Netra™ E1 PCI System Expander
Just the Facts

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Netra™ E1 PCI System Expander Positioning

Introduction

The Netra E1 PCI System Expander is designed to provide PCI I/O connectivity to PCI-based servers including those in the Netra family; for example, Netra t1 servers, Netra t 1120 and 1125 servers, and Netra t 1400 and 1405 servers. Netra E1 PCI System Expanders have four PCI slots contained in a very compact 1 rack unit form factor. For each Netra E1 PCI System Expander, a PCI host card is installed in one of the host server's PCI slots, effectively adding three PCI slots to a server system. The Netra E1 PCI System Expander's four PCI slots support half, three-quarters, and full length, 64/32-bit, universal PCI cards. The peak PCI bandwidth is 133 MB/sec. Previous to the introduction of the Netra E1 PCI System Expander, customers had to invest in additional servers or third-party expansion products.

The Netra E1 PCI System Expander is designed with carrier-grade features that are a standard part of Netra server and storage products. These features include:

- Choice of AC or DC power
- NEBS Level 3 ruggedization and certification, which means that the unit has been tested to operate in extreme environment conditions and to interoperate without affecting the operations of other rackmount equipment in the same rack
- 18.7-inch depth
- Front to back cooling
- Power and fault status LEDs in front and back
- Easy serviceability

Product Family Placement

The Netra E1 PCI System Expander is part of the Netra family, which includes a broad range of servers and storage systems.

Key Messages

The Netra E1 PCI System Expander is a PCI expansion product that operates with PCI-based servers such as those in the Netra server family. Because of its carrier-grade reliability as indicated by various design features and NEBS Level 3 certification, Netra E1 PCI System Expanders meet many of the requirements of service providers, which includes telecommunications carriers.

- The Netra E1 PCI System Expander is a compact, carrier-grade PCI system expander designed to enhance server connectivity cost-efficiently for demanding applications.
- The Netra E1 PCI System Expander is easy to install and maintain and supports a wide range of PCI cards from half to full length with 33 MHz/32 bit performance.

Availability

The Netra E1 PCI System Expander launch date is 17 January 2001. General availability is targeted for early March 2001. Revenue release is late February 2001.

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Target Users

Netra E1 PCI System Expanders are for customers who require greater PCI card functionality; for example, service providers and telecommunications carriers with applications such as voice over IP, clustering, and softswitches. The Netra E1 PCI System Expander provides a cost efficient way of providing additional slots needed.

Netra E1 PCI System Expanders are also suitable for users in the commercial market.

Target Markets

The target markets for the Netra E1 PCI System Expander are service providers, telecommunications carriers, and enterprises.

For service providers and enterprises, highlight the following key features:

- Provides additional PCI slots in a 1 U form factor
- Fits in rackmount environments
- Supports half, three-quarters, and full length PCI cards

For telecommunications carriers, highlight the following key features:

- Provides additional PCI slots in a 1 U form factor
- Fits in rackmount environments
- Supports half, three-quarters, and full length PCI cards
- AC and DC versions available
- Carrier-grade features (NEBS Level 3 certification)

Selling Highlights

Market Value Proposition

The Netra E1 PCI System Expander provides a cost efficient method for increasing server functionality and capabilities. Each Netra E1 PCI System Expander adds three additional PCI slots to PCI-based server systems. Netra E1 PCI System Expanders support half length to full length cards, 5 V and universal. Because the Netra E1 PCI System Expander has a 1 U form factor, customers do not have to sacrifice precious vertical space as they may have to with third-party products. Additional market value propositions include:

- Increased server connectivity: Users gain a net of four PCI slots when deploying a Netra E1 PCI System Expander
- Compact 1 U form factor, with four PCI slots
- Carrier-grade, NEBS Level 3 ruggedization and certification, choice of AC or DC power, rackmount in a 19-inch, 23-inch, 24-inch, 600 mm, two-post relay, and Sun 72-inch Sun StorEdge™ rack, 19-inch depth, fits into service provider and telecom infrastructure
- Low total cost of ownership
- Modular stacks: Users can mix and match CPU/memory (Netra T1 server, 112x servers, 140x servers), storage (Netra st D130, A1000/D1000), and connectivity (Netra E1 PCI System Expanders) to help achieve the right combination of resources for their particular needs

Applications

Netra E1 PCI System Expanders can be used to run most applications requiring the use of many PCI cards. Example applications and the typical PCI cards used include the following:

- Voice over IP
  - Third-party T1/E1, voice, DSP cards
  - Sun Ethernet and storage host adapters
- Clustering
  - Sun Ethernet
  - Sun storage host adapters
- Softswitch, next generation class 4/5 switches
  - Sun Ethernet, storage host adapters
  - Sun ATM, HSI interfaces
  - Third-party cards

Compatibility

Netra E1 PCI System Expanders are compatible with the following types of servers:

- Any Netra-branded server in the "t" product line, AC and DC versions; for example, Netra t1 servers, Netra t 1120 servers, Netra t 1400 servers
- Sun Enterprise™ servers

For a list of other services supported, go to Sun's external Web site at www.sun.com/netra or Sun's internal Web site at sp.eng/products.

Netra E1 PCI System Expanders are compatible with many Sun and third-party 5 V or universal cards. For a list of cards supported, go to Sun's external Web site at www.sun.com/netra or Sun's internal Web site at sp.eng/products.

Technology Overview

The Netra E1 System Expander adds PCI slots to a server by extending the PCI bus by means of a patented PCI bridging technology. A PCI host adapter with a PCI bridge is installed on a server PCI slot. A cable connects the host adapter to the Netra E1 PCI System Expander unit, where there are four PCI slots. Because this PCI expansion technology is patented by Magma, a division of Mobility Electronics, there are only a few vendors in the market, including Magma, SBS, and Sun Microsystems, Inc.

Host Interface Card

The host interface card shipped with the system expander is installed in the host system and cabled to the PCI connector located at the back of the system expander. The host interface card is a bridge which allows PCI cards installed in the system expander to operate as if they were installed in the host system. The card requires no additional driver software.

Host interface card
installed in PCI slot
of a host system

Host system

Netra E1
PCI System Expander
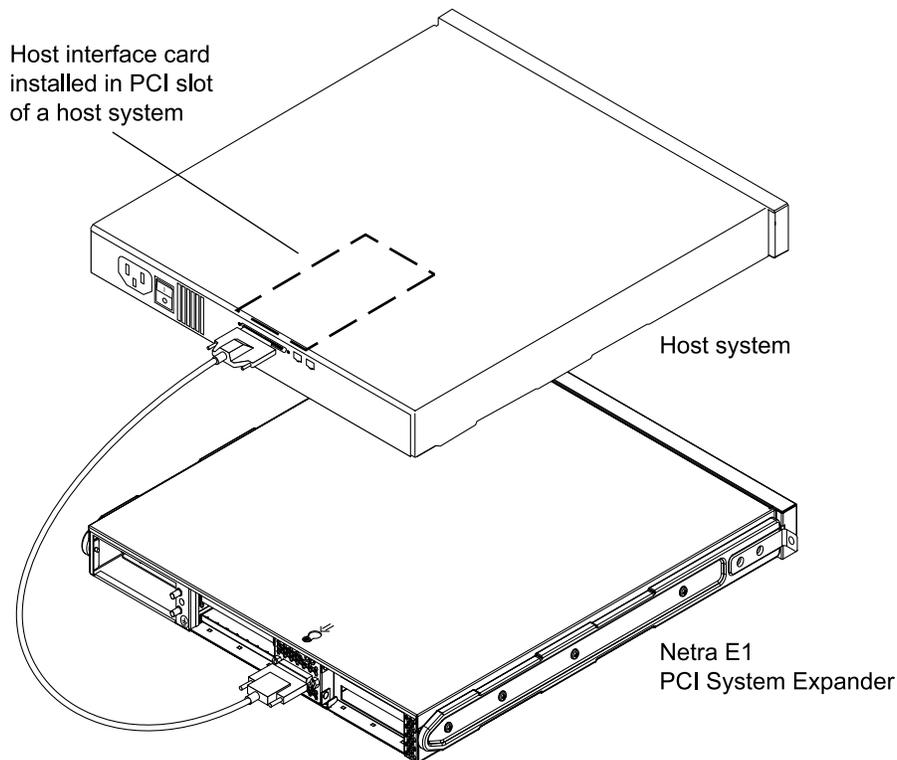
Figure 1. Netra E1 PCI System Expander Cabled to the Host Interface Card

Power and Fault LEDs in Front and Back

The system power and fault LEDs in the figure below are on both the front and back panels of the system expander enclosure. The table below describes the LED system states.
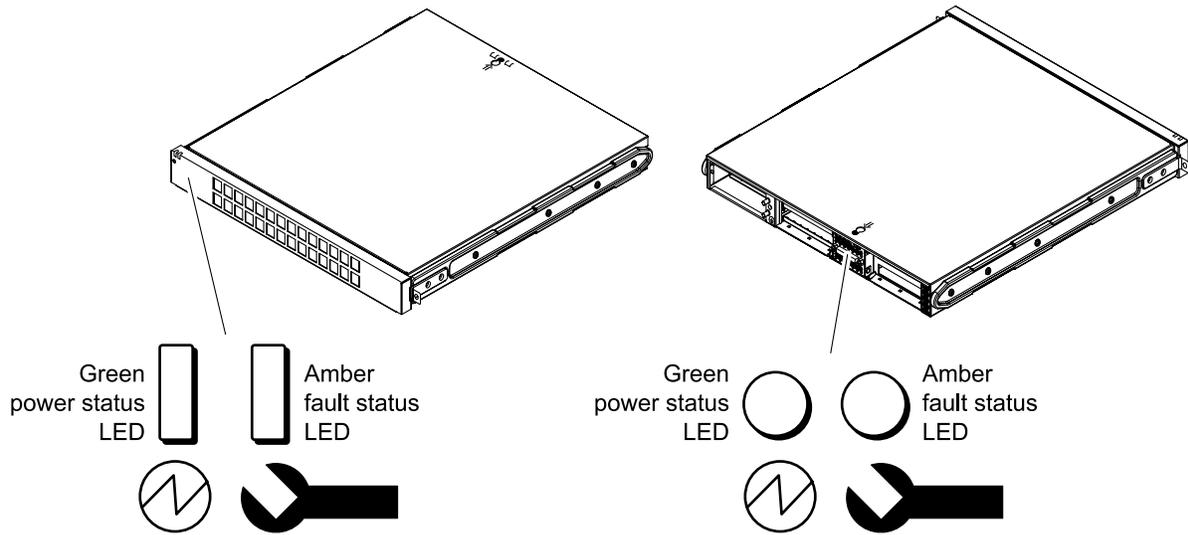
Figure 2. System Icons, Power, and Fault LEDs

LED Status Description

LED Type	Off	On	Flashing
Green power status LED	Output power is off	Output power is on	Input power is connected, but output power is in a standby state[1], or the PSU is nonoperational.
Amber fault status LED	OK, no system faults	One of four fans has failed or power supply fan has failed or one of two DC inputs is not connected, or has failed	Two or more failures have occurred, and/or output power is out of specification. If this occurs, the system expander will electrically isolate itself from the host and the amber LED will continue to flash.

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[1] Standby state means the PSU input power feeds are connected, but only 5V standby power is on. All other outputs, those which power the electronic components, are off.

System Architecture

Overview

Each Netra E1 PCI System Expander consists of the following components which are accessible by removing one screw from the top cover:

- A 1U high PCI expansion box available with an AC or DC power supply. The box provides four PCI slots, 33 MHz, 64-bit internal bus. It supports half, three-quarters, and full length PCI cards, 5 V or universal.
- A one-half length, 33 MHz, 32-bit, universal host interface card that resides in the server.
- A two foot cable that connects the Netra E1 PCI System Expander to the server.
- 19-inch and two-post relay rack rackmount kit.

Documentation is also provided.
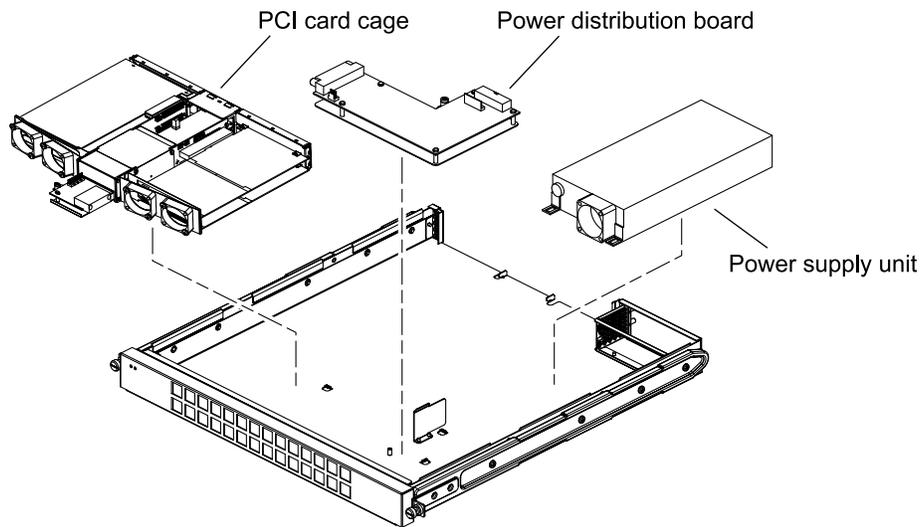
Figure 3. Netra E1 PCI System Expander Internal Components. The components are accessible by removing one screw from the top cover.

PCI Card Cage

The figure below illustrates the PCI card cage after PCI cards have been installed.
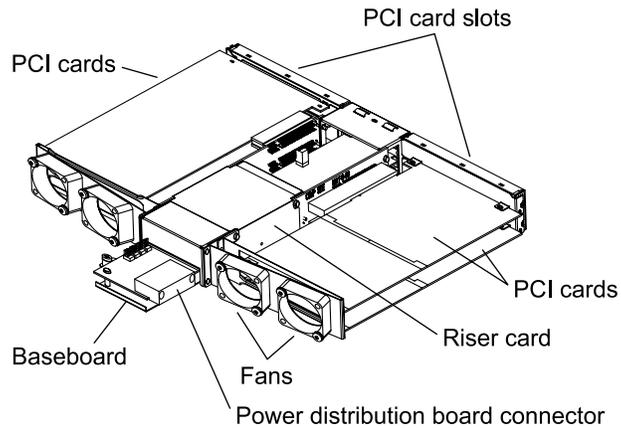
Figure 4. Netra E1 PCI System Expander PCI Card Cage

Riser Cards

The riser cards are perpendicular to the system expander's baseboard, which is located at the bottom of the PCI card cage assembly. The PCI cards attach to the riser card connectors.

Fans

The system expander is cooled by four fans mounted on the PCI card cage. The fans provide airflow over the printed circuit boards within the chassis. Baffling is provided to maximize airflow over the boards.

The power supply has a built-in fan, which provides its own cooling.

Power Distribution Board

The power distribution board distributes power from the AC or DC power supply to all electrical components within the system expander. It is connected to the PCI card cage assembly by a single connector.

Removing the PCI card cage to install PCI cards can be done without disconnecting any power connections, all of which attach to the power distribution board.

Power Supply Unit

The Netra E1 PCI System Expander is powered by either an AC or DC power supply unit.

AC or DC Power Connections

The system expander is connected to AC or DC power from the back of the chassis.
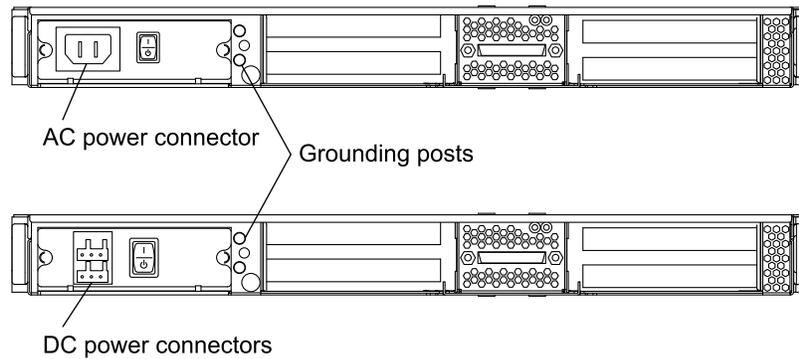
Figure 5. Power Connectors and Grounding Posts on Netra E1 PCI System Expander

Features and Benefits

Features	Benefits
• Four PCI slots	• Increase return on investment
• Full PCI performance at 33 MHz/32 bit	• Maintain same performance
• Support for half, three-quarters, and full-length 5 V or universal PCI cards	• Compatible with most PCI cards; Sun supports some PCI cards
• Rear cables and cards mounted 2 on left, 2 on right	• Quick deployment
• Up to two Netra E1 PCI System Expanders supported per server	• Increases I/O slots
• LEDs located on front and back	• Maximize uptime because of quick problem resolution
• NEBS Level 3 certification	• Fits into CO, POP, and other telecommunications carrier environments
• 1U low-profile design	• Reduces co-location costs and/or facilities expenses
• 20-inch depth	• Investment protection because Netra E1 PCI System Expander will mount in existing racks
• Many options available for rackmounting	• Investment protection
• 5-fan cooling	• Increases reliability
• AC or DC power supply	• Use the Netra E1 PCI System Expander in any type of power environment

Reliability, Availability, and Serviceability (RAS)

Reliability

- Five fans—four fans for PCI card cooling and one fan built into the power supply—cool the unit.
- NEBS Level 3 certification helps ensure greater reliability.

Availability

- Carrier-grade features help ensure continued availability even under less than optimal environmental conditions.
- Automatic power on when the host system is powered on.

The server must run through its start up sequence to recognize any newly installed cards.

The Netra E1 PCI System Expander must not be powered down while the server is running, so as not to cause the Solaris™ Operating Environment to panic. Note that the Netra E1 PCI System Expander is designed with a recessed power switch so as to minimize accidentally powering off the power supply.

Serviceability

- LEDs located on the front and rear of the unit help enable problems to be spotted and resolved quickly.
- The Netra E1 PCI System Expander is designed for easy serviceability with its innovative card cage. There is only one screw to remove the top cover and two screws to remove the PCI card cage. There is no need to disturb the power connections. PCI cards can be added or changed in less than ten minutes.

Environmental Specifications

Type		Minimum to Maximum Range
Certification	Telcordia NEBS GR-63-CORE Level 3 (Earthquake Risk Zone 4)	
Temperature	Operating	41°F to 104°F, (5°C to 40°C)
	Nonoperating	-40°F to 158°F, (-40°C to 70°C)
Relative humidity (noncondensing)	Operating	5% to 85% 26°C maximum (wet bulb)
Relative humidity (noncondensing)	Nonoperating	90%, 100°F (38°C) max wet bulb
Sound power/pressure: Declared noise emissions in accordance with ISO 9296	Sound power level, LWAd (1B=10dB)	6.4 B (operating and idling)
	Sound pressure level, LpAm (bystander positions)	51 dB (operating and idling)

Physical Requirements

Measure	English	Metric
Width	17.2 in.	436.7 mm
Depth	18.7 in.	474.9 mm
Height	1.728 in., to fit into 1 rack unit (1U)	43.9 mm
Weight, without PCI cards	15.04 lbs	6.83 kg
Weight with four PCI long cards	17.44 lbs	7.91 kg

Electrical Specifications

AC Input and DC Output Power Requirements

Electrical Element	Requirement
Voltage (nominal)	100 VAC to 240 VAC
Frequency	47 to 63 Hz
Local power	+5V +/- 5% +3.3V +/- 5% +12V +/- 5% +5V standby +/- 5%
Maximum input surge current	20 amps peak for cold start (power dropouts > 200 ms.); 100 amps peak for warm start (power dropouts < 200 ms.)

DC Input and AC Output Power Requirements

Electrical Element	Requirement
Voltage (nominal)	-48 VDC to -60 VDC
Local power	+5V +/- 5% +3.3V +/- 5% +12V +/- 5% +5V standby +/- 5%
Maximum input surge current	20 amps peak for cold start (power dropouts > 200 ms.);100 amps peak for warm start (power dropouts < 200 ms.)

Site Power Source Requirements

AC Site Power Source Requirements

Electrical Element	Requirement
Voltage (nominal)	100 VAC to 240 VAC
Frequency	47 to 63 Hz
AC power supply range	90 VAC to 264 VAC
Circuit breaker rating	5 amps
Maximum operating current for whole system	2.5 amps
Maximum input surge current	20 amps peak for cold start (power dropouts > 200 ms.); 100 amps peak for warm start (power dropouts < 200 ms.)

DC Site Power Source Requirements

Electrical Element	Requirement
Voltage (nominal)	–48 VDC to -60 VDC
DC Power supply range	–40 VDC to -75 VDC
Circuit breaker rating	10 amps
Maximum operating current for whole system	5.5 amps
Maximum input surge current	20 amps peak for cold start (power dropouts > 200 ms);.100 amps peak for warm start (power dropouts < 200 ms.)

Declaration of Conformity

Compliance Model Number: BJK1A

Product Name: Netra E1 PCI System Expander

EMC

European Union

This equipment complies with the following requirements of the EMC Directive 89/336/EEC:

EN300-386-2:1997: Telecom Center

EN55022/CISPR22	Class A
ETS300-386-1	Subclause 7.2.3
EN61000-4-2	Criteria B:4 kV (Direct), 4 kV (Air)
	Criteria R:8 kV (Direct), 15 kV(Air)
EN61000-4-3	3 V/m
EN61000-4-4	1 kV AC Power Lines, 0.5 kV Signal & DC Power Lines
EN61000-4-5	Criteria B:0.5 kV AC Line-Line & Indoor Signal Lines
	1 kV AC Line-Gnd & Outdoor Signal Lines
	Criteria R:1 kV AC Line-Line, 2 kV AC Line-Gnd,
	4kV Outdoor Signal Lines as applicable
EN61000-4-6	3V
EN61000-4-8	N/A
EN61000-4-11	Pass
EN61000-3-2:1995 w/AM. 1,2	Pass
EN61000-3-3:1995	Pass

Safety

This equipment complies with the following requirements of Low Voltage Directive 73/23/EEC:

EC Type Examination Certificates:

EN60950:1992, 2nd Edition, Am. 1, 2, 3, 4, 11	TÜV Rheinland Certificate No. S 2072599
IEC 950:1991, 2nd Edition, Am. 1, 2, 3, 4	CB Scheme Certificate No. US/4637/UL
Evaluated to all CB Countries	

Supplementary Information:

This product was tested and complies with all the requirements for the CE Mark.

Compliance Model Number: BJK1D

Product Name: Netra E1 PCI System Expander

EMC

European Union

This equipment complies with the following requirements of the EMC Directive 89/336/EEC:

EN300-386-2:1997: Telecom Center

EN55022/CISPR22	Class A
ETS300-386-1	Subclause 7.2.3
EN61000-4-2	Criteria B:4 kV (Direct), 4 kV (Air)
	Criteria R:8 kV (Direct), 15 kV(Air)
EN61000-4-3	3 V/m
EN61000-4-4	1 kV AC Power Lines, 0.5 kV Signal & DC Power Lines
EN61000-4-5	Criteria B:0.5 kV AC Line-Line & Indoor Signal Lines
	1 kV AC Line-Gnd & Outdoor Signal Lines
	Criteria R:1 kV AC Line-Line, 2 kV AC Line-Gnd,
	4kV Outdoor Signal Lines as applicable
EN61000-4-6	3V
EN61000-4-8	N/A

Safety

This equipment complies with the following requirements of Low Voltage Directive 73/23/EEC:

EC Type Examination Certificates:

EN60950:1992, 2nd Edition, Am. 1, 2, 3, 4, 11	TÜV Rheinland Certificate No. S 2072599
IEC 950:1991, 2nd Edition, Am. 1, 2, 3, 4	CB Scheme Certificate No. US/4634/UL
Evaluated to all CB Countries	

Supplementary Information:

This product was tested and complies with all the requirements for the CE Mark.

System Requirements

Netra E1 PCI System Expanders support half, three-quarters, and full length 5 V or universal PCI cards. While any cards meeting the PCI specification may reasonably be expected to function in the Netra E1 PCI System Expander, the following Sun-manufactured cards have undergone verification testing to date:

- SunSAI/P Adapter, X2156A
- Sun Quad FastEthernet™ PCI Adapter, X1034A
- SunATM™/P 155 MMF Adapter, X1157A and SunATM/P 155 UTP Adapter, X1158A
- SunHSI/P™ Adapter, X1155A

Refer to www.sun.com/netra or sp.eng/products for a current list of PCI cards which Sun has verified for use with the Netra E1 PCI System Expander.

System Configuration

PCI Card Power Ratings

It is important to consider the total power ratings of combined PCI cards installed in the Netra E1 PCI System Expander, to avoid exceeding power supply restrictions.

The total PCI card power ratings for cards installed in the system expander should not exceed 100 watts. Sun-manufactured PCI cards all have 5-volt power ratings of less than 15 watts, so any four Sun-manufactured cards will function in the Netra E1 PCI System Expander without exceeding the power supply restrictions.

To Calculate PCI Card Power Ratings

1. **Refer to your third-party PCI card documentation to determine the power rating for PCI cards sold by other vendors.**

   Third-party cards of same voltages should not exceed a total of 100 watts. If the PCI cards are of differing voltages, the power restrictions differ.

2. **Consult the tables below which give examples of power rating computations for third-party PCI cards to be certain you do not exceed the system expander's power supply restrictions.**

Power Computation Example for Four PCI Cards

		Power (Watts)			
Row #	PCI Card Voltage	5 V	3.3 V	12 V	–12 V
1	PCI card installed in slot 1	10 W	1.5 W	0.1 W	
2	PCI card installed in slot 2	20 W			
3	PCI card installed in slot 3	8 W	3.5 W	0.2 W	0.1 W
4	PCI card installed in slot 4	3 W		0.1 W	

		Power (Watts)			
5	Total PCI card power (add rows 1–4)	51 W	5 W	0.4 W	0.1 W
6	Maximum power allowed for different-voltage PCI cards	85 W	48 W	24 W	4.8 W
7	Add totals for power for 5 V and 3.3 V cards from row 5	56 W			
8	Maximum power allowed for cards which use 5 V and 3.3 V	85 W			
9	Total system power (add totals for 5 V/3.3 V/12 V/–12 V from row 5)	56.5 W			
10	Maximum total system power allowed	100 W			

This example shows that the total power for each column is within the maximum voltage allowed in row 6.

Row 7 shows the total power of the 5v and 3.3v PCI cards is 56 W, which is less than the maximum allowed for this combination of voltages, or 85 W.

The total system power shown in row 9 is 56.5 W, which is well within the maximum total system power allowed, or 100 W.

3. **When PCI cards are stated in amperes, a conversion to watts is necessary. See row 6 in the table below for instructions.**

Total Power Computation Example of Four PCI Cards

		Current (Amperes)			
Row #	Voltage	5 V	3.3 V	12 V	–12 V
1	PCI card installed in slot 1	2 A		1A	0.1 A
2	PCI card installed in slot 2		5 A		
3	PCI card installed in slot 3	3 A	1.5 A	0.2 A	0.2 A
4	PCI card installed in slot 4	3 A	2 A	0.1 A	
5	Total current	8 A	8.5 A	1.3 A	0.3
6	Convert current to power (multiply total current by its voltage)	40 W	29.05 W	15.6 W	3.6 W
7	Maximum watts allowed	85 W	48 W	24 W	4.8 W
8	Add totals for power for 5 V and 3.3 V from row 6	68.05 W			
9	Maximum allowed in watts	85 W			
10	Total system power in watts (add totals for 5 V/3.3 V/12V/–12 V from row 6)	96.8 W			
11	Maximum power allowed in watts	100 W			

This example shows that the total power for each column from row 6 is within the maximum allowed, shown in row 7.

Row 8 shows that the total power of the 5v and 3.3v PCI cards is 68.05 watts, which is within the maximum allowed of 85 watts, shown in row 9.

The total system power of 96.85 watts is within the maximum allowed limit of 100 watts shown in row 11.

Caution: Your system expander can be damaged if you install same-voltage PCI cards that exceed the 100 watt total power rating, or if you install PCI cards which exceed the allowable power ratings listed in the tables above.

4. **Fill one of the worksheets below to compute power requirements for third-party PCI cards you plan to install in the system expander.**

Total Power Computation Worksheet for PCI Cards

		Power (Watts)			
Row #	PCI Card Voltage	5 V	3.3 V	12 V	−12 V
1	PCI card installed in slot 1				
2	PCI card installed in slot 2				
3	PCI card installed in slot 3				
4	PCI card installed in slot 4				
5	Total PCI card power (add rows 1–4)				
6	Maximum power allowed for different-voltage PCI cards	85 W	48 W	24 W	4.8 W
7	Add totals for power for 5 V and 3.3 V cards from row 5				
8	Maximum power allowed for cards which use 5 V and 3.3 V	85 W			
9	Total system power (add totals for 5 V/3.3 V/12 V/–12 V from row 5)				
10	Maximum total system power allowed	100 W			

Total Power Computation Worksheet for PCI Cards

		Current (Amperes)			
Row #	Voltage	5 V	3.3 V	12 V	−12 V
1	PCI card installed in slot 1				
2	PCI card installed in slot 2				
3	PCI card installed in slot 3				
4	PCI card installed in slot 4				
5	Total current				
6	Convert current to power (multiply total current by its voltage)				

		Current (Amperes)			
7	Maximum watts allowed	85 W	48 W	24 W	4.8 W
8	Add totals for power for 5 V and 3.3 V from row 6				
9	Maximum allowed in watts	85 W			
10	Total system power in watts (add totals for 5 V/3.3 V/12V/–12 V from row 6)				
11	Maximum power allowed in watts	100 W			

To Calculate Thermal Dissipation

If you intend to install many system expanders in one location, you may need to calculate the heat your cooling system must dissipate. To do this, you must convert the system expander's power ratings to BTU/hr. Refer to steps 1 through 4.

1. Add power ratings for your system expander components, as shown in the table below.

Components	Power Ratings
Baseboard	8.25w
Power distribution board	4w
Cooling fans	10.75w
Maximum for PCI slots (25w x 4)	100w
Total power rating	123w

2. Divide total power ratings by the power supply efficiency rating.

   123w /.65% = 189.23w

3. Multiply total watts by 3.413 to convert to BTU/hr.

   189.23w x 3.413 = 645.84 BTU/hr.

4. Multiply by the number of system expanders installed in your facility.

Netra E1 PCI System Expander Installation Overview

Figure 6 shows how the Netra E1 PCI System Expander and the host server connect. The steps below show the recommended order of installation. Consult the *Netra E1 PCI System Expander Installation and Maintenance Manual* (806-6325-10) included with your system for important cautions and step-by-step instructions.

Caution: These instructions assume you have not yet connected the system expander to a power source. You have only unpacked the shipping carton and removed the top cover.

Preparing the System Expander

1. Use a #1 Phillips screwdriver to loosen the captive screw holding the power distribution board in place.

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2. Slide the power distribution board toward the left side of the chassis, detaching it from the PCI card cage connector.

3. Loosen the captive screw holding the PCI card cage.

4. Gripping the PCI card cage on the purple service label, push toward the chassis front to dislodge the card cage.

5. Slide the card cage toward the back of the chassis and lift out at a 45º angle.

6. Flip the PCI card cage so that the PCI slot side is near the PCI card cage stabilizer in the right front corner of the chassis.

7. Insert the PCI slot side of the card cage under the lip of the PCI card cage stabilizer to provide stability while installing PCI cards.

Connecting to the Host System

8. Refer to illustrations A–D on the purple service label on the PCI card cage for instructions on installing PCI cards.

9. Install the host interface card into the PCI slot of the host system.

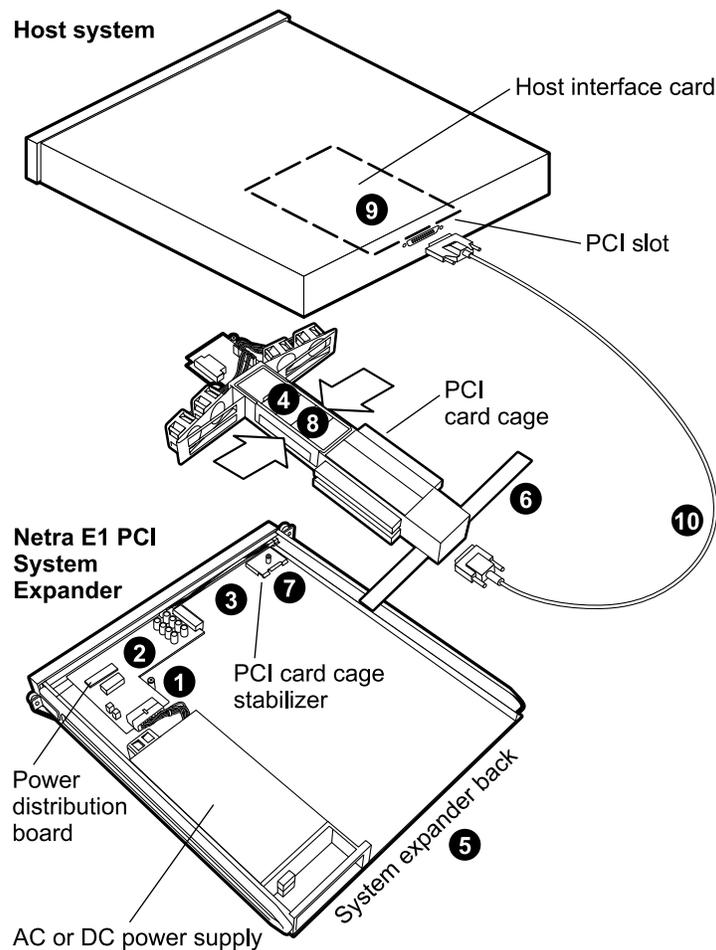10. Connect the host server to the system expander with the included cable.

Figure 6. Netra E1 PCI System Expander Installation

Configuring and Locating PCI Cards

You can use the OpenBoot PROM show-devs command to verify that your host system recognizes each of the PCI cards installed in your Netra E1 PCI System Expander. The system expander itself is transparent to the host system.

Locating PCI Cards Installed in the System Expander

Use the show-devs command at the host system OpenBoot PROM prompt to locate specific PCI cards installed in the system expander.

More detailed procedures are outlined in the host system service manual or user's guide.

1. Bring up the OpenBoot (ok) prompt on the host system.

    – **If the host system is not powered on,** power on and boot the system. After the system has booted, get to the OK system prompt as described in your host system documentation.

    – **If the host system is already powered on,** notify any users, and then get to the OK system prompt as described in your host system documentation.

2. At the ok prompt, use the show-devs command to list the system devices.

    The output displays the logical device numbers of PCI cards that are installed in the system expander, using the following form:

    /host-system/pci-slot[/bridge[/bridge]/card-in-slot]

Example:

```
ok show-devs
. . .
/pci@1f,4000/pci@2/pci@8
/pci@1f,4000/pci@2/pci@8/SUNW,hme@f,1
/pci@1f,4000/pci@2/pci@8/pci108e,1000@f
/pci@1f,4000/pci@2/pci@8/pci@e
/pci@1f,4000/pci@2/pci@8/pci@d
/pci@1f,4000/pci@2/pci@8/pci@c
/pci@1f,4000/pci@2/pci@8/pci@e/SUNW,isptwo@4
/pci@1f,4000/pci@2/pci@8/pci@e/SUNW,hme@0,1
/pci@1f,4000/pci@2/pci@8/pci@e/pci108e,1000@0
/pci@1f,4000/pci@2/pci@8/pci@e/SUNW,isptwo@4/st
/pci@1f,4000/pci@2/pci@8/pci@e/SUNW,isptwo@4/sd
/pci@1f,4000/pci@2/pci@8/pci@d/SUNW,isptwo@4
/pci@1f,4000/pci@2/pci@8/pci@d/SUNW,hme@0,1
/pci@1f,4000/pci@2/pci@8/pci@d/pci108e,1000@0
/pci@1f,4000/pci@2/pci@8/pci@d/SUNW,isptwo@4/st
/pci@1f,4000/pci@2/pci@8/pci@d/SUNW,isptwo@4/sd
/pci@1f,4000/pci@2/pci@8/pci@c/SUNW,qfe@3,1
/pci@1f,4000/pci@2/pci@8/pci@c/pci108e,1000@3
/pci@1f,4000/pci@2/pci@8/pci@c/SUNW,qfe@2,1
/pci@1f,4000/pci@2/pci@8/pci@c/pci108e,1000@2
/pci@1f,4000/pci@2/pci@8/pci@c/SUNW,qfe@1,1
/pci@1f,4000/pci@2/pci@8/pci@c/pci108e,1000@1
/pci@1f,4000/pci@2/pci@8/pci@c/SUNW,qfe@0,1
```

`/pci@1f,4000/pci@2/pci@8/pci@c/pci108e,1000@0`

Logical and Physical Device Numbers

When reading the show-devs output for system expander slots, note that the *logical* device numbers displayed are not the same as the *physical* slot numbers marked on the system expander. The show-devs command displays the logical slot numbers on the bridge chip that controls a given slot. Bridge chips are necessary because PCI buses can operate only within a limited distance. Software in the bridge chips extends this distance.

The logical slot numbers vary according to the host system being used, as well as the quantity and position of the PCI cards installed.

The table below shows how the logical and physical device numbers correspond.

Correspondence Between Logical and Physical Device Numbers

Physical Slot Numbers	Logical Device Numbers
Slot 1	. . . pci@8/pci@f
Slot 2	. . . /pci@8/pci@e
Slot 3	. . . /pci@8/pci@d
Slot 4	. . . /pci@8/pci@c

The figure below illustrates an example of the logical device numbers used when one Netra E1 PCI System Expander is connected. The host system slot names will vary according to the host system you are using.
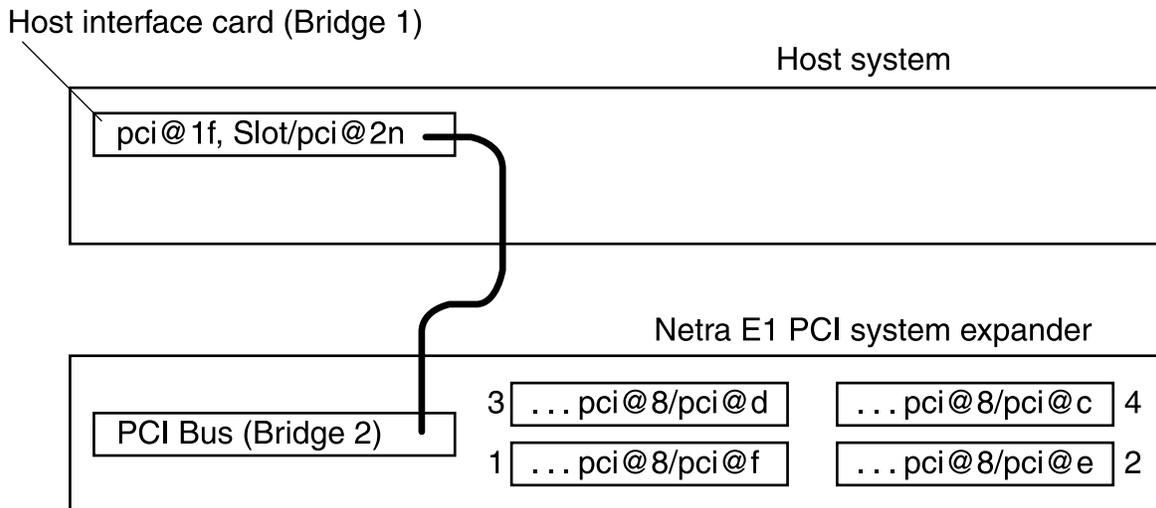
Figure 7. Logical and Physical Device Numbers With One System Expander

Connectivity

A Netra E1 PCI System Expander is attached to a server via a thick cable. A host interface card resides in the server on one of the PCI slots. One Netra E1 PCI System Expander can be connected to a Netra t1 server. Up to two Netra E1 PCI System Expanders can be connected to a four-slot Netra t 1120/1125 or a Netra t 1400/1405 server.

Figure 8. Netra t1 or Netra T1 Server Connected to a Netra E1 PCI System Expander

Figure 9. Netra 1120 Server or Netra 1125 Server Connected to Two Netra E1 PCI System Expanders

Figure 10. Netra 1400 Server or Netra 1405 Server Connected to Two Netra E1 PCI System Expanders

For a list of other services supported, go to Sun's external Web site at www.sun.com/netra or Sun's internal Web site at sp.eng/products.
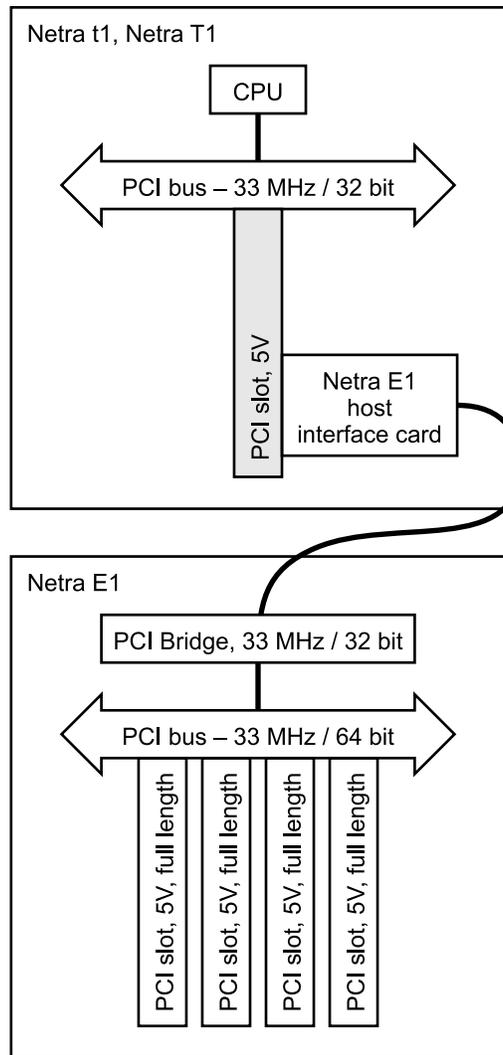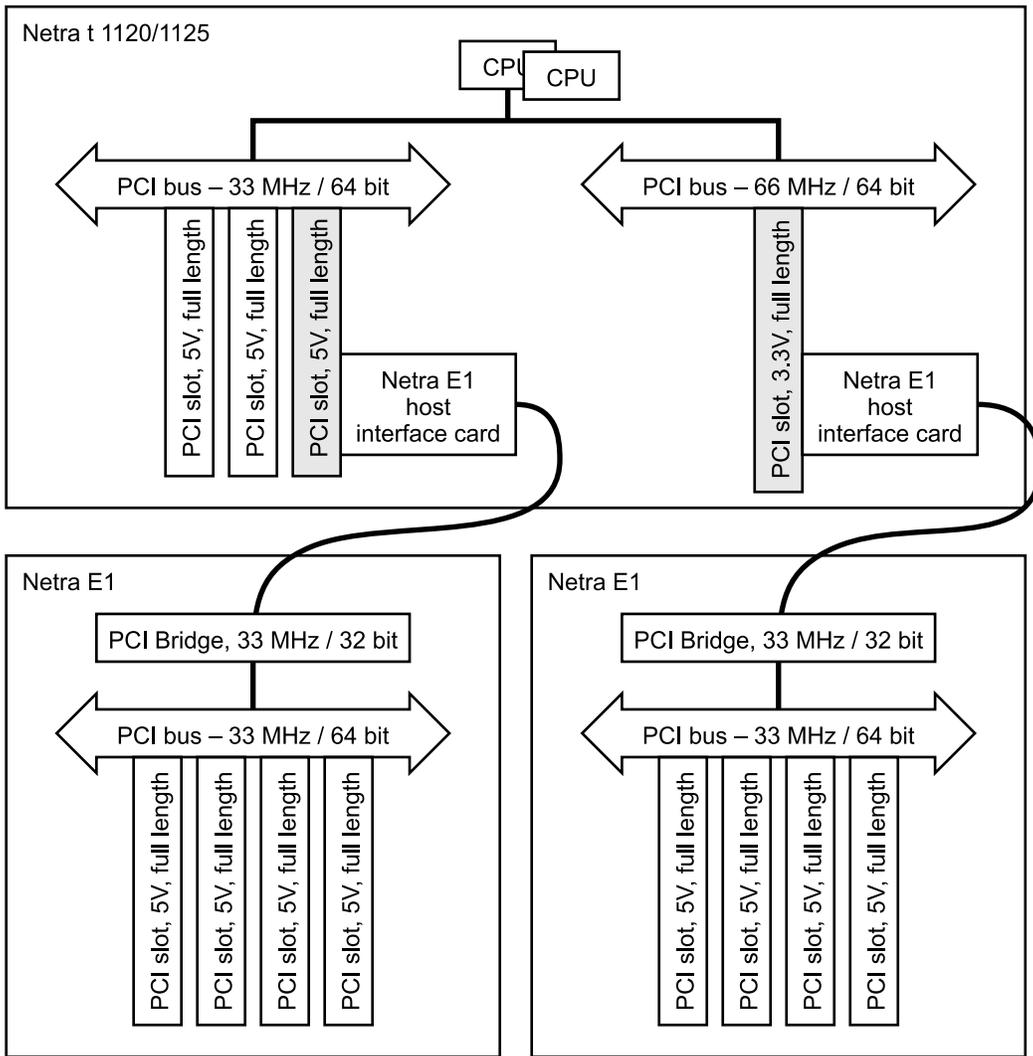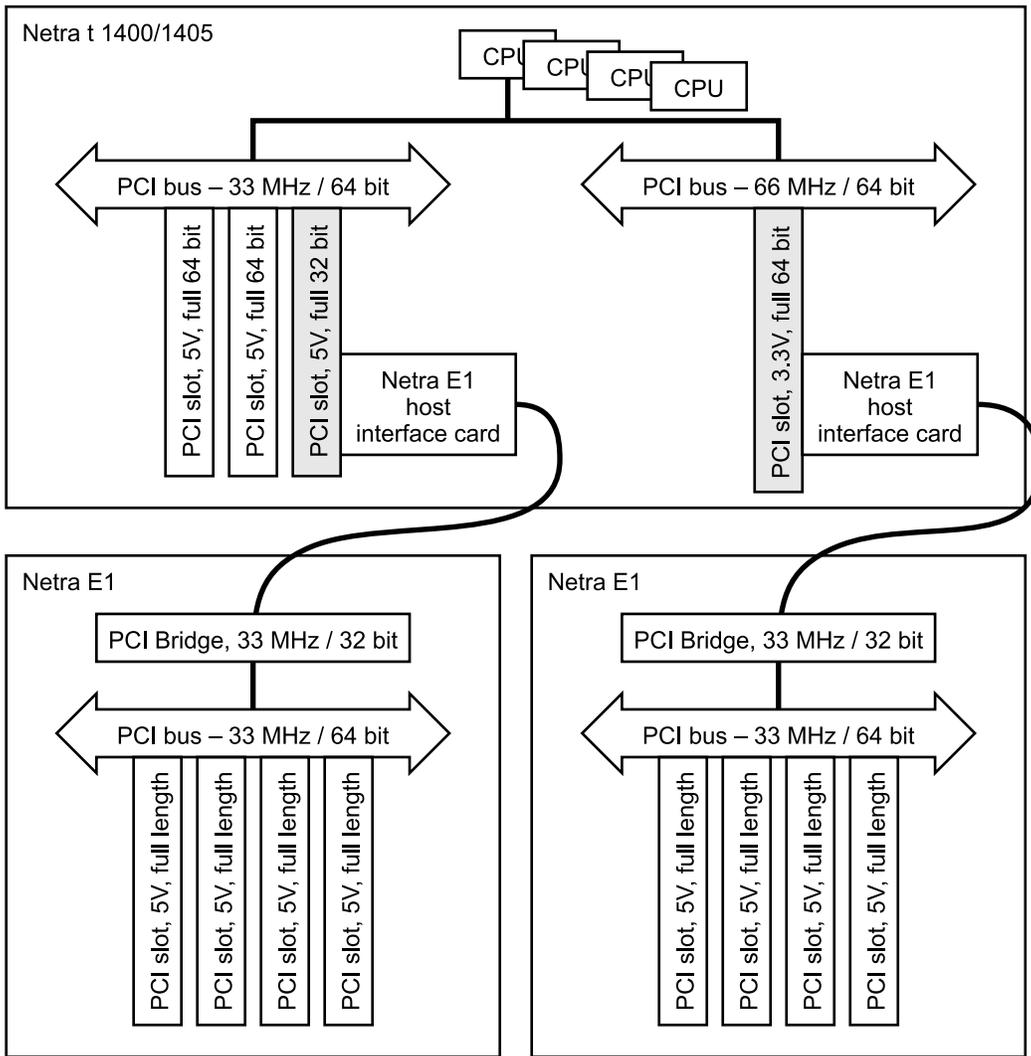
Licensing/Usage

Not applicable.

System Administration

Refer to sp.eng/products for system administration and management and performance information.

Software

No software drivers for the Netra E1 PCI System Expander is provided or needs to be loaded. The Netra E1 PCI System Expander is transparent to the Solaris Operating Environment. The startup sequence senses additional Netra E1 System Expander cards. Diagnosis is performed through the host server system or through the LED displays on the Netra E1 PCI System Expander.

Operating System

The Netra E1 PCI System Expander is supported in Solaris 2.6, 2.7, and 8 Operating Environments.

Operation Caution

The Netra E1 PCI System Expander must be powered on before the server in order for the server to see the PCI cards in the Netra E1 System Expander.

The Netra E1 PCI System Expander must not be powered down while the server is running, so as not to cause the Solaris Operating Environment to panic. Note that the Netra E1 PCI System Expander is designed with a receded power switch so as to minimize accidentally powering off the power supply.

Ordering Information

Netra E1 PCI System Expander Order Numbers

Order Number	Title and Description
X1184A	AC-powered Netra E1 PCI System Expander
X1186A	DC-powered Netra E1 PCI System Expander

AC-powered Netra E1 PCI System Expander Components (X1184A)

Description	Quantity	Part Number
AC-powered Netra E1 PCI System Expander	1	540-4640
Host interface card	1	375-0129
Connector cable	1	530-2977
AC power supply		300-1488
AC power cord	1	included
19-inch and two-post rackmounting kit	1	included
Netra t1 Gasket kit	1	230-1854
Netra E1 PCI System Expander Installation and Maintenance Manual	1	806-6325-10
Netra E1 PCI System Expander Product Notes	1	806-6326-10
Netra E1 PCI System Expander Installation Overview	1	806-7645-10

DC-powered Netra E1 PCI System Expander Components (X1186A)

Description	Quantity	Part No.
DC-powered Netra E1 PCI System Expander	1	540-4641
Host interface card	1	375-0129
Connector cable	1	530-2977
DC power supply		300-1489
DC power input connector cables and assembly materials	2	included with unit
19-inch and two-post rackmounting kit	1	included
Netra t1 Gasket kit	1	230-1854
Netra E1 PCI System Expander Installation and Maintenance Manual	1	806-6325-10
Netra E1 PCI System Expander Product Notes	1	806-6326-10
Netra E1 PCI System Expander Installation Overview	1	806-7645-10

19-inch Rackmounting Kit (included with System Expander [X7085A])

Description	Quantity	Part No.
Slide assembly	2	540-4785
Cable management bracket	1	340-6151
Thumbscrew bracket	2	340-6085
M4 8 mm Phillips countersunk screw	4	565-1654
10-32 UNF screws	8	565-1645
Fixed mount brackets for two-post racks	4	340-5819

23-inch Rackmounting Kit (X6966A)

Description	Quantity	Part No.
Slide assembly	2	540-4359
Cable management bracket	1	340-6151
Thumbscrew bracket	2	340-6085
M4 8 mm Phillips countersunk screw	4	565-1654
10-32 UNF screws	8	565-1645

24-inch Rackmounting Kit (X6967A)

Description	Quantity	Part No.
Slide assembly	2	540-4360
Cable management bracket	1	340-6151
Thumbscrew bracket	2	340-6085
M4 8 mm Phillips countersunk screw	4	565-1654
10-32 UNF screws	8	565-1645

600mm Rackmounting Kit (X6968A)

Description	Quantity	Part No.
Slide assembly	2	540-4361
Cable management bracket	1	340-6151
Thumbscrew bracket	2	340-6085
M4 8 mm Phillips countersunk screw	4	565-1654
10-32 UNF screws	8	565-1645

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72-inch Expansion Rackmounting Kit (X6919A)

Description	Quantity	Part No.
Slide assembly	2	540-4785
Cable management bracket	1	340-6151
Thumbscrew bracket	2	340-6085
M4 8 mm Phillips countersunk screw	4	565-1654
10-32 UNF screws	8	565-1654

Upgrades

Upgrade Paths

No upgrades available to date.

Service and Support

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

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

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

![Sun microsystems logo]

Warranty

The Netra E1 PCI System Expander has a one year warranty, 15 day return to depot.

Glossary

1 RU	One rack unit as defined by the Electronic Industries Alliances (EIA). A vertical measurement equal to 1.75 inches.
AC	Alternating current.
ATM	Asynchronous transfer mode. ATM is a network technology that supports realtime voice, video, and data. ATM is used as a backbone technology by major enterprises and ISPs.
Carrier-grade	Ruggedized, rackmountable systems with features including remote alarm capabilities, front-back cooling, front accessibility of media, rear cabling, and rugged NEBS-compliant packaging.
Density	Number of units in a given amount of space.
Ethernet 10/100BASE-T	The most widely used LAN access method defined by the IEEE 802.3 standard; uses standard RJ-45 connectors and telephone wire. 100BASE-T is also referred to as Fast Ethernet.
FC-AL	Fibre channel arbitrated loop. A topology for Fibre Channel in which all devices are linked together in a loop.
Gigabit Ethernet	An Ethernet technology with transmission speeds up to 1 Gbps.
Host ID	The unique identifier assigned to the host computer.
I/O	Input/output. Transferring data between the CPU and any peripherals.
ISP	Internet service provider.
MTBF	Mean time between failures. The average time a component works without failure.
MTTR	Mean time to repair. The average time it takes to repair a component.
NEBS	Network Equipment Building Standard. A stringent standard for durability, grounding cables, and hardware interfaces specified by Telcordia Technologies (formerly Bellcore) for equipment used in Telco central offices. The highest level is NEBS Level 3.
NEPs	Network equipment providers.
NSPs	Network service providers.
PCI	Peripheral component interconnect. Provides a high-speed data path between the CPU and peripheral devices.
RAM	Random access memory.
SCSI	Small computer systems interface. Pronounced "scuzzy." A hardware interface that allows the connection of up to 15 peripheral devices to a single bus.
Sun Quad FastEthernet™	A Sun product that has four Fast Ethernet ports on the same I/O card.

Materials Abstract

Accessing Sun Documentation Online

The docs.sun.com Web site enables you to access a select group of technical documentation on the Web. You can browse the docs.sun.com archive or search for a specific book title or subject at http://docs.sun.com. Documentation and product information for the Netra product line is available at http://www.sun.com/netra.

Ordering Sun Documentation

Fatbrain.com, an Internet professional bookstore, stocks select product documentation from Sun Microsystems, Inc. For a list of documents and how to order them, visit the Sun Documentation Center on Fatbrain.com at http://www.fatbrain.com/documentation/sun.

Collateral	Description	Purpose	Distribution	Token # or COMAC Order #
Powerpack				
– *Netra Internet Server Just the Facts*	Reference Guide for Netra Internet Server	Training Sales Tool	SunWIN, Reseller Web	xxxxx
– *Simple, Powerful Server Solutions for PC Networks Customer presentation*	Presentation on Netra Internet and System Management Server Overview; Slide Notes for Presentation	Sales Tool	SunWIN, Reseller Web	xxxxx
References				
– *Sun Intro*	Introduction E-mail	Sales Tool	SunWIN, Reseller Web, E-mail	xxxxx xxxxx
– *Netra Internet Server Quick Reference Card*	Quick Reference Card for Netra Internet Server	Sales Tool	SunWIN, Reseller Web, First Resort	xxxxx
Product Literature				
–				xxxxx
Training				
–		Training		xxxxx
Performance Brief				
–				xxxxx
Competitive				
–				xxxxx
Success Stories				
–				xxxxx
Demos				
–				xxxxx
Videos				

Collateral	Description	Purpose	Distribution	Token # or COMAC Order #
–				xxxxx
External Web Sites –	http://			
Internal Web Sites –	www.sun.com			

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Future/Roadmap

Future enhancements to the Netra E1 PCI System Expander may include:

- Lights-out management
- Longer cables
- Support for 66 MHz/64 bit PCI cards
- Support for Sun™Cluster software