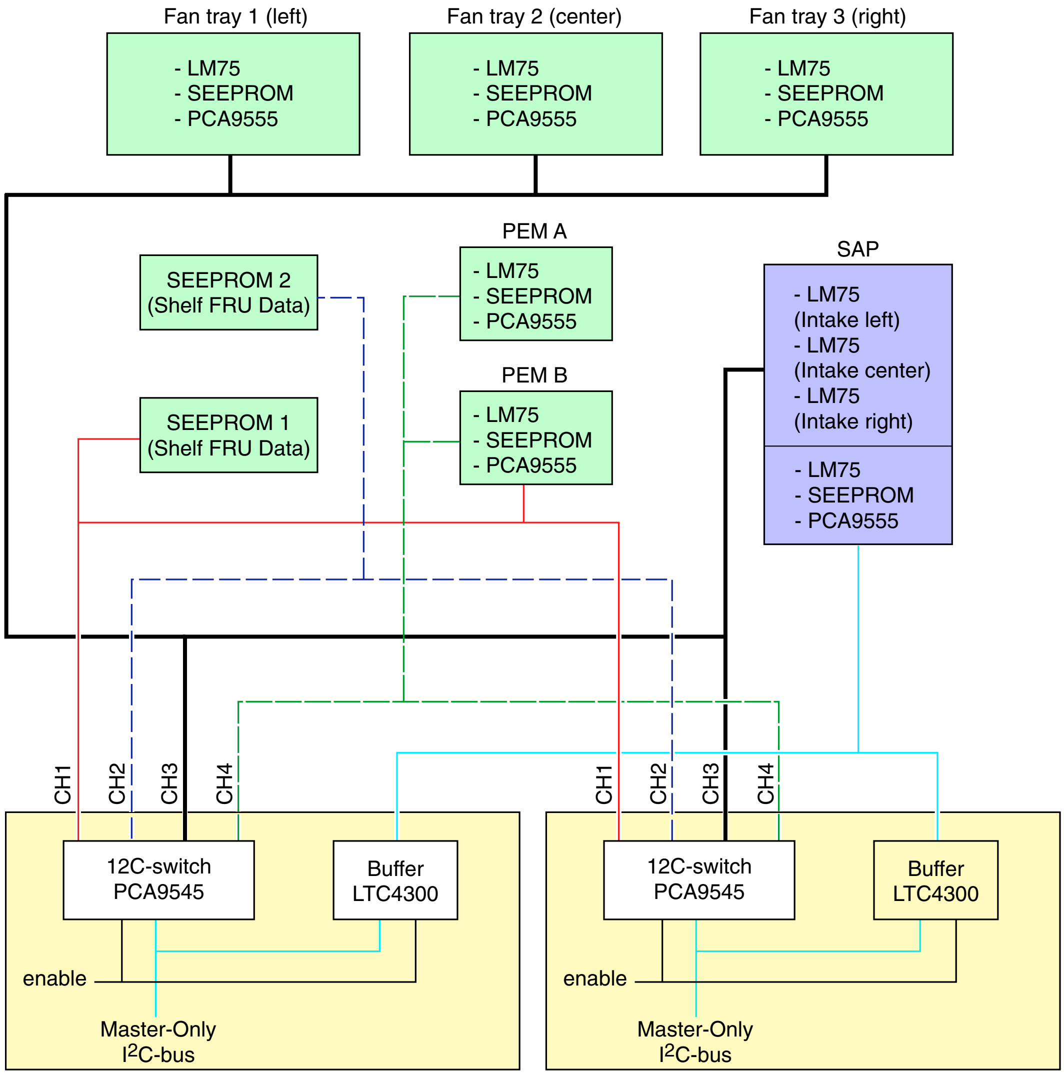

FIGURE 4-3 Distribution of the Master-Only I^{2}C Bus on the Midplane

4.3 Ports and LEDs

The following sections give information on the ports and LEDs on the shelf management card.

4.3.1 Serial Console Interface

The shelf management card provides an RS-232 console interface that provides a full set of the RS-232 signals, including modem control. These signals are routed to the serial port on the shelf alarm panel. Refer to Chapter 3 for more information on the serial ports on the shelf alarm panel for the primary and backup shelf management cards.

Following is the default configuration for the serial console:

- 115200 baud
- No parity
- 8 data bits
- 1 stop bit

4.3.2 Ethernet LEDs

The shelf management card provides two status LEDs for the two Ethernet channels (ETH0 and ETH1). FIGURE 4-4 shows the location of the Ethernet LEDs on the shelf management card for both Ethernet channels.

The LEDs for the two Ethernet channels are:

- Yellow 10/100 LED—Indicates 100-Mb speed when lit
- Green li/act LED—Indicates link and activity when blinking

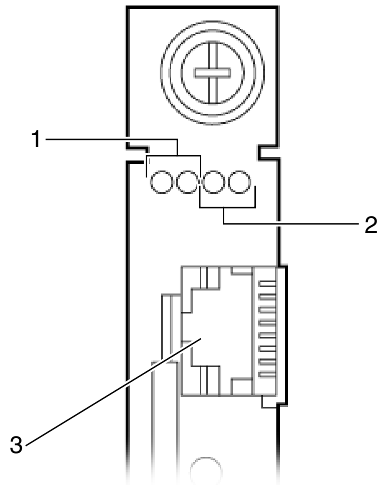

FIGURE 4-4 Ethernet LEDs on the Shelf Management Card

TABLE 4-2 Legend for FIGURE 4-4

Callout	Description
1	Ethernet 0 LEDs
2	Ethernet 1 LEDs
3	Ethernet port (not used)

4.3.3 Front Panel Reset Push Button

The shelf management card provides a front panel Reset push button. If there is a hardware or software failure, the backup shelf management card takes over the shelf management functions. Use the front panel Reset push button to reset the failed shelf management card. If the reset successfully clears the hardware or software problem, the reset shelf management card becomes the active shelf management card once again and resumes the shelf management functions.

FIGURE 4-5 shows the location of the front panel Reset push button.

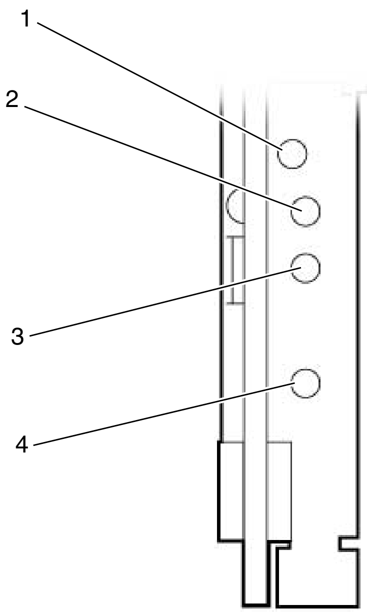

FIGURE 4-5 Status and Hot-Swap LEDs and Reset Button on the Shelf Management Card

TABLE 4-3 Legend for FIGURE 4-5

Callout	Description
1	Reset button
2	Green Status LED
3	Red Status LED
4	Hot-Swap LED

4.3.4 Status LEDs

There are two Status LEDs on the shelf management card: the green (upper) Status LED and the red (lower) Status LED. The Status LEDs tell you whether that particular shelf management card is the active or backup card, and if the card is running or not.

- Green Status LED:
  - Solid—Shows that this shelf management card is the active card
  - Blinking—Shows that this shelf management card is the backup card
- Red Status LED—Shows that this shelf management card is not running

4.3.5 Hot-Swap LED

The shelf management card provides a blue Hot-Swap LED. This LED indicates when it is safe to remove the shelf management card from a shelf that is powered on. TABLE 4-4 describes the different states for the Hot-Swap LED.

TABLE 4-4 Hot-Swap LED States

State	Condition
Off	The shelf management card is not ready to be removed or disconnected from the shelf.
Blue	The shelf management card is ready to be removed or disconnected from the shelf.
Long-blink	The shelf management card is activating itself.
Short-blink	Deactivation has been requested.

4.4 Hardware Address

The shelf management card reads the hardware address and parity bit from the midplane connector of the dedicated shelf management card slot.

4.5 Redundancy Control

The shelf management card supports redundant operation with automatic switchover using redundant shelf management cards. In a configuration where two shelf management cards are present, the upper shelf management card acts as the active shelf management card and the lower shelf management card acts as a backup. The shelf management cards monitor each other and either can trigger a switchover if necessary.

CHAPTER 5

Switch Description

Two switches are available to use in the Netra CT 900 server: the Netra CP3140 and the Netra CP3240. This chapter describes the Netra CP3140 switch.

For documentation about the Netra CP3240 switch, refer to the following web site:

`http://docs.sun.com/app/docs/prod/cp3240.switch?l=en#hic`

The Netra CP3140 1-GbE switch is an AdvancedTCA 3.0 and 3.1 Option 1 switch. This means that the switch implements two separate switched networks on a single printed circuit board (PCB). By separating the Base and Extended Fabric networks, the switch provides a separate control plane and data plane. It provides 10/100/1000BASE-T Ethernet switching on the 3.0 Base Fabric interface and on the 3.1 Extended Fabric interface it provides 1000BASE-X Ethernet switching. Both of these networks are fully managed and work with the robust FASTPATH management suite. Both networks support Layer 2 switching as well as Layer 3 routing. The Netra CP3140 switch also supports a rear transition module to expand connectivity with additional uplink ports.

This chapter includes the following topics:

- "Block Diagrams of the Switch and Rear Transition Module" on page 5-2
- "Base Fabric Switch Subsystem" on page 5-5
- "Extended Fabric Gigabit Ethernet Switch Subsystem" on page 5-5
- "Rear Transition Module" on page 5-6
- "Key Components" on page 5-6
- "System Requirements" on page 5-7
- "Ports and LEDs" on page 5-9
- "Configuration" on page 5-19

5.1 Block Diagrams of the Switch and Rear Transition Module

FIGURE 5-1 shows the functional block diagram for the Netra CP3140 switch, and FIGURE 5-2 shows the functional block diagram for the rear transition module for the switch. Refer to TABLE 5-1 for a key to the different colored blocks in the block diagrams.

TABLE 5-1 Key to the Block Diagram for the Switch

	Color	Meaning
Blocks	Gray	Base
	Green	Extended Fabric gigabit Ethernet
	Yellow	Always needed
Links	Tan	Serial link
	Light blue	32-bit 66-MHz PCI
	Orange	SGMII
	Purple	10/100BASE-TX
	Green	10/100/1000BASE-T

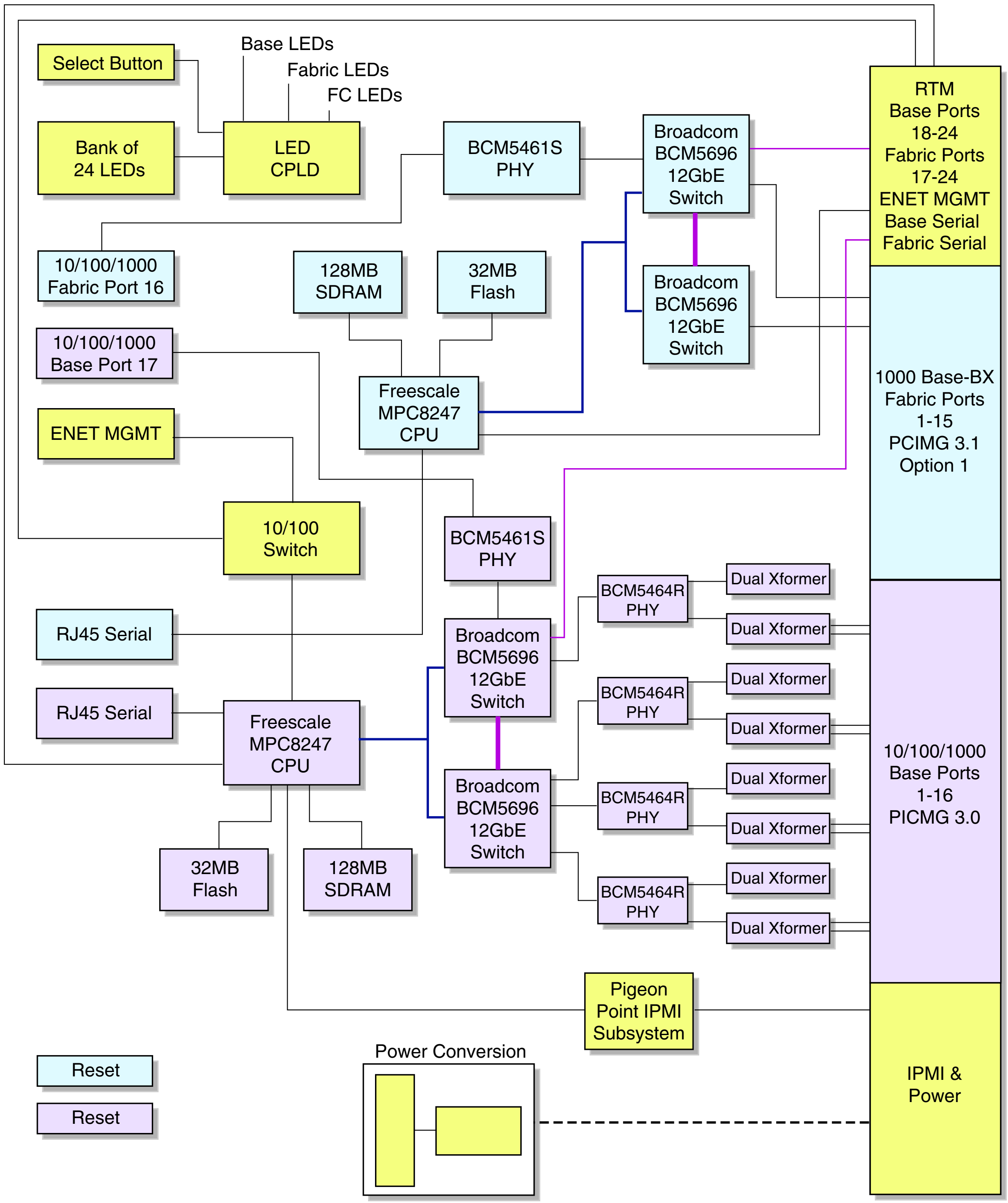

FIGURE 5-1 Functional Block Diagram of the Netra CP3140 Switch

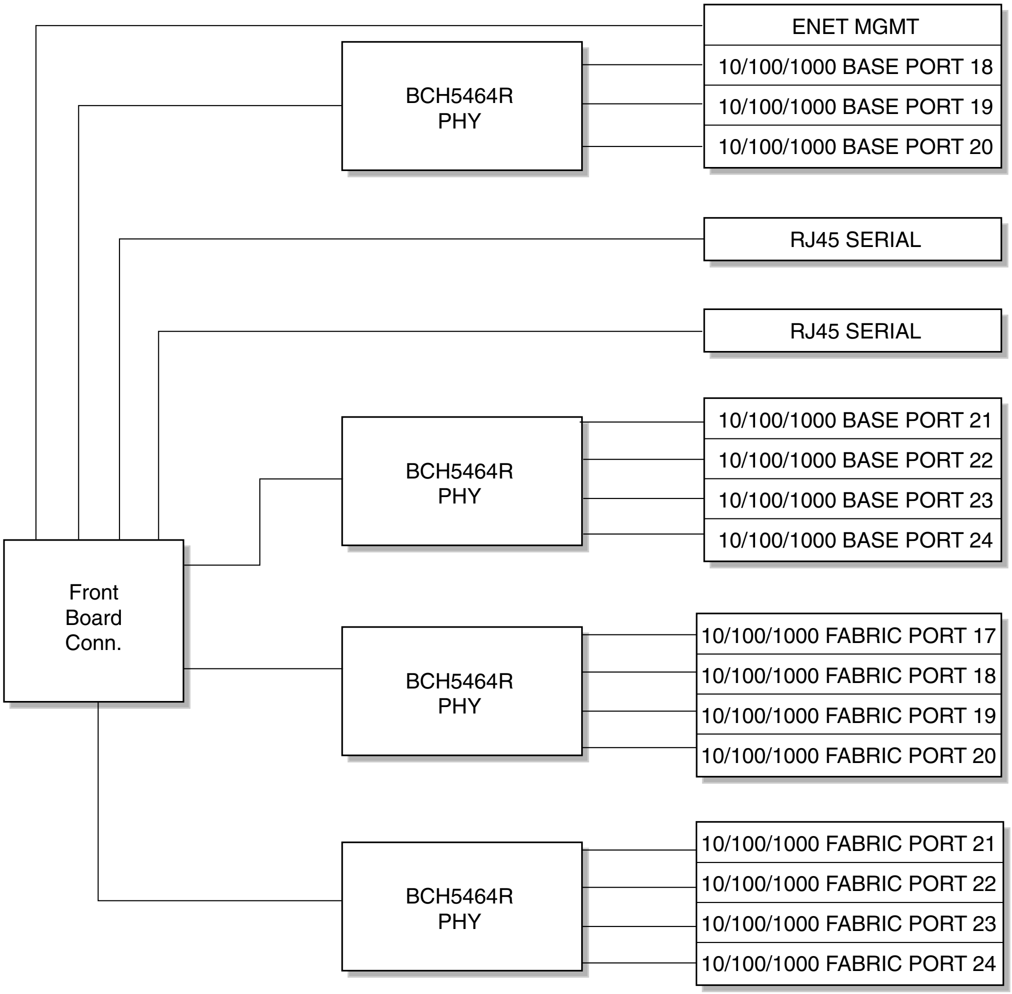

FIGURE 5-2 Functional Block Diagram for the Netra CP3140 Rear Transition Module

The switch can be divided into four portions:

- Base Fabric switch subsystem
- Extended Fabric gigabit Ethernet switch subsystem
- rear transition module
- Support circuits used by the subsystems

The following sections provide overviews of the switch's main components and subsystems.

5.2 Base Fabric Switch Subsystem

PICMG 3.0 AdvancedTCA defines 10/100/1000BASE-T Ethernet over the Base Fabric interface, called "Base" in this manual. Pictured in gray in FIGURE 5-1, the Base is designed to be the control plane for the shelf. Scaling from 10 Mbps to 1000 Mbps, the Base interface can accommodate a wide variety of node boards.

5.3 Extended Fabric Gigabit Ethernet Switch Subsystem

PICMG 3.1 AdvancedTCA provides an agnostic mesh on the backplane called the Extended Fabric interface. This fabric can be several different technologies defined by AdvancedTCA subspecifications. The switch is designed to comply with the PICMG 3.1 Ethernet/Fibre Channel for AdvancedTCA Systems. Specifically, the switch supports option 1 of the PICMG 3.1 specification, which provides a single gigabit Ethernet port to the node board. The Extended Fabric gigabit Ethernet is depicted in green in FIGURE 5-1. The gigabit Ethernet portion of the Fabric interface is called "Fabric GbE" in this manual.

The Fabric GbE interface uses 1000BASE-BX to provide connectivity between boards through the backplane. This interface is the data plane in the shelf. Fabric GbE interface is a different type of Ethernet than Base interface. It is 1000BASE-BX, whereas Base interface is 10/100/1000BASE-T. 1000BASE-BX is digital and does not scale down to 10 Mbps or 100 Mbps. It only operates at 1000 Mbps. The Fabric GbE subsystem is based on the same components as the Base except BCM5464x (transceivers) are not needed for the backplane ports. Note that the Fabric GbE RJ-45 ingress and egress ports are 10/100/1000BASE-T, not 1000BASE-BX.

5.4 Port Shutdown Behavior on Base and Fabric Interfaces

There is a difference in port shutdown behavior between the Base and Fabric interfaces. The Fabric ports are physically shutdown. This means that when a Fabric port is shutdown, the other side will not show a link. In contrast, Base ports are only logically shutdown. This means that when a Base port is shutdown, the other side will show a link. This difference is not a defect, but merely a difference in the Fabric and Base interfaces.

This difference occurs because Fabric ports are a different type of Ethernet than Base ports. Base ports need external PHYs to support 1000Base-T. Fabric ports do not need external PHYs, because the BCM5695 can support 1000Base-BX directly.

When a shutdown command is issued on both the Base and Fabric ports, the command goes to the BCM5695, because the BCM5695 connects directly to the backplane in case the Fabric link goes down. In the case of the Base, even when the BCM5695 port is shut down, the BCM5464R port is not shut down, so the link partner still sees a link.

5.5 Rear Transition Module

The Netra CP3140 switch supports a rear transition module through ATCA Zone 3 connectors. Seven Base ports and eight Fabric ports go to the rear transition module. Rather than run 10/100/1000BASE-T to the rear transition module, SGMII signals are used for each port. This means the rear transition module can support 10/100/1000BASE-T, 1000BASE-CX, or 1000BASE-LX in any combination of these technologies. In addition to the uplink ports, serial management ports for both the Base and Fabric interfaces, as well as a 10/100 management port, are provided to the rear transition module.

5.6 Key Components

The following sections provide a short description of key parts on the switch.

5.6.1 Broadcom StrataXGS 2 BCM5695 Ethernet Switch

The switch uses Broadcom StrataXGS 2 BCM5695 for Ethernet switching and routing. This chip is an Ethernet switch with twelve 1-GbE ports and 1-HiGig+ (12 GbE) port. There are four total BCM5695s on the switch, two for the Base and two for the Fabric GbE interface. The two chips in each subsystem are connected to each other with their HiGig+ (12 Gps) ports. Therefore, these two chips are set up to act as a single 24-port non-blocking, wire-speed gigabit Ethernet switch and router. The BCM5695 features hardware support for line rate switching, a 16-Kbyte MAC address table, IP multicast, Rapid Spanning Tree Protocol (RSTP), jumbo frames, and packet processor for Quality of Service (QoS) among other features.

5.6.2 Broadcom BCM5464R and BCM5461S 10/100/1000BASE-T Ethernet PHY

The quad (BCM5464R) and single (BCM5461S) Broadcom ports provide the physical interfacing for 10/100/1000BASE-T. They are low-power devices and provide features such as jumbo frames support, auto-MDIX, and cable testing.

5.6.3 Freescale PowerQUICC II MPC8247 Communications Processor

The Freescale MPC8247 is a microprocessor designed for maximum flexibility. It features a dual core architecture with a PPC G2 LE core and a RISC core controlling the peripherals. Running at 400 MHz with only 1W power, the MPC8247 provides high performance with incredibly low power consumption. Paired with the 128-Mbyte PC100 SDRAM and 32-Mbyte flash memory, the CPU subsystem of the switch is only 20 percent utilized in worst case conditions. This provides plenty of room for customer applications and future upgrades.

5.7 System Requirements

The following sections briefly describe the basic system requirements and configurable features of the switch. Links are provided to other chapters and appendixes containing more detailed information.

5.7.1 Connectivity

The two switches must be installed in logical slots 1 and 2 (physical slots 7 and 8) in the Netra CT 900 server.

The Base interface is always routed in a Dual Star topology on the midplane. This means every node slot has a Base channel routed to each of the switch slots. Independent of how the Fabric interface is used, a switch is always needed for the Base interface. The Fabric interface is normally routed the same way, one Fabric channel per node per switch for a total of two Fabric channels per node. Shelves routed like this are called Dual Stars and they are the most common.

5.7.2 Electrical and Environmental Requirements

TABLE 5-2 describes the power requirements for the switch.

TABLE 5-2 Electrical and Environmental Requirements for the Switch

State	Power in Watts (W)	Current draw on -48VDC in Amperes (A)
Idle without rear transition module	56	1.17
Idle with rear transition module	62	1.29
Typical heavy load without rear transition module	76	1.58
Typical heavy load with rear transition module	98	2.04

The –48 VDC has a tolerance of 0 VDC to –75 VDC without damage. The switch operates when –48 VDC is –-40.5 VDC to –72 VDC, inclusive.

Caution – Any input voltage not in the range of 0 VDC to –75 VDC can damage the switch.

The switch might contain materials that require regulation upon disposal. Please dispose of this product in accordance with local rules and regulations. For disposal or recycling information, please contact your local authorities or the Electronic Industries Alliance at `http://www.eiae.org/`.

5.8 Ports and LEDs

FIGURE 5-3 shows the location of the ports and LEDs on the front of the switch, and FIGURE 5-4 shows the location of the ports and LEDs on the rear transition module for the switch.

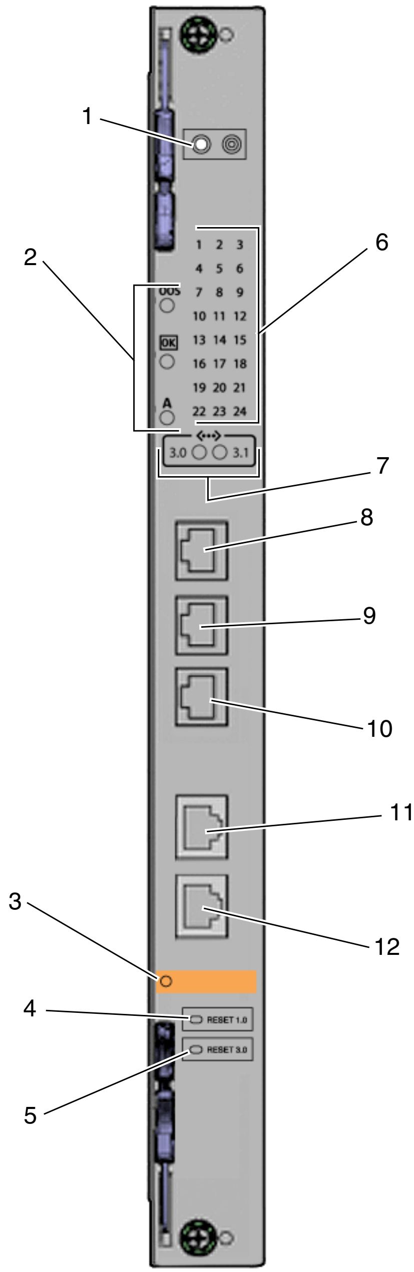

FIGURE 5-3 Ports and LEDs on the Netra CP3140 Switch

TABLE 5-3 Legend for FIGURE 5-3

Callout	Description
1	LED Select push button
2	ATCA Status LEDs
3	Hot-Swap LED
4	Extended Fabric gigabit Ethernet push button reset
5	Base push button reset
6	Port Status LEDs
7	Current Selected Switch LEDs – 3.0 (Base) or 3.1 (Extended)
8	Extended Fabric Ethernet 10/100/1000BASE-T port
9	Base 10/100/1000BASE-T port
10	Base 10/100BASE-TX management port
11	Extended Fabric Ethernet serial management port
12	Base serial management port

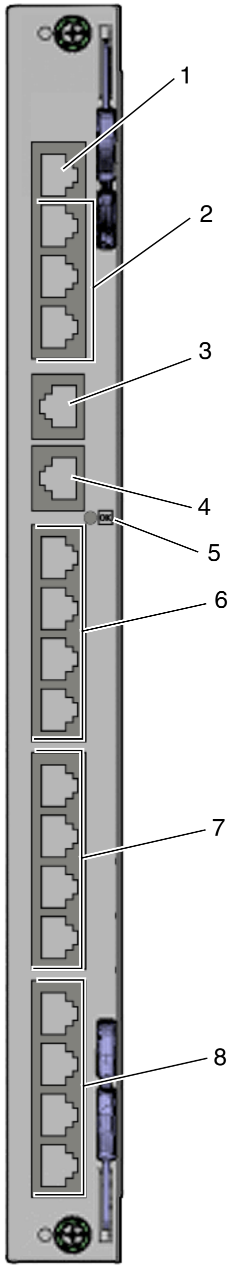

FIGURE 5-4 Ports on the Netra CP3140 Rear Transition Module

TABLE 5-4 Legend for FIGURE 5-4

Callout	Description
1	Base and Extended Fabric Ethernet 10/100BASE-TX management port
2	Base (3.0) 10/100/1000BASE-T ports 18-20
3	Base (3.0) serial management port
4	Extended Fabric (3.1) gigabit Ethernet serial management port
5	OK (Power) LED
6	Base (3.0) 10/100/1000BASE-T ports 21-24
7	Extended Fabric (3.1) gigabit Ethernet 10/100/1000BASE-T ports 17-20
8	Extended Fabric (3.1) gigabit Ethernet 10/100/1000BASE-T ports 21-24

5.8.1 LED Select Push Button and Current Selected Switch LEDs

The LED Select push button switches between 3.0 and 3.1 mode on the Port Status LEDs. The 3.0 mode is the Base Fabric which is a *dual-star* 10/100/1000BASE-T Ethernet configuration. The 3.1 mode is the Extended Fabric which is a *mesh* 10/100/1000BASE-T Ethernet configuration.

The numbering of the Port Status LEDs is shown in TABLE 5-5. Slots 7 and 8 are the switches. LED numbers 16 to 24 corresponds to the ports on the rear transition module. The port numbers are labeled on the rear transition module.

TABLE 5-5 Physical Slot to Status LED Mapping

Physical Slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Status LEDs	13	11	9	7	5	3	1	2	4	6	8	10	12	14

5.8.2 Port Status LEDs

There is a single set of 24 LEDs on the faceplate of the switch. Each LED represents a port on one of the subsystems' switch. They are numbered 1 through 24, and the number lights up when the corresponding port is linked.

TABLE 5-6 Port Status LEDs

Color	Description
Orange	1000 Mbps link
Green	100 Mbps link
Yellow	10 Mbps link
Off	No link

5.8.3 ATCA Status LEDs

There are three LED locations defined by AdvancedTCA to monitor board status.

TABLE 5-7 ATCA Status LEDs

Name	Color	Normal Operation	Description
OOS	Red		Out of service. This LED lights on a critical switch error, such that the board should be removed.
ACTIVE	Green	On	This LED lights when the switch is booted and switching.
MINOR	Amber	Off	Minor Error/User Defined. This LED is software defined.

Note that both the OOS and MINOR LEDs are lit when the board is powered on but not booted. This includes all hot-swap states M1 through M3. It remains on until the FASTPATH software has booted on both the Base and Fabric interface. See "Hot-Swap LED" on page 5-18 for more information on the hot-swap states.

5.8.4 10/100/1000BASE-T Ports

The Fabric gigabit Ethernet 10/100/1000BASE-T and Base 10/100/1000BASE-T Ethernet uplink ports on the switch use standard RJ-45 connectors.

The Base 10/100/1000BASE-T port is port number 17 on the Base network. The Base 10/100/1000BASE-T port is mutually exclusive with the second ShMC port. That is, if the ShMC cross-connection is being used, this port goes to the second ShMC and not the faceplate of the switch.

The Fabric gigabit Ethernet 10/100/1000BASE-T port is port number 16 on the Fabric network.

FIGURE 5-5 shows the pinouts for the 10/100/1000BASE-T port.

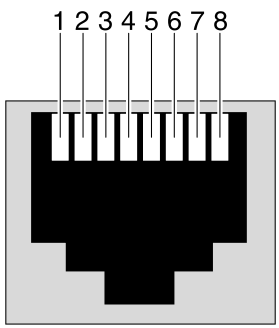

FIGURE 5-5 10/100/1000BASE-T Ports Connector Diagram

TABLE 5-8 gives the pinout information for the 10/100/1000BASE-T port.

TABLE 5-8 10/100/1000BASE-T Port Pinouts

Pin No.	Signal	Pin No.	Signal
1	MDI_0+	5	MDI_2-
2	MDI_0-	6	MDI_1-
3	MDI_1+	7	MDI_3+
4	MDI_2+	8	MDI_3-

5.8.5 Base 10/100BASE-TX Management Port

The Base 10/100BASE-TX management port uses a standard RJ-45 connector. This port can be used to manage the Base and Fabric interfaces. This port and the 10/100 management port on the rear transition module can be used at the same time.

FIGURE 5-6 shows the pinouts for the 10/100BASE-TX management port.

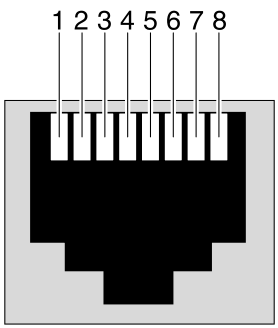

FIGURE 5-6 Base 10/100BASE-TX Management Port Connector Diagram

TABLE 5-9 gives the pinout information for the 10/100BASE-TX management port.

TABLE 5-9 10/100BASE-TX Management Port Pinouts

Pin No.	Signal	Pin No.	Signal
1	Tx+	5	Unused
2	Tx-	6	Rx-
3	Rx+	7	Unused
4	Unused	8	Unused

5.8.6 Extended Fabric Gigabit Ethernet and Base Serial Management Ports

The Extended Fabric gigabit Ethernet serial port and Base serial port on the switch use standard RJ-45 connectors. Note that the front serial port and rear transition module serial port are actually the same port. Only one of the interfaces can be used. Jumpers E7 and E8 can be used to steer the port out the front or out the back, or to allow software to control the direction.

FIGURE 5-7 shows the pinouts for the Fabric gigabit Ethernet serial port and Base serial port.

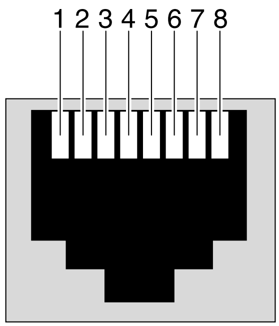

FIGURE 5-7 Fabric Gigabit Ethernet and Base Serial Ports Connector Diagram

TABLE 5-10 gives the pinout information for the Fabric gigabit Ethernet serial port and Base serial port.

TABLE 5-10 Extended Fabric Gigabit Ethernet and Base Serial Port Pinouts

Pin No.	Signal	Pin No.	Signal
1	RTS~	5	GND
2	DTR	6	RXD
3	TXD	7	DSR
4	GND	8	CTS~

TABLE 5-11 gives the minimum crossover cable pinouts needed to create a special cable or adapter to convert the serial ports' RJ-45 connectors on the switch to the more standard DB-9 connectors.

TABLE 5-11 Serial Port Pinouts

	RJ-45	DB-9
RXD to TXD	6	3
TXD to RXD	3	2
GND to GND	5	5

5.8.7 Hot-Swap LED

This blue LED communicates the hot-swap status of the switch. TABLE 5-12 shows the different states the Hot-Swap LED goes through.

TABLE 5-12 Hot-Swap LED States

Order	Visible State	State	Description
1	Solid	M1 FRU Inactive	The IPMI microcontroller is booted, but the payload is not. The bottom latch is not fully closed.
2	Blinking (from solid)	M2 Activation Request	The IPMI microcontroller has requested permission to boot the payload from the shelf management controller.
3	Off	M3-M4 Active	The IPMI microcontroller has received permission to boot the payload, and has done so. This should be the state under normal operation.
4	Blinking (from off)	M5-M6 Deactivation Request	The IPMI microcontroller has requested permission to shut down the payload. Opening the bottom latch activates this state.
Back to 1			

Note – A board should be hot-swapped only when the LED is solid blue.

5.8.8 Reset Push Buttons

There are separate Reset push buttons for the Base and Fabric GbE interfaces. The buttons are recessed and a paper clip or pin should be used to press the buttons. When pushed, just the ports in the button respective subsystem resets. The IPMI subsystem is not reset. It resets only with a board hot-swap.

5.9 Configuration

The switch has been designed for maximum flexibility. Many features can be configured by the user for specific applications. Most configuration options are selected through the switch software covered in detail in the *Netra CT 900 Server Switch Software Reference Manual*. Some options cannot be software controlled and are configured with jumpers. Those options are covered in this section.

5.9.1 Jumper Settings

TABLE 5-13 lists the configuration features that are controlled by jumpers on the switch, and FIGURE 5-8 shows the locations of the jumpers on the switch.

TABLE 5-13 Default Jumper Settings on the Switch

Jumper	Default	Purpose
E1	OFF	Cross-connect Control
E2	OFF	Test Jumper
E3(1-2)	OFF	IPMI Board Reset Disable
E3(3-4)	OFF	IPMI Board Power Disable
E4(1-2)	OFF	IPMI Watchdog Reset Disable
E4(3-4)	OFF	IPMI Disable
E5(1-2)	OFF	Fabric Zero Reset Configuration Word
E5(3-4)	OFF	Base Zero Reset Configuration Word
E6	OFF	IPMI Programming Jumpers
E7	OFF	Base Serial Direction
E8	OFF	Fabric Serial Direction
E9	OFF	FPGA GPIO
E10	OFF	EMI Ground to Logic Ground

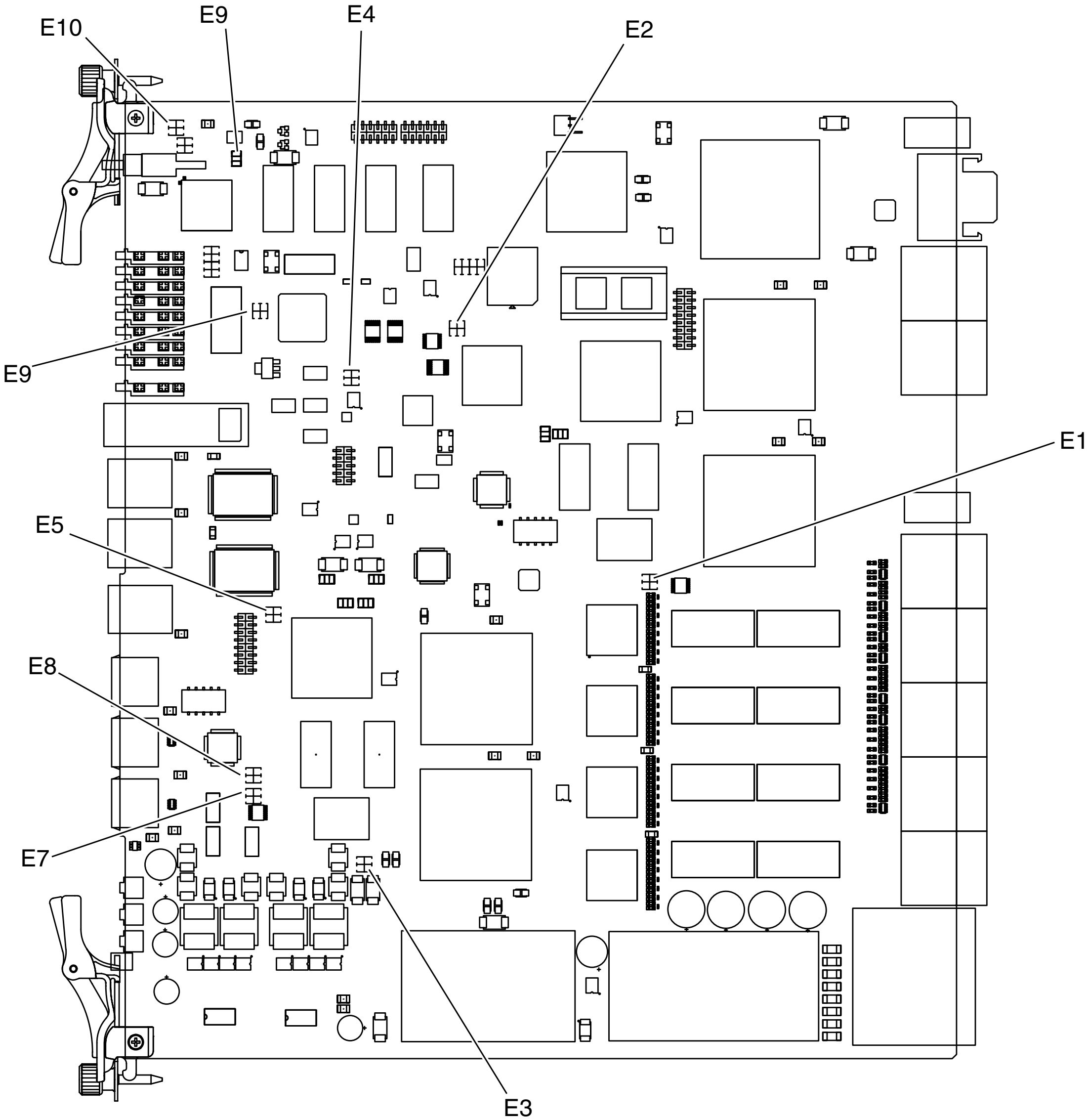

FIGURE 5-8 Jumper Locations on the Netra CP3140 Switch

5.9.1.1 E1 Cross-Connect Control

This jumper is used to control ShMC cross-connect. ShMC cross-connect is the ability to connect to two ShMCs at 10/100 each rather than using a single 10/100/1000 for a single ShMC. When cross-connect is enabled, the front panel Base port (J23) is redirected to the secondary ShMC. Therefore the front panel port no longer works (TABLE 5-14).

TABLE 5-14 E1 Cross-Connect Control Jumper Settings

E1	Function
OFF (Default position)	No cross-connect, front panel port enabled, base channel 1 is 10/100/1000BASE-T
1-2	Force cross-connect enabled, base channel 1 is two 10/100BASETX ports, front panel port disabled
1-3	None
3-4	Software control of cross-connect
2-4	None

5.9.1.2 E2 Test Jumper

This jumper is used in the manufacturer's test. Leave this jumper off (TABLE 5-15).

TABLE 5-15 E2 Test Jumper Settings

E6	Function
1-2	None
1-3	None
3-4	None
2-4	None
OFF (Default position)	None

5.9.1.3 E3(1-2) IPMI Board Reset

This jumper allows the Intelligent Platform Management Interface (IPMI) to send a reset signal that resets the entire board (TABLE 5-16).

TABLE 5-16 E3 (1-2) IPMI Board Reset Jumper Settings

E3(1-2)	Function
ON	IPMI subsystem cannot reset the switch (use this to run without a ShMC).
OFF (Default position)	IPMI subsystem can reset the switch and hold it in reset.

5.9.1.4 E3(3-4) IPMI Board Power Disable

This jumper is used to control whether the switch is forced on when it is powered on or if the IPMI subsystem controls the power on of the switch. Note that forcing power to the board is not enough; the board could still be held in reset. Install E3(1-2) as well or alternatively install E4(3-4) to either bring the board out of reset or hold the IPMI in reset (TABLE 5-17).

TABLE 5-17 E3 (3-4) IPMI Board Power Disable Jumper Settings

E3(3-4)	Function
ON	Force power on (use this to run without a ShMC).
OFF (Default position)	IPMI controls power to the board.

5.9.1.5 E4(1-2) IPMI Watchdog Reset Disable

The IPMI watchdog should be enabled so that the IPMI subsystem can reset itself if the shelf is not ready or if there is a problem. Use this jumper to disable the watchdog (TABLE 5-18).

TABLE 5-18 E4 (1-2) IPMI Watchdog Reset Disable Jumper Settings

E4(1-2)	Function
ON	Disable IPMI watchdog reset
OFF (Default position)	Enable IPMI watchdog reset

5.9.1.6 E4(3-4) IPMI Disable

If on, this jumper holds the IPMI subsystem in reset (TABLE 5-19).

TABLE 5-19 E4 (3-4) IPMI Disable Jumper Settings

E3(3-4)	Function
ON	Disable IPMI subsystem (hold it in reset)
OFF (Default position)	Enable IPMI subsystem

5.9.1.7 E5(1-2) Fabric Zero Reset Configuration Word

This jumper is used to tell the Fabric GbE CPU to use the default Reset Configuration Word, or use the one in the flash memory (TABLE 5-20).

TABLE 5-20 E5 (1-2) Fabric Zero Reset Configuration Word Jumper Settings

E5(1-2)	Function
ON	Use default Reset Configuration Word (all zeros).
OFF (Default position)	Use Reset Configuration Word in flash memory.

5.9.1.8 E5(3-4) Base Zero Reset Configuration Word

This jumper is used to tell the Base CPU to use the default Reset Configuration Word, or use the one in the flash memory (TABLE 5-21).

TABLE 5-21 E5 (3-4) Base Zero Reset Configuration Word Jumper Settings

E5(3-4)	Function
ON	Use default Reset Configuration Word (all zeros).
OFF (Default position)	Use Reset Configuration Word in flash memory.

5.9.1.9 E6 IPMI Programming Jumpers

This jumper is used to adjust the Joint Test Action Group (JTAG) chain of the IPMI subsystem during programming. It has no effect under normal operation (TABLE 5-22).

TABLE 5-22 E6 IPMI Programming Jumper Settings

E6	Function
1-2	None
1-3	None
3-4	None
2-4	None
OFF (Default position)	None

5.9.1.10 E7 Base Serial Direction

The front panel serial port and the rear transition module serial port are mutually exclusive. Only one can be used at any one time. The serial port can be forced to the front card or the rear transition module, or it can be controlled by the software (TABLE 5-23).

TABLE 5-23 E7 Base Serial Direction Jumper Settings

E7	Function
OFF (Default position)	Front serial port active, rear transition module serial port disabled
1-2	Front serial port disabled, rear transition module serial port active
1-3	None
3-4	Software control of Base serial direction
2-4	None

5.9.1.11 E8 Fabric Serial Direction

The front panel serial port and the rear transition module serial port are mutually exclusive. Only one can be used at any one time. The serial port can be forced to the front card or the rear transition module, or it can be controlled by the software (TABLE 5-24).

TABLE 5-24 E8 Fabric Serial Direction Jumper Settings

E8	Function
OFF (Default position)	Front serial port active, rear transition module serial port disabled
1-2	Front serial port disabled, rear transition module serial port active
1-3	None
3-4	Software control of Fabric serial direction
2-4	None

5.9.1.12 E9 FPGA GPIO

This jumper is connected to the field-programmable gate array (FPGA). It is reserved for future use (TABLE 5-25).

TABLE 5-25 E9 FPGA GPIO Jumper Settings

E6	Function
1-2	None
1-3	None
3-4	None
2-4	None
OFF (Default position)	None

5.9.1.13 E10(1-2), E10 (3-4) EMI Ground to Logic Ground

The switch, and the whole AdvancedTCA shelf for that matter, separate the ground of the chassis itself from the digital ground for EMI protection. This jumper connects those two grounds (TABLE 5-26).

TABLE 5-26 E10 (1-2), E10 (3-4) EMI Ground-to-Logic Ground Jumper Settings

E10(1-2), E10 (3-4)	Function
ON	Connect EMI ground to logic ground
OFF (Default position)	Separate EMI ground and logic ground

Glossary

Knowledge of the following terms and acronyms is useful in the administration of the Netra CT 900 server.

A

ATCA (Advanced Telecommunications Computing Architecture) Also referred to as AdvancedTCA. A series of industry standard specifications for the next generation of carrier grade communications equipment. AdvancedTCA incorporates the latest trends in high speed interconnect technologies, next generation processors, and improved reliability, manageability and serviceability, resulting in a new blade (board) and chassis (shelf) form factor optimized for communications at the lowest cost due to standardization.

B

backup shelf management card Any shelf management card capable of assuming support for the shelf manager function.

Base channel A physical connection within the Base interface composed of up to four differential signal pairs. Each Base channel is the endpoint of a slot-to-slot connection within the base interface.

Base switch A switch that supports the Base interface. A Base switch provides 10/100/1000BASE-T packet switching services to all node boards installed in the shelf. In the Netra CT 900 server, the Base switches reside in physical slots

7 and 8 (logical slots 1 and 2) in the shelf and support connections to all node slots and boards. Boards that support the Fabric interface and Base interface are also referred to as "switches."

Base interface An interface that is used to support 10/100 or 1000BASE-T connections between node boards and switches in a shelf. Midplanes are required to support the Base interface by routing four different signal pairs between all node board slots and each switch slot (in the Netra CT 900 server, the Base switch slots are physical slots 7 and 8, logical slots 1 and 2).

D

data transport interface A collection of point-to-point interfaces and bused signals intended to provide interconnect among the payloads on switches and node boards.

Dual Star topology An interconnect fabric topology in which two switch resources provide redundant connections to all end points within the network. A pair of switches provide redundant interconnects between node boards.

E

Electronic Keying or E-Keying A protocol used to describe the compatibility between the Base interface, Fabric interface, update channel interface, and synchronization clocks connections of front boards.

ETSI European Telecommunications Standards Institute.

F

Fabric channel A Fabric channel is comprised of two rows of signal pairs for a total of eight signal pairs per channel. Thus, each connector supports up to five channels available for board to board connectivity. A channel may also be viewed as being comprised of four 2-pair ports.

Fabric interface A Zone 2 interface that provides 15 connections per board or slot, each comprising up to 8 differential signal pairs (channels) supporting connections with up to 15 other slots or boards. Midplanes can support the Fabric interface in a variety of configurations including Full Mesh and Dual Star topologies. Boards that support the Fabric interface can be configured as fabric node boards, fabric switches, or mesh-enabled boards. Board implementations of the Fabric interface are defined by the PICMG 3.x subsidiary specifications.

field-replaceable unit (FRU) From a service point of view, the smallest irreducible elements of a server. Examples of FRUs are disk drives, I/O cards, and power entry modules. Note that a server, with all of its cards and other components, is not a FRU. However, an empty server is a FRU.

frame A physical or logical entity that can contain one or more shelves. Also called a rack, or, if enclosed, a cabinet.

front board A board that conforms to PICMG 3.0 mechanicals (8U x280mm), including a PCB and a panel. A front board connects with the Zone 1 and Zone 2 midplane connectors. It can optionally connect with a Zone 3 midplane connector or directly to a rear transition module connector and is installed into the front position in the shelf.

Full channel A Fabric channel connection that uses all eight differential signal pairs between end-points.

Full Mesh topology A Full Mesh configuration that can be supported within the Fabric interface to provide one dedicated channel of connectivity between each pair of slots within a shelf. Full Mesh-configured midplanes are capable of supporting mesh-enabled boards or switches and node boards installed in a Dual Star arrangement.

H

hot-swap The connection and disconnection of peripherals or other components without interrupting system operation. This facility may have design implications for both hardware and software.

I

I^2C Inter-integrated circuit bus. A multi-master, 2-wire serial bus used as the basis for current IPMBs.

IPMB (Intelligent Platform Management Bus) The lowest level hardware management bus as described in the Intelligent Platform Management Bus Communications Protocol specification.

IPMB-0 hub A hub device that provides multiple radial IPMB-0 links to various FRUs in the system. For example, an IPMB-0 hub is present in an ShMC that has radial IPMB-0 links.

IPMB-0 link With radial topology, the physical IPMB-0 segment between an IPMB-0 segment between an IPMB-0 hub and a single FRU. Each IPMB-0 link on an IPMB-0 hub is usually associated with a separate IPMB-0 sensor. An IPMB-0 link can also connect in a bused topology to multiple FRUs.

IPM controller (IPMC) The portion of a FRU that interfaces to the ATCA IPMB-0 and represents that FRU and any device subsidiary to it.

IPMI (Intelligent Platform Management Interface) A specification and mechanism for providing inventory management, monitoring, logging, and control for elements of a computer system. As defined in Intelligent Platform Management Interface specification.

L

logic ground A shelf-wide electrical net used on boards and midplanes as a reference and return path for logic-level signals that are carried between boards.

M

Mesh Enabled board A board that provides connectivity to all other boards within the midplane. Mesh Enabled boards support the Fabric interface and can also support the Base interface. Mesh Enabled boards can use 2 to 15 Fabric interface channels (typically all 15 channels) to support direct connections to all other boards in the shelf. The number of channels supported dictate the maximum number of boards that can be connected to within a shelf. Mesh Enabled boards that do not use the Base interface can be installed in the lowest available logical slot. Mesh Enabled boards supporting the Base interface can be Base switches, in which case they can support Base channels 1 and 2 and can be installed into logical slots 3 to 16. Boards supporting the Base interface use Base channels 1 and 2 only to support 10/100/1000BASE-T Ethernet.

midplane The functional equivalent of a backplane. The midplane is secured to the back of the server. The CPU card, I/O cards, and storage devices connect to the midplane from the front, and the rear transition modules and power entry modules connect to the midplane from the rear.

N

NEBS (Network Equipment-Building System) A set of requirements for equipment installed in telecommunications control offices in the United States. These requirements cover personnel safety, protection of property, and operational continuity. NEBS testing involves subjecting equipment to various vibration stresses, fire, and other environmental and quality metrics. There are three levels of NEBS compliance, each a superset of the preceding. NEBS level 3, the highest level, certifies that a piece of equipment can be safely deployed in an "extreme environment." A telecommunications central office is considered an extreme environment.

The NEBS standards are maintained by Telcordia Technologies, Inc., formerly Bellcore.

node board A board intended for use in a star topology midplane that has connectivity to a switch within the midplane. Node boards can support either or both the Base interface and Fabric interface. Boards supporting the Fabric interface use Fabric channels 1 and 2. Boards supporting the Base interface use Base channels 1 and 2 only to support 10/100/1000BASE-T Ethernet.

node slot A slot in the midplane that supports only node boards. A node slot is not capable of supporting a switch, thus a node board can never occupy logical slots 1 and 2. Node slots apply only to midplanes designed to support star topologies. Node slots support both the Base interface and Fabric interface. Typically, a node slot supports two or four Fabric channels and Base channels 1 and 2. Each two channel node slots establish connections to logical slots 1 and 2, respectively. Four channel node slots establish connections to logical slots 1, 2, 3, and 4, respectively.

P

PCI (Peripheral Component Interconnect) A standard for connecting peripherals to a computer. It runs at 20 - 33 MHz and carries 32 bits at a time over a 124-pin connector or 64 bits over a 188-pin connector. An address is sent in one cycle followed by one word of data (or several in burst mode).

Technically, PCI is not a bus but a bridge or mezzanine. It includes buffers to decouple the CPU from relatively slow peripherals and allow them to operate asynchronously.

physical address An address that defines the physical slot location of a FRU. A physical address consists of a site type and site number.

PICMG (PCI Industrial Computer Manufacturers Group) A consortium of companies who develop open specifications for telecommunications and industrial computing applications, including the CompactPCI standard.

R

rear-access A configuration option for the Netra CT 900 server in which all of the cables come out from the back of the shelf.

rear transition module A card used only on the rear-access models of the Netra CT 900 server to extend the connectors to the back of the shelf.

Reliability, Availability, Serviceability (RAS) A hardware and software feature that implements or improves the reliability, availability and serviceability of a server.

S

secondary shelf management card Any shelf management card capable of assuming support for the shelf manager function.

shelf A collection of components that consists of the midplane, front boards, cooling devices, rear transition modules, and power entry modules. The shelf was historically known as a chassis. A shelf is also defined as a sub-system of a rack or frame that physically takes up less than 50% of the vertical space in that rack or frame, and thus a second shelf can be installed. The Netra CT 900 Server is considered to be a shelf, because it is 12RU tall and racks and frames are taller than 25RU.

shelf address A variable length, variable format descriptor of up to 20 bytes in length that provides a unique identifier for each shelf within a management domain.

shelf ground A safety ground and earth return that is connected to the frame and is available to all boards.

shelf manager The entity in the system that is responsible for managing the power, cooling, and interconnects (with Electronic Keying) in an AdvancedTCA shelf. The shelf manager also routes messages between the System Manager Interface and

IPMB-0, provides interfaces to system repositories, and responds to event messages. The shelf manager can be partially or wholly deployed on the ShMC or System Manager Hardware.

ShMC (Shelf Management Controller) An IPMC that is also capable of supporting the functions required of the shelf manager.

SNMP Simple Network Management Protocol.

star topology A midplane topology having one or more hub slots providing connectivity among the supported node slots.

switch A board intended for use in a star topology midplane that provides connectivity to a number of node boards within the midplane. Switches can support either or both the Base interface and Fabric interface. Boards utilizing the Fabric interface typically provide switching resources to all 15 available Fabric channels. Switches supporting the Base interface are installed into logical slots 1 and 2 and use all 16 Base channels to provide 10/100/1000BASE-T Ethernet switching resources to up to 14 node boards and the other switch. One Base channel is assigned to support a connection to the shelf management card.

switch slot In a star topology midplane, switch slots must reside in logical slots 1 and 2. Switch slots support both the Base interface and Fabric interface. Switch slots located in logical sots 1 and 2 are capable of supporting both Base interface and Fabric interface switches. Logical slots 1 and 2 are always switch slots regardless of the fabric topology. These slots support up to 16 Base channels and up to 15 Fabric channels each.

system A managed entity that can include one or more of the following components: node and switches, shelves, and frames.

U

U A unit of measure equal to 1.75 in. (44.45 mm).

update channel interface Also referred to as the update channel. A Zone 2 interface that provides connections comprising of ten differential signal pairs between two boards. This direct connection between two boards can be used to synchronize state information. The transport implemented for the update channel on a board is not defined. Update channels can be used only by two like-function boards created by a single vendor. Electronic Keying is used to ensure that update channel end points have matching transport protocols mapped prior to enabling the drivers. Midplanes must support the update channel. Boards can support the update channel.

Z

Zone 1 The linear space along the height dimension of an ATCA slot that is allocated for power, management, and other ancillary functions.

Zone 2 The linear space along the height dimension of an ATCA slot that is allocated to the data transport interface.

Zone 3 The linear space along the height dimension of an ATCA slot that is reserved for user-defined connections and/or interconnections to the rear transition modules for rear access systems.

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