**Acme Packet 3900 Hardware Installation
and Maintenanace Guide**

November 2016

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# About This Guide

## Overview

The Acme Packet 3900 is a high performance, high capacity session border controller that optimally delivers interactive communications — voice, video, and multimedia sessions — across wireline, wireless, and cable IP network borders. With its compact single unit 1U design the Acme Packet 3900 provides exceptional functionality in a tightly integrated system. This chapter provides an introduction and overview of the main components of the Acme Packet 3900 System.

The *Acme Packet 3900 Hardware Installation and Maintenance Guide* describes:

- Safety
- Component overview
- Unit installation
- Startup
- Maintenance
- Alarms
- Glossary

**Audience**    This guide is written for network administrators, telecommunications equipment installers and technicians. It provides information related to the hardware components, features, installation, start-up, and operation of the Acme Packet 3900 system. Only experienced and authorized personnel should perform installation, configuration, and maintenance tasks.

# Revision History

This section contains a revision history for this document.

| Date | Description |
| --- | --- |
| November 2016 | • Initial Release |

# 1 Safety

## Introduction

This chapter provides an overview of the recommended safety precautions for installing the Acme Packet 3900.

Before you install your Acme Packet 3900, Oracle recommends that you review the contents of this chapter and the installation chapter. Both chapters provide information intended to protect you and your Acme Packet 3900 from experiencing any harm during the installation process. These chapters also provide information that helps to keep your Acme Packet 3900 functioning properly and prevent damage.

## Environmental, Safety, and Regulatory Certifications

For information regarding safety and regulatory certifications applicable to the Acme Packet 3900, refer to the *Acme Packet Platforms Safety and Compliance Guide*.

## General Safety Precautions

To ensure general safety, follow the safety precautions listed in this section.

**Unit Maintenance**

Aside from the air filter, fan modules, power supplies, transcode module and TDM module, there are no user-serviceable parts inside the Acme Packet 3900. Only professionals trained to maintain, adjust, or repair the Acme Packet 3900 may provide these services.

**Fan Module**

To avoid overheating the system, do not block the air inlets or the fan module, or otherwise obstruct airflow to the system. Keep the area around the Acme Packet 3900 clean and clutter-free.

**Fiber Optic Cable**

Looking into a fiber optic cable can cause eye damage. Never look directly into the end of the fiber optic cables. Instead, use a fiber optic power meter to determine if power is present.

**Environmental Specifications**

Adhere to the environmental specifications for the Acme Packet 3900 stated in this manual.

**Using This Guide**

Read and understand all notes of warning and caution included in the Acme Packet 3900 documentation. These warnings and cautions are designed to keep you safe and protect the Acme Packet 3900 from damage.

# Electrical Safety Precautions

To protect yourself from harm and the Acme Packet 3900 from damage, follow these electrical safety precautions:

**Precautions**

- Note the location of the emergency power circuit breaker for the power to the equipment rack and the room where the Acme Packet 3900 is located.

- If an electrical accident occurs, remove power from the unit immediately by unplugging the chassis.

- Always disconnect the power from the unit when removing an Acme Packet 3900 from its rack.

- When disconnecting power:

  - Disconnect the circuit breaker at the rack.

  - Unplug or unscrew the power cords from the power supplies.

- Use grounded AC power cords that are plugged into grounded electrical outlets.

- Never use extension cords to power an Acme Packet 3900.

- Ensure that the installation facilities have proper grounding systems and include a grounded rack structure or local grounding bus bar.

- When installing the Acme Packet 3900 in an equipment rack, always make the ground connection first and disconnect it last when removing it.

- Use shielded Category 5e or 6, RJ45 cables for all 10/100/1000 Ethernet connections to protect the Acme Packet 3900 from potential damage.

- To avoid making a complete circuit (which causes electrical shock), use only one hand when working with powered-on electrical equipment.

- Use caution when using electrically conductive tools around the Acme Packet 3900.

- Remove jewelry before working on the Acme Packet 3900.

# Battery Warning

**Caution:**

There is a risk of explosion if the battery is replaced by an incorrect type. Dispose of used batteries according to the instructions.

**Caution:**

Perchlorate Material — Special handling may apply. See www.dtsc.ca.gov/hazardouswaste/perchlorate.

# ESD Safety

To protect the Acme Packet 3900 delicate electronic components from damage from static electricity, always follow the appropriate ESD procedures and wear the proper protective devices (such as an ESD wrist strap) when handling any and all Acme Packet 3900 hardware and while performing any Acme Packet 3900 hardware procedures.

## Precautions

To protect your equipment from ESD, follow these ESD safety precautions:

- Ensure that the Acme Packet 3900 is properly grounded.

- If you are grounding your Acme Packet 3900 to an electrically conductive, grounded rack, check to see whether or not the rack is painted. Paint can hinder proper grounding. If your equipment rack is painted, you should ground the unit to some other reliable place or remove a small portion of paint for proper grounding.

- Use a grounded ESD wrist or ankle strap when working on the Acme Packet 3900 to prevent static discharge.

- To avoid damaging ESD-sensitive hardware, discharge all static electricity from your body before working directly with the Acme Packet 3900 chassis by touching a grounded object.

# 2 Acme Packet 3900 Component Overview

## Chassis

Please find complete installation instructions in *Chapter 3 Unit Installation*. This chapter includes cabling information for the Acme Packet 3900.

The Acme Packet 3900 is contained in a 1U rack-mounted chassis. It can be front- or center-mounted in standard 19" wide racks (up to 28" deep), with options for 23" wide racks.
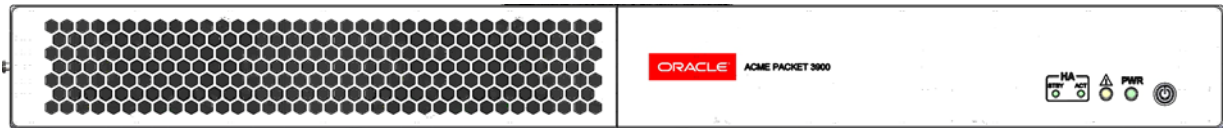


**Figure 2 - 1.   Acme Packet 3900 - Front Panel**
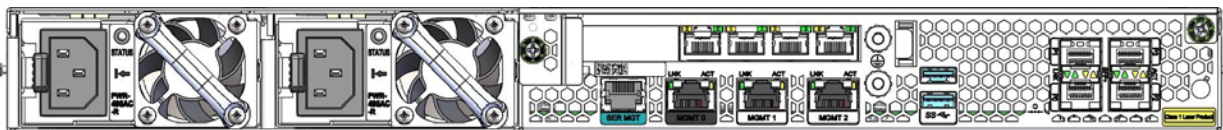


**Figure 2 - 2.   Acme Packet 3900 - Rear Panel**

**Mounting Hardware**

The Acme Packet 3900 is supported by a pair of cabinet slides that are affixed to an equipment rack by front and rear mounting flanges. The cabinet slides are adjustable for equipment racks of various depths.

**Equipment Rack Installation Hardware**

For equipment rack installations, the chassis must be outfitted with left and right chassis-mounted slide rails. One rail is secured to each side of the chassis, that slides into another rail that is attached to the inner posts on both sides of the equipment rack. This two-piece mounting simplifies chassis installation and removal.

When installing the chassis, the user can easily slide the chassis along the slide rails until a locking clip on each chassis-mounted rail locks the chassis into the slide rails. Pressing this clip will then allow the chassis to be fully installed into the equipment rack. Once inserted into the equipment rack, the Acme Packet 3900 is secured in place with two captive thumbscrews.

The locking clip is also a safety mechanism for removing the chassis from the equipment rack. When removing the chassis, the locking clip engages to prevent the

chassis from being overextended and requiring the user to unlock the clip to intentionally remove the chassis.



**Figure 2 - 3.  Slide Rail Locking Clip**

• The slide rails that are bolted to either side of the chassis or equipment rack are reversible and can be used on either side of the Acme Packet 3900.



**Figure 2 - 4.  Rack-Mounted Slide Rail (rear mounting point at left)**



**Figure 2 - 5.  Chassis-Mounted Slide Rail**

• Once the slide rails are installed on the chassis and on the equipment rack, the chassis can be installed in the rack by inserting the chassis slide rails into the tracks of the slide rails already mounted on the equipment rack. When the locking clip latch on the chassis slide rail meets the hole in the rack slide rail, the rails lock together. Push the locking latch in to continue to slide the chassis into the rack rails.

Locking Clip Latch          Keyhole Slot
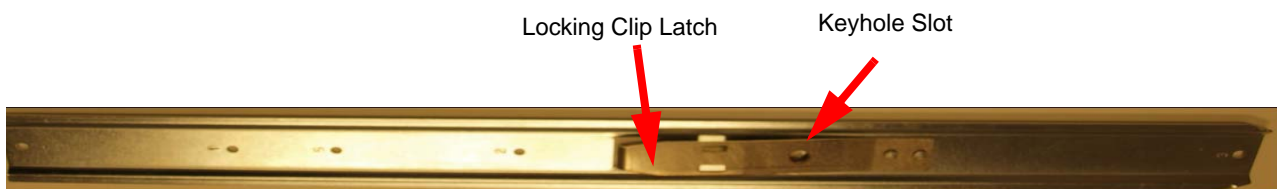


**Figure 2 - 6.  Locking Clip Latch and Keyhole Slot**

Once the chassis has been fully inserted into the rack, turning the captive thumbscrews clockwise will lock the chassis securely into the rack.

**Figure 2 - 7.  Locking the Chassis to the Rack**

# Unit Processor

**Processor**

The Acme Packet 3900 processor is located on the main board. This processor handles the management and signal processing within the unit as well as performing call and media control.

# Unit Control Panels

This section describes the front and rear control panels of the Acme Packet 3900.

**Front Panel**

The Acme Packet 3900 front control panel provides easy access to several unit components. You can access the power pushbutton, view the power LED, the Alarm LED and the High Availability LEDs. The following is a closeup of the front control panel.
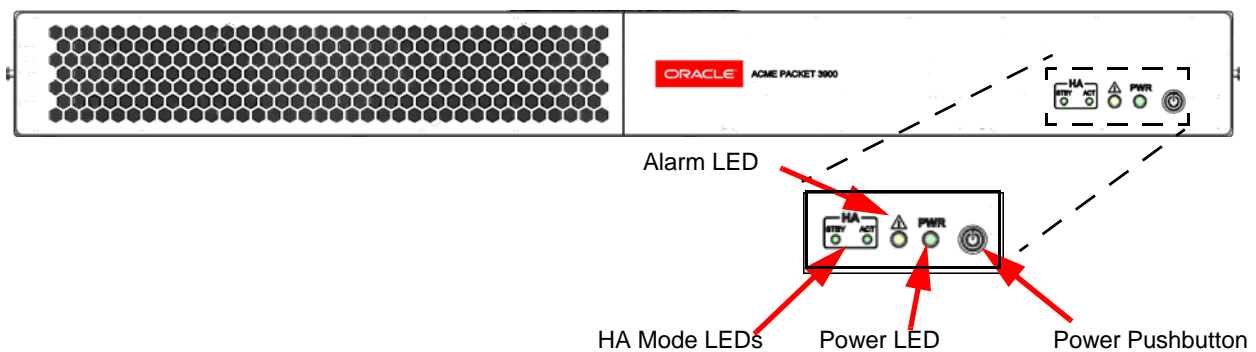


**Figure 2 - 8.  Front Control Panel**

**High Availability Mode LEDs**

If you configure the Acme Packet 3900 as part of an High Availability pair, these LEDs will specify the current HA mode for the unit; whether the unit is in Standby or Active Mode. If the unit is not part of an HA pair these LEDs will not be lit.

**Alarm LED**

The Alarm LED will be lit when the unit is in alarm mode. Appendix A of this document for a list and description of the alarm conditions that will activate this LED.

**Power LED**

The green PWR LED indicates the operational state of the chassis.

• on — indicates that power is being applied to the chassis.

• off — indicates that power is not being applied to the chassis.

## Power Pushbutton

Pressing the front panel Power Pushbutton will turn on and off to the Acme Packet 3900. After the power is turned on, the Acme Packet 3900 begins its boot sequence and loads the configured software file.

Do not turn off the unit using the Power Pushbutton until you have performed a graceful shutdown of the unit. Pressing the power button to turn off the Acme Packet 3900 without gracefully shutting down the unit first can result in the loss of software data or your configuration.

# Chassis Rear Panel

The Acme Packet 3900 comes with the Rear Panel as a permanent part of the chassis. All the Signaling, Media and Network Management ports are located on the Rear Panel of the chassis.
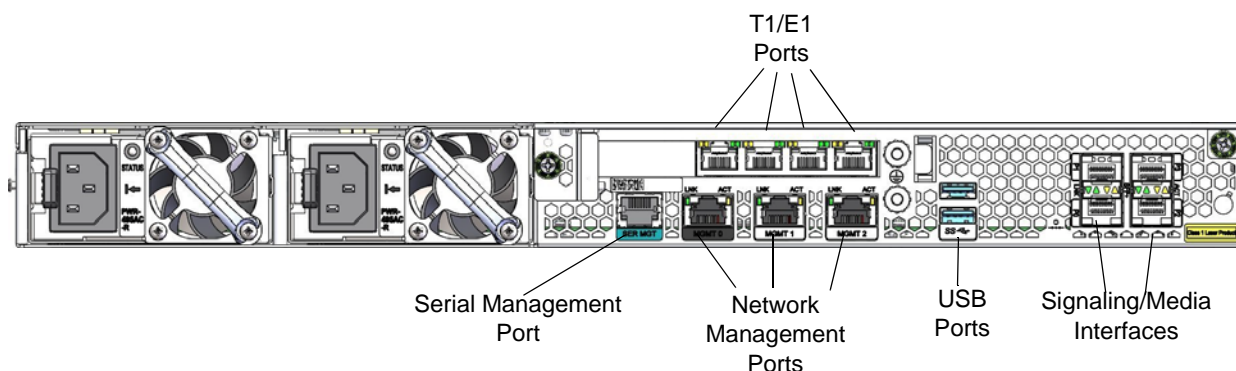


**Figure 2 - 9.  Acme Packet 3900 Rear Chassis Panel Ports**

Each of the chassis rear panel components are described in these subsections.

## T1/E1 Ports

In centralized SIP trunking topologies, this T1/E1 module preserves voice services in the event of a corporate WAN connectivity failure. In distributed SIP trunking topologies the module preserves dial-out voice services in the event of a local SIP trunk interface failure.

The RJ48C connector looks very similar to an RJ45 connector found on a typical CAT5 cable, but they are very different. A RJ48C connector is fastened on to a STP (Shielded Twisted Pair) cable, not the standard UTP (Unshielded Twisted Pair) CAT-(1-6) cable. A RJ48C connector also uses a different pin out arrangement, voltage level, and line capacitance than a RJ45 connector.

## Serial Management Port

The serial management port on the Acme Packet 3900 rear panel the provides console access to the unit over an RS-232C serial connection. The serial management port is useful for customers who want permanent console access, and provides a layer of physical security for the unit if access to the site is controlled.

Console port communication is used for administration and maintenance purposes from a central office (CO) location. Tasks conducted over a console port include:

- Creating the initial connection to the Acme Packet 3900 System

- Accessing and using all functionality available via the ACLI

- Performing in-lab unit maintenance

**Serial Management Port Pin-out**

The Acme Packet 3900 console port features one RJ45 port on the unit console. Because the Acme Packet 3900 does not employ any type of flow control on its RS-232 port, only the RX, TX, and GND pins are used. The following table identifies the pin assignments and signal names/descriptions for the console connector.

**Table 2 - 1.   Console Port Pin-Out**

| Pin Number | Signal Name/Description |
|---|---|
| 3 | Receive Data (RX) |
| 4 | Ground (GND) |
| 6 | Transmit Data (TX) |

**Serial Management Port Console Adapter**

A standard RJ45 to DB-9 serial console adapter is shipped with the Acme Packet 3900. This adapter converts the RJ45 plug on a straight-through Ethernet cable to a standard DB-9 serial port jack, found on a PC or laptop. Any straight-through Ethernet cable can be used between the Acme Packet 3900 and the console adapter.



**Figure 2 - 10. Serial Management Port Console Adapter**

**Network Management Ports**

The Acme Packet 3900 has three network management ports located on the rear left side of the chassis, labeled *Mgmt 0 Mgmt 1 Mgmt 2*. These 10/100/1000 Base-T Ethernet ports are used for EMS control, RADIUS accounting, CLI management, SNMP queries and traps, and other management functions.
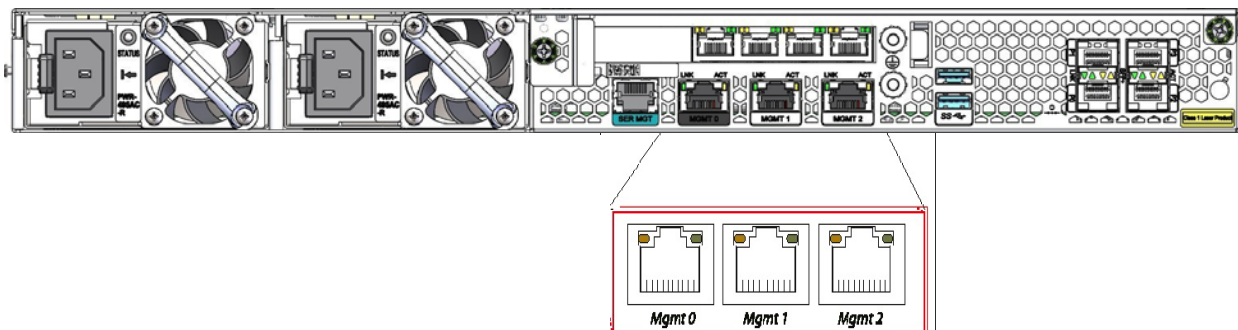


**Figure 2 - 11. Acme Packet 3900 Network Management Ports**

**Ethernet LEDs**

Each network management Ethernet port has two integrated LEDs: one LED indicates Link, and the other indicates Activity. The LED pair is located directly above its associated port.
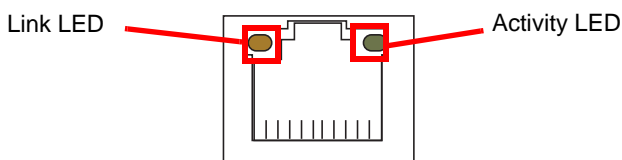


**Figure 2 - 12. Acme Packet 3900 Network Management Ethernet Port**

**Link LED**

The link LED is located to the top left side of the network management Ethernet port. This LED illuminates yellow when a link has been established between the link partner device and the Acme Packet 3900.

**Activity LED**

The activity LED is located at the top right side of the network management Ethernet port. The activity LED illuminates green when an Ethernet connection has either transmit or receive packet activity.

Upon initial bootup of the Acme Packet 3900, the network management Ethernet ports are not configured. You must first connect to the Acme Packet 3900 over a serial connection before you can configure the management Ethernet ports for use. Set up the management interfaces using the physical and network interface configuration elements. Refer to the *System Configuration* chapter of the *Acme Packet Configuration Guide* for details.

Once the network management interface is configured, it should be reserved for the following uses: Maintenance activities

- Application log retrieval
- Software upgrades
- Unit configuration
- Telnet, SSH, SNMP and SFTP connections
- RADIUS CDR transmission

Oracle recommends that you use shielded CAT5e or CAT6 Ethernet cables with RJ45 plugs for connecting to the rear-panel Acme Packet 3900 Ethernet interfaces. These Ethernet interfaces have a distance limitation of 328 feet (100 m), as defined by the FAST Ethernet standard, IEEE 802.3.

## USB3 Ports

The two USB3 ports, located on the Acme Packet 3900 rear panel, are reserved for software-enabled applications, such as software updates.
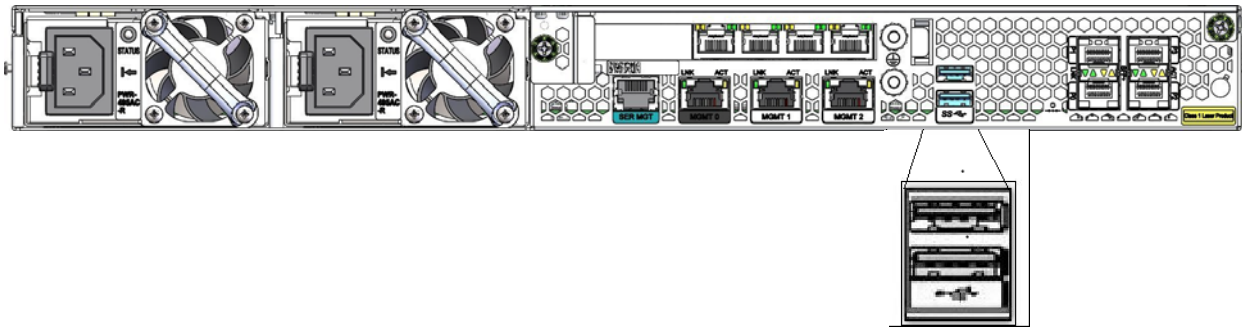


**Figure 2 - 13. USB3 Ports**

## Signaling and Media Interfaces

The signaling and media interfaces provide network connectivity for signaling and media traffic. The Acme Packet 3900 has 4 SFP ports (P0-P3) which operate at 1 Gbps speed. Any ports may be used.

The optical 1GbE ports can accept an LC fiber connector using either single mode or multimode cable. These signaling ports require a transceiver to be installed which can be of three types: Single Mode, Multi Mode, and Copper.
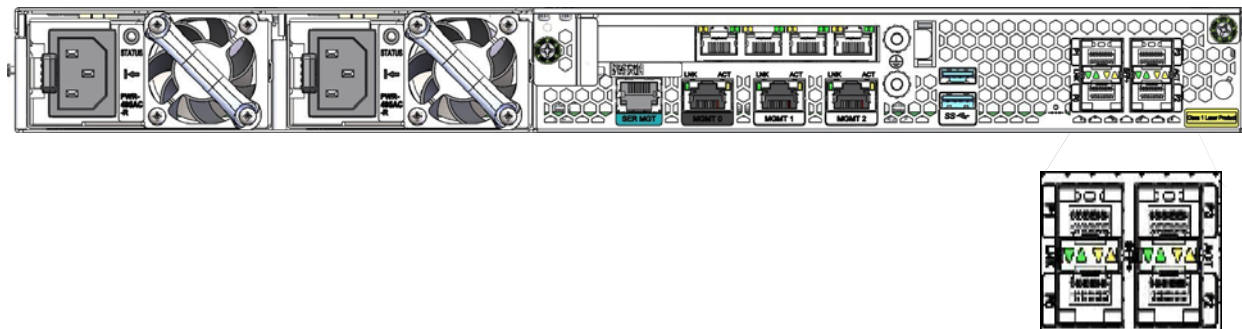


**Figure 2 - 14. Signaling and Media Interfaces**

# Media Cables

This section describes the media signaling interfaces as well as fiber optic and copper cables used on the Acme Packet 3900 network interface rear panel. Each transceiver type — multi mode, and single mode — take a different fiber optic cable. You must use the proper fiber optic cable for each transceiver. Cables may be ordered from Oracle, or you may get them elsewhere.

## Cable Information

Three different fiber optic cables used on the Acme Packet 3900 rear panel include:

- Multi-mode transceivers — use an orange fiber optic cable.
- Single-mode transceivers — use a yellow fiber optic cable.
- Copper transceiver — use a Cat 5 or 6 ethernet cable.

## Cable Identification

A Multi Mode SX transceiver uses an orange colored fiber optic cable.



**Figure 2 - 15. Multi Mode SX Fiber Optic Cable**

A Single Mode LX transceiver uses yellow colored fiber optic cable.



**Figure 2 - 16. Single Mode LX Fiber Optic Cable**

A copper transceiver uses Category 5 or 6 Ethernet cable.



**Figure 2 - 17. Copper Category 5 or 6 Ethernet Cable**

# Power Components

**Acme Packet 3900 Dual Power Supplies**

Oracle offers AC or DC power options for the Acme Packet 3900. The power supplies are user-replaceable, hot swappable components. Each power supply is accessed from the rear panel of the Acme Packet 3900. The power supply located at right is designated as power supply 0 (PS0) while the power supply located at left is designated as power supply 1 (PS1).

**Power Supply Redundancy**

During normal operation, the Acme Packet 3900 is load-balanced and draws power from both supplies. The two power supplies also provide hardware redundancy. If a power supply fails, the Acme Packet 3900 can rely on only one functional power supply to sustain normal operation. A malfunctioning power supply must be removed and replaced as soon as possible. If the Acme Packet 3900 starts up with only one power supply, the alarm LED will blink continuously.



Locking Tab          PS1          PS0          Chassis
                                                Grounding Terminals
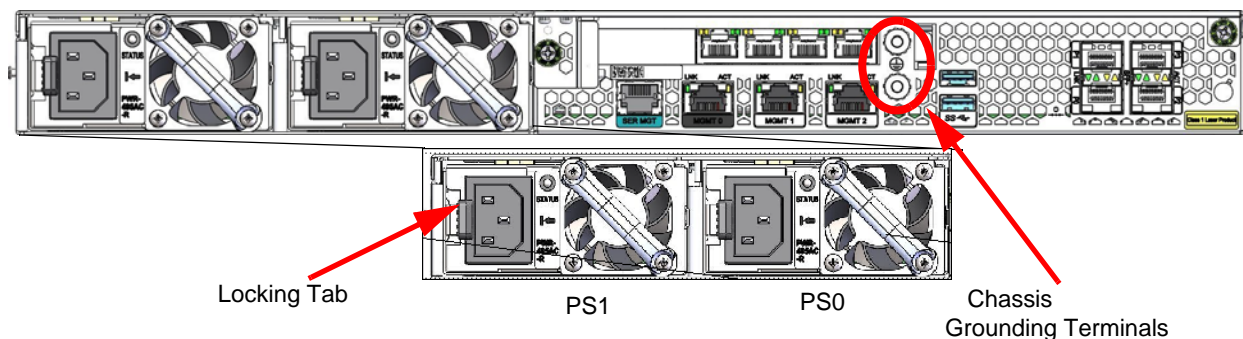
**Figure 2 - 18. Acme Packet 3900 Dual AC Power Supplies and Chassis Grounding Terminals**

The grounding terminals are used to attach the Acme Packet 3900 chassis to a local earth ground. The terminals are located between MGMT 2 port and USB port on the Acme Packet 3900 rear panel. The Acme Packet 3900 is shipped with nuts attached to the terminals along with a pre-made ground cable.

**AC Power**

The auto-sensing AC power supply is rated at 110-240 VAC, 50-60 Hz, and is supplied with an IEC connector. The handle on the front panel of the power supply is used to remove the power supply from the chassis. The black locking tab, when moved from left to right, unlocks the power supply from the chassis for removal. The AC power cord must be removed before the black locking tab can be moved to free the power supply.

Black Locking
Tab to Lock/Un-
lock Power Sup-
ply to Acme
Packet 3900

Handle to
Remove/Insert
Power Supply

**Figure 2 - 19. Acme Packet 3900 AC Power Supply**

**AC Power Cords**     Oracle ships one region-specific power cord with each AC-power supply.

# DC Power

The Acme Packet 3900 can be powered by central office –48 VDC operations with a DC-DC supply. The red handle on the front panel of the power supply is used to remove the power supply from the chassis. The black locking handle, when moved from left to right, unlocks the power supply from the chassis when removing the power supply. A removable terminal block on the DC power supply serves as the DC power interconnect. The terminal block must be removed before the black locking handle can be moved to free the power supply.

Locking Tab
DC Power Supply Grounding Terminals

Chassis
Grounding Terminals
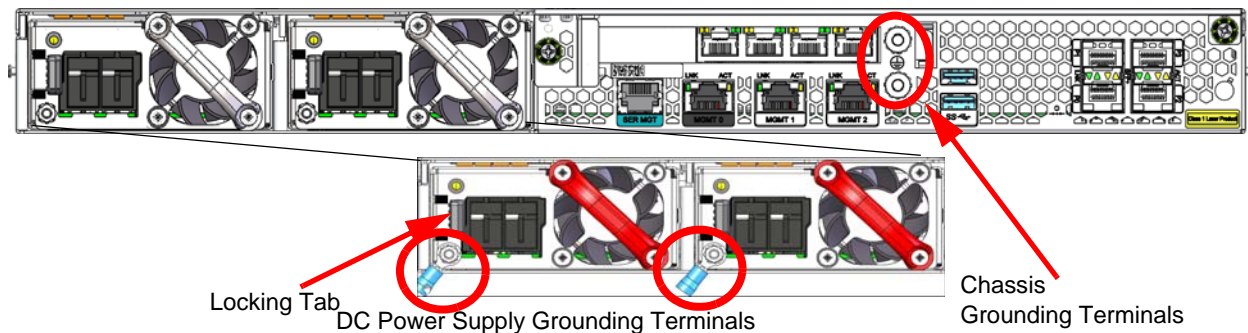
**Figure 2 - 20. DC Power Acme Packet 3900 Dual DC Power Supplies and Grounding Terminals**

Black Locking Tab to Lock/Un-lock Power Sup-ply to Acme Packet 3900

Handle to Remove/Insert Power Supply

**Figure 2 - 21. Acme Packet 3900 DC Power Supply**

### DC Power Cord
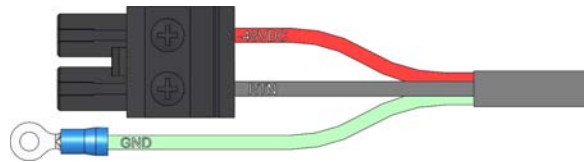


**Figure 2 - 22. Acme Packet 3900 DC Power Cords and Grounding Wire Attached to the DC Terminal Block**

A mating connector (terminal block) for a DC power cord ships with each DC power supply. You must create the above power cord with using the supplied Terminal Block. You must supply all cables needed and the #6 Ring Terminal for the Ground.



**Figure 2 - 23. Three Views of a DC Terminal Block**

**Table 2 - 2.   DC Power Cord Wire Markings**

| Wire Color | Lead Designation (DC Power Supply) |
|---|---|
| Red | RTN |
| Green/Yellow | GND |
| Black | -48 V |

## Cooling Components

The Acme Packet 3900 must remain well ventilated for reliable and continuous operation. The cooling features of the chassis include:

- Fan module
- Air Filter

## Cooling Fans

The Acme Packet 3900 chassis pulls cool ambient air into the chassis through two front-installed intake fans and exhausts heated air through perforated air outlets located along the rear of the chassis. To avoid overheating the system, do not block the air intake or exhaust or otherwise obstruct airflow to the unit in any way.

Each individual fan attaches to the chassis with two captive screws, and is powered by a connector that joins the fan to the motherboard when screwed into the chassis.
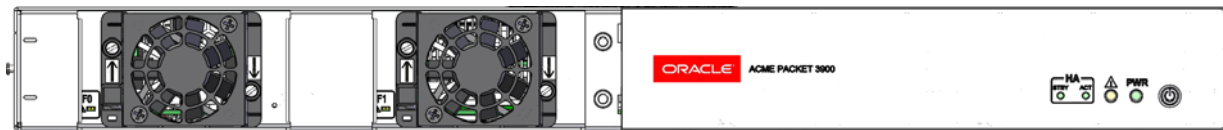


**Figure 2 - 24. Acme Packet 3900 Cooling Fans (shown with front left bezel removed)**

## Intake Fans

The intake fans are hot-pluggable and are covered by an air filter that prevents excess dust and contaminants from entering the system. The air filter is retained by the removable front bezel.

The Acme Packet 3900 automatically adjusts the fan speed based on the current operational status and environmental conditions. Fan speed regulation is an automated process that requires no user intervention. You can monitor the status of the fan speed from the Environment menu.

Each fan is a user-replaceable, hot-swappable component. If the Acme Packet 3900 experiences a fan malfunction and generates an alarm, you must remove the existing fan and replace it with a fully functioning fan.

## Air Filter

The Acme Packet 3900 foam air filter removes airborne particles before they are drawn into the unit chassis. The air filter, which is located behind the bezel that attaches to the front of the Acme Packet 3900, can be easily removed for maintenance. The air filter is a field replaceable unit that should be replaced at least once every three months.
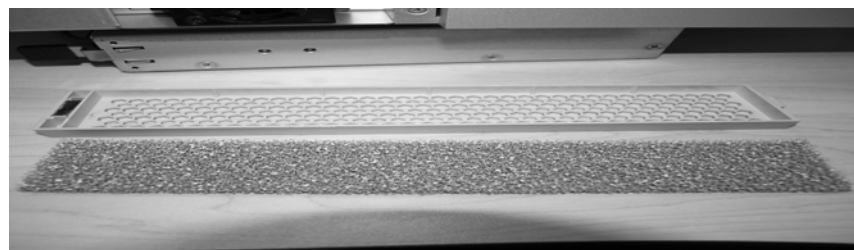


**Figure 2 - 25. Acme Packet 3900 Air Filter Behind Front Bezel**

# 3          Unit Installation

## Introduction

This chapter provides information about how to install the Acme Packet 3900 and its associated components.

## Shipped Parts

Each Acme Packet 3900 ships in one box. Inside this box is the Acme Packet 3900 chassis and the accessory kit. The ordered options (such as a T1/E1 module or DSP modules) as well as power supplies are already installed in the chassis.

**Table 3 - 3.   Acme Packet 3900 Shipping Contents**

| Location | Item |
| --- | --- |
| Main Shipping Box | Acme Packet 3900 chassis |
| Accessory Kit | Console adapter<br>AC power cords or DC connectors, one per power supply<br>Grounding cable<br>Slide Rail Mounting Kit<br>Rack Mount brackets |

### Installation Tools and Parts

The following tools and parts are required to install the Acme Packet 3900 into your equipment rack:

- #2 Phillips-head screwdriver
- Small flat-head screwdriver
- Rack and associated mounting hardware
- Shielded Ethernet CAT5e or CAT6 RJ45 cables
- 11/32″ nut driver
- 5/16″ nut driver

**Recommended Tools and Parts**

Acme Packet recommends that you have the following parts on hand:

* Cable labels
* UPS for AC installations
* ESD wrist or heel straps
* ESD-safe location

# Pre-Installation Guidelines

The Acme Packet 3900 must have access to reliable power and cooling. When choosing a location for your Acme Packet 3900, follow the guidelines listed in this section.

**Environmental Guidelines**

When preparing to install your Acme Packet 3900:

* Ensure that the equipment rack location complies with the environmental specifications (e.g., temperature, relative humidity, and maximum altitude) of the Acme Packet 3900 described in the chapter Specifications in this document.
* Locate the Acme Packet 3900 in a clean and well-ventilated room. This location should also be far from areas where heat, electrical noise, and electromagnetic fields are present.

**Power Guidelines**

When preparing to install your Acme Packet 3900, please ensure you do the following:

* Ensure that the installation location has access to adequate power and grounding. Separate circuits should be available for each of the Acme Packet 3900 two power supplies.
* The Acme Packet 3900 may only be powered by either AC or DC circuits at one time; mixed power configurations are not supported.
* Never use extension cords when powering an Acme Packet 3900.
* Use grounded, 3-conductor circuits.
* A local earth ground must be available.

**Caution**

Connect each of the Acme Packet 3900 power supplies to a separate circuit. If both supplies are connected to outlets on the same circuit, the Acme Packet 3900 will lose power to both supplies if that circuit loses power. In that case, the whole Acme Packet 3900 would lose power.

| **Mounting Guidelines** | When preparing to install your Acme Packet 3900, please ensure you follow these mounting guidelines: |

- Leave enough clearance, approximately 8″ (20 cm), behind the equipment rack to allow adequate air ventilation, for ease in cabling, and to access the console connector.

- Do not block the air inlets or the fan module, or obstruct airflow to the unit in any way.

- Position the equipment to allow for serviceability. This will aid in chassis removal, and prevent the need to remove or loosen other equipment in the rack.

| **Other Safety Guidelines** | When preparing to install your Acme Packet 3900, ensure you follow these safety guidelines: |

- Review all safety precautions with respect to the Acme Packet 3900 before beginning installation.

- Ensure that the equipment rack is securely bolted to the floor and that the equipment rack and components are properly grounded.

- For AC power installations, use a regulating UPS to protect the Acme Packet 3900 from power surges, voltage spikes, and power failures.

- For AC power installations, ensure that your UPS can supply power for enough time to save your unit data and shut down the unit gracefully.

## Mounting Installation

| **Overview** | This section explains how to unpack and install your Acme Packet 3900 into a telecommunications or server equipment rack. The Acme Packet 3900 standard mounting hardware is used for installation in a 4-post, 19″ cabinet-style equipment rack. Mounting hardware for a 23″ equipment rack is available by special order. |

| **Mounting Options** | The Acme Packet 3900 ships with hardware for mounting in a 4-post, tapped-hole equipment rack or square-hole equipment rack. The Acme Packet 3900 also ships with hardware for mounting in a 2-post, center-mount equipment racks, both 19″ and 23″. This section explains the procedures for each mounting option. |

| **Caution** | **Failure to follow the instructions outlined in this section might compromise the proper function of the Acme Packet 3900. To prevent personal injury, Acme Packet recommends that two people lift and install the chassis into the equipment rack.** |

**Unpacking the Acme Packet 3900**

**To unpack the Acme Packet 3900:**

1. Inspect the external packing materials and note if they are damaged in any way.

2. Open the exterior box.

3. Unpack the contents of the Acme Packet 3900 shipment.

4. Locate the packing list on the outside of the Acme Packet 3900 shipment box.

5. Confirm that all of the components listed in the packing list are present and in good condition.

   **If you discover that any of the parts are missing or were damaged in shipment, contact customer support.**

**Mounting Hardware**

The hardware used for the Acme Packet 3900 mounting procedures include the following:

- Front mounting flanges (2) for use with mounting slide rails, used to secure the chassis into the rack



**Figure 3 - 26. Front Mounting Flanges**

- Slide rail assembly (2), as shipped, with the chassis slide rail inserted into the equipment rack slide rail.



**Figure 3 - 27. Slide Rail Assembly**

- Equipment rack slide rail (part of the slide rail assembly)



**Figure 3 - 28. Equipment Rack Slide Rail**

- Chassis slide rail (part of the slide rail assembly)



**Figure 3 - 29. Chassis Slide Rail**

- Nut Bar (4)



**Figure 3 - 30. Nut Bars**

- Mounting Spacer (2)



**Figure 3 - 31. Mounting Spacers**

• Phillips screws and flat head screws

#2 Phillips Screw #10-32 x 5/8" (8 x shipped):



#6-32 x 1/4" Flat Head Screws (6 x shipped)



Flat Head Screw #6-32 x 1/4" (6 x shipped)



Flat Head Screw #-32 x 5/16" (6 x shipped)



**Figure 3 - 32. Phillips Screws and Flat Head Screws**

• Center mounting flanges (2) for a 2-post 19-inch rack



**Figure 3 - 33. Center Mounting Flanges 19-inch rack**

• Center mounting flanges (2) for a 2-post 23-inch rack

# Cabinet-style 4-Post Chassis Installation

The following sections explain how to mount the Acme Packet 3900 in a cabinet-style, 4-post equipment rack.

## Mounting System

Oracle provides flexible mounting options for your Acme Packet 3900 equipment rack installation.

The mounting system consists of a slide rail mounted on each side of an equipment rack and a chassis slide rail mounted on each side of the Acme Packet 3900 chassis. Once the slide rails are installed on the equipment rack and chassis, the chassis can be slid into place by aligning the installed chassis slide rails along the guides on the equipment rack slide rails. When the Acme Packet 3900 is fully inserted into the equipment rack, it is secured in place with two captive thumbscrews.

## Installing the Equipment Rack Slide Rails

In the first stage of unit installation, secure the equipment rack slide rail to the equipment rack. The equipment rack slide rail can expand and contract to accommodate equipment racks of various depths up to 32".

You can mount the equipment rack slide rail to both tapped hole rack and square rack. Follow the appropriate procedure below.

### Installing Slide Rails into a Tapped-Hole Rack

This section explains how to mount the Acme Packet 3900 slide rail assembly into a tapped-hole equipment rack.

> **Note: The following procedure presumes that the tapped hole size is #10-32. If alternate tapped holes are used, the customer must supply the proper screws.**

**To install the slide rails to the front of a tapped-hole equipment rack:**

1. Locate the following components:

   - Assembled equipment rack slide rails (2)
   - #10-32 x 5/8" screws (8)
   - Mounting spacers (2)

2. Line up the equipment rack slide rail with an appropriate mount point on the front of the equipment rack.



**Figure 3 - 34. Aligning the Slide Rail Front Mount Point in a Tapped-Hole Rack**

3. For both holes in the flange, place one #10-32 x 5/8" screw through the mounting spacer, then through the slide rail flange and into the tapped hole.
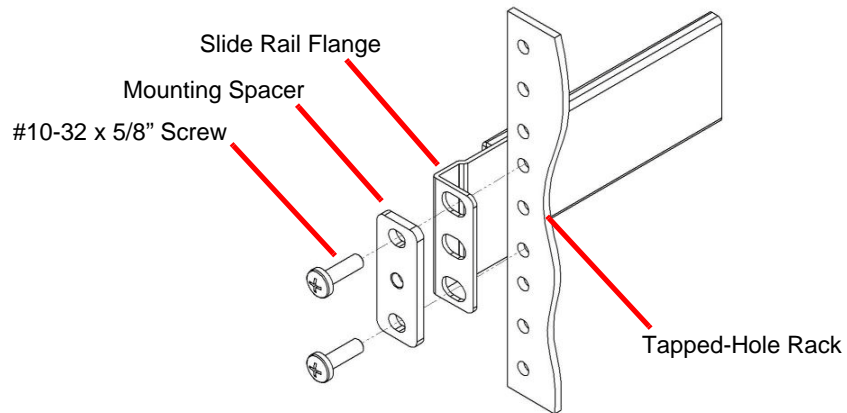


**Figure 3 - 35. Attaching the Slide Rail to a Tapped-Hole Rack**

4. Using a #2 Phillips head screwdriver, tighten the screws to secure the slide rail to the equipment rack. Do not completely torque the screws; leave a small amount of play at this time.



**Figure 3 - 36. Installed Slide Rail in a Tapped-Hole Rack - Front Mount Point**

*Acme Packet 3900 Hardware Installation and Maintenance Guide*

5. Expand and line up the equipment rack slide rail on the outside of the rear rack slide rail at the same height used for the front mount point.
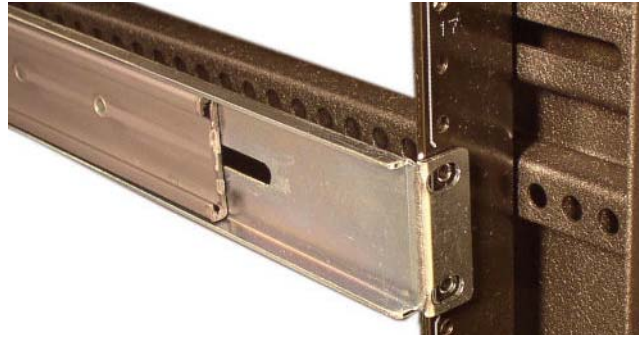


**Figure 3 - 37. Aligning Rear Mount Points of the Slide Rail in a Tapped-Hole Rack**

6. For both holes in the slide rail flange, place one #10-32 x 5/8" screw through the flange and into the tapped hole, and screw them into place.



**Figure 3 - 38. Installed Slide Rail in a Tapped-Hole Rack - Rear Mount Point**

7. Repeat Steps 2 and 6 for the other test equipment slide rail.



**Figure 3 - 39. Installed Slide Rails in a Tapped-Hole Rack - Front Mount Points**



**Figure 3 - 40. Installed Slide Rails in a Tapped-Hole Rack - Rear Mount Points**

**Installing Slide Rails into a Square-Hole Rack**

This section explains how to mount the Acme Packet 3900 slide rail assembly into a square-hole equipment rack. The customer can use #10-32, 1/4-20, M5 or M6 cage nuts as an alternative, but the cage nuts will be customer-supplied along with the associated mounting screws for the cage nut selected.

**To install the slide rails on the front of a square-hole equipment rack:**

1. Locate the following components:
   - Equipment rack slide rails (2)
   - #10-32 x 5/8" screws (8)
   - Mounting spacers (2)
   - Nut bars (2)

2. Line up the painted side of the stationary rail with an appropriate mount point on the front of the equipment rack.



**Figure 3 - 41. Aligning the Slide Rail Front Mount Point in a Square-Hole Rack**

3. For each of the two holes in the slide rail flange, place a #10-32 screw through the mounting spacer, then through the slide rail flange, and finally through the square hole in the rack rail.
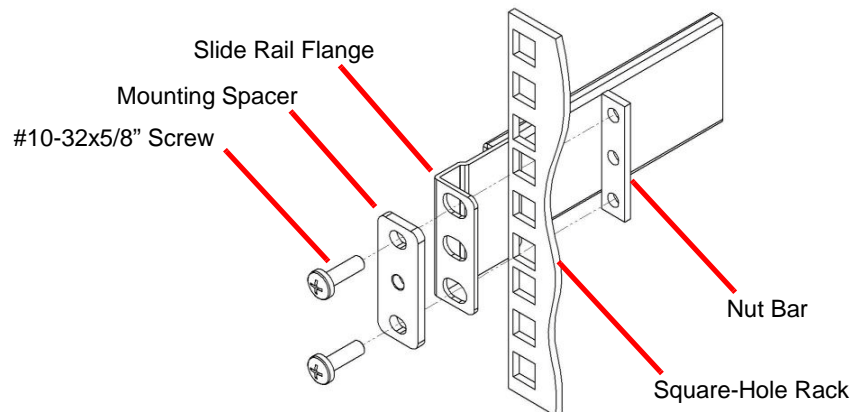


**Figure 3 - 42. Attaching the Slide Rail to a Square-Hole Rack**

4. Hold the nut bar behind the front rack rail.

5. Using a #2 Phillips head screwdriver, tighten the screws to secure the slide rail to the equipment rack. Do not completely torque the screws; leave a small

amount of play at this time.



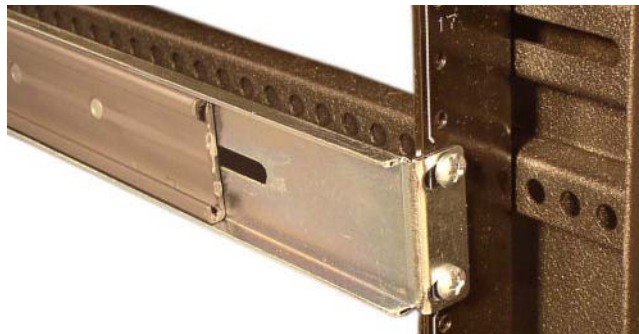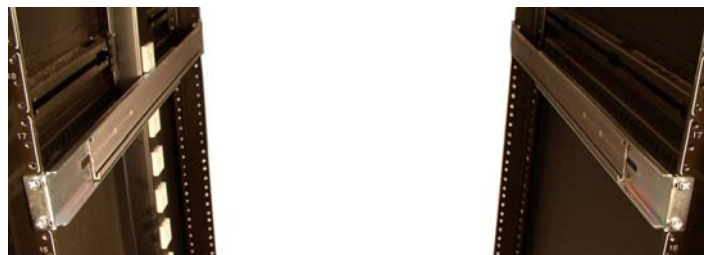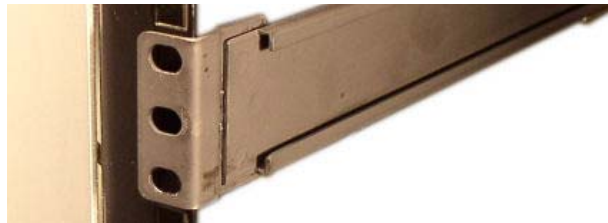**Figure 3 - 43. Installed Slide Rail in a Square-Hole Rack - Front Mount Point**

6.  Expand and line up the unpainted side of the stationary rail flange on the outside of the rear rack rail at the height used for the front mount point.



**Figure 3 - 44. Aligning the Slide Rail Rear Mount Point in a Square-Hole Rack**

7.  Hold the nut bar behind the rear rack slide rail.

8.  Place one #10-32 screw through each of the holes in the slide rail flange, then through the square hole in the rack, and finally into the nut bar.

9.  Using a #2 Phillips head screwdriver, tighten the screws securely into place.
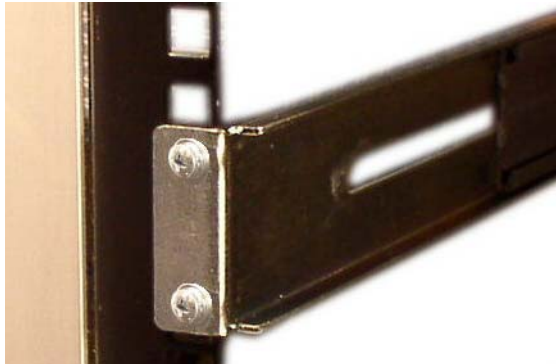


**Figure 3 - 45. Installed Slide Rail in a Square-Hole Rack - Rear Mount Point**

10. Torque the screws on the front and back of the rail slide.

11. Repeat this procedure for the other slide rail.

## Installing the Chassis Flanges and Slide Rails

In this second portion of unit installation, two chassis flanges and two chassis slide rails are secured to the Acme Packet 3900 chassis.

**To install the chassis rail slides on the Acme Packet 3900 chassis:**

1. Locate the following components:
   - #6-32 x 1/4" flat head screws (6)
   - Front-mounting flanges (2)
   - #6-32 x 5/16" screws (4)
   - #2 Phillips screwdriver
   - Chassis slide rails (2)

2. Line up one chassis flange with the tapped holes. Position the chassis flange's spring-loaded thumbscrew toward the front panel of the system.



**Figure 3 - 46. Tapped Holes to Accommodate Front-Mounting Flange**

3. Insert 2 x #10-32 x 5/16" flat head screws into the flange and chassis, and using a #2 Phillips screwdriver, tighten the screws to secure the flange to the chassis.



Flange attached

**Figure 3 - 47. Acme Packet 3900 With Front-Mounting Flange Installed**

4. Line up the chassis slide rail with the Acme Packet 3900 side panel. Position hole #4 closest to the flange at the front of the Acme Packet 3900 chassis. Line up the keyhole slot on the slide rail with the keyhole button on the side of the Acme Packet 3900 and slide the rail slightly backwards to secure the slide. When you do this, hole #5 on the slide will line up with the corresponding tapped holes on on the chassis.



Tapped Chassis Holes for Slide Rail Holes #4 and #5    keyhole button

**Figure 3 - 48. Acme Packet 3900 With showing tapped holes and button**



Slide Rail Hole #4          Slide Rail Hole #5          Keyhole Slot for Chassis Button Under the spring
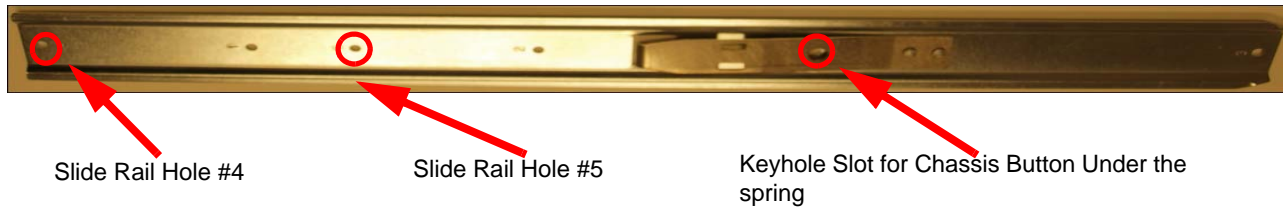
**Figure 3 - 49. Slide Rail with mounting holes**

5. Use 2 x #6-32 x 5/16" screws to secure the chassis slide rail to the side of the Acme Packet 3900.



**Figure 3 - 50. Acme Packet 3900 with Installed Chassis Slide Rail**

6. Repeat this procedure for the other side of the Acme Packet 3900 chassis.

## Installing the Chassis in the Rack

The Acme Packet 3900 is now ready to be installed into a 4-post equipment rack. To prevent personal injury or damage to the Acme Packet 3900, follow these guidelines:

• This installation requires two people and should not be attempted otherwise.

• Follow your organization's best practices for lifting and installing heavy components into an equipment rack.

• Ensure that the Acme Packet 3900 chassis remains supported until you have completely installed it into the equipment rack.

**To install the Acme Packet 3900 chassis into the equipment rack:**

1. Lift the Acme Packet 3900 into the correct position to prepare to be installed into the equipment rack.

2. Line up the chassis slide rails in back of the chassis with the guides in front of the equipment rack slide rails.

3. If necessary, press in the latches on either side of the Acme Packet 3900 in order for the assembly to slide into the guides.



Test Equipment Slide Rail Guides
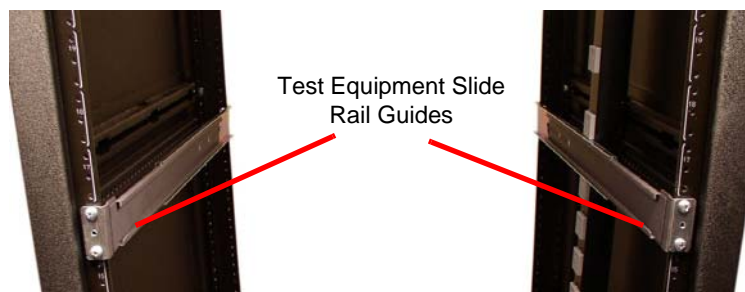
**Figure 3 - 51. Equipment Rack Slide Rail Guides (front of the rack**

4.  Push the Acme Packet 3900 fully into the equipment rack.



**Figure 3 - 52. Acme Packet 3900 Inserted Into the Chassis Slide Rails**

5.  Line up the chassis-mounted thumbscrews with the threads on the Acme Packet 3900 mounting spacer. You may have to adjust the spacer locations before they line up with the Acme Packet 3900's captive screws.



**Figure 3 - 53. Tightening the Thumbscrews to Secure the Chassis to the Rack**

6.  Once correctly positioned, hand-tighten the thumbscrews into the mounting spacer and secure the chassis in the rack.

7.  Torque the two captive thumbscrews using a #2 Phillips screwdriver.

8.  Torque all four #10-32 x 5/8″ front screws that hold the slide rails to the rack.

# Center-Mount 2-Post Chassis Installation

The following sections explain how to center mount your Acme Packet 3900 into a 2-post equipment rack.
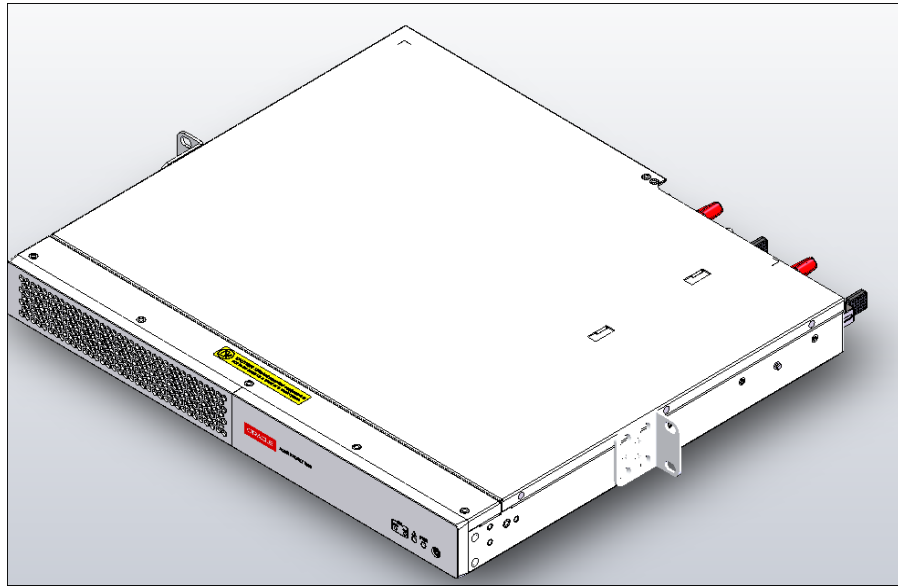


**Figure 3 - 54. Acme Packet 3900 Ready to Center-Mount in a Two-Post Rack**

## Installing the Center-Mount Hardware

Center-mounting flanges are attached to each side of the Acme Packet 3900. These mounting flanges are reversible, and are not mated to a specific side of the chassis. While the Acme Packet 3900 is shipped with all mounting hardware for attaching the rack flanges to the chassis, you must obtain and use the appropriate hardware recommended by the equipment rack manufacturer for mounting the unit in the rack.

**To install your Acme Packet 3900 in a center-mount configuration:**

1. Locate the following components:
   - Center-mounting flanges (2)
   - #6-32 x 1/4" flat head screws (6)

2. Line up one chassis flange with the three tapped holes found along the center of the side of the Acme Packet 3900 chassis. The three screw holes of the chassis flange will only align in one direction.
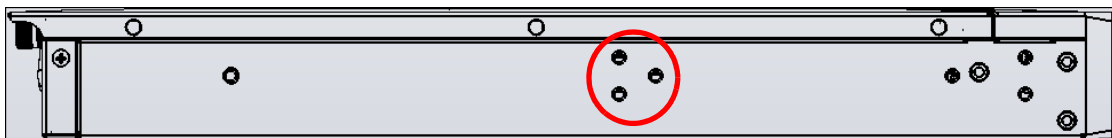


**Figure 3 - 55. Tapped Holes to Accommodate Center-Mounting Flange**

3. Using a Phillips head screwdriver, tighten the three 6-32 x 1/4" flat head screws to secure the flange to the chassis.
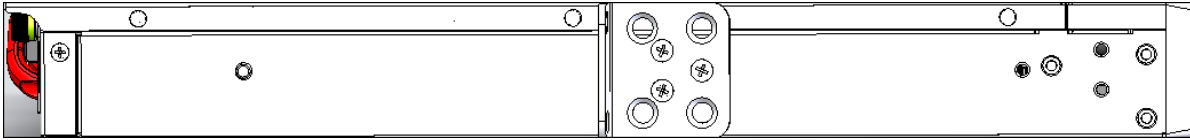


**Figure 3 - 56. Center-Mounted Flange Installed**

4. Repeat this procedure for the other side of the Acme Packet 3900 chassis.

**Installing the Chassis in the Rack**

The Acme Packet 3900 chassis is now ready to be installed into a 2-post equipment rack. To prevent personal injury or damage to the Acme Packet 3900 follow these guidelines:

• This installation requires two people and should not be attempted otherwise.

• Follow your organization's best practices for lifting and installing heavy components into an equipment rack.

• Ensure that the Acme Packet 3900 chassis remains supported until you have completely installed it into the equipment rack.

1. Locate the following components:

• Equipment rack screws (4)

2. Lift the Acme Packet 3900 into the desired position in the equipment rack.

3. Use a #2 Phillips screwdriver to secure two screws through the mounting flanges on the Acme Packet 3900 and into the equipment rack. One person should hold the Acme Packet 3900 in position while the other person screws the Acme Packet 3900 in place.

4. Ensure that the Acme Packet 3900 chassis remains supported until you have completely installed it into the equipment rack.

# Fan Module Installation

The fan module is pre-installed in the Acme Packet 3900 chassis when it ships. There is no need to remove the fan module prior to installation. In the event that this part needs service or replacement, you can remove and replace it with a functioning one.

# Ground and Power Cable Installation

The Acme Packet 3900 must be properly grounded to ensure efficient unit performance. Grounding your Acme Packet 3900 chassis is an extremely important part of the installation and maintenance procedures. Physical harm or problems with unit functionality may occur on the Acme Packet 3900 if it is not properly grounded. If your Acme Packet 3900 chassis is not properly grounded, the unit can exhibit unpredictable problems such as:

- Garbled output
- Sudden crashes
- Physical damage to the Acme Packet chassis and its hardware components

**Caution**

**Failure to ground the chassis properly can result in permanent damage to the Acme Packet 3900 and its components. Bodily harm may also result under some circumstances.**

**Caution**

**The Acme Packet 3900 does not support mixing AC and DC power supplies in the same chassis. A mixed power configuration is prohibited.**

Your equipment rack location must have a local earth ground. This ground can be either an unpainted spot on the grounded equipment rack frame, or a grounded bus bar in the equipment room.

## Chassis Grounding Cable Installation

The chassis grounding terminals are located on the rear of the Acme Packet 3900 chassis, to the left of the USB ports. The Acme Packet 3900 ships with 2 kep nuts screwed onto the ground terminals. Use an 11/32″ nut driver to remove and install these kep nuts.
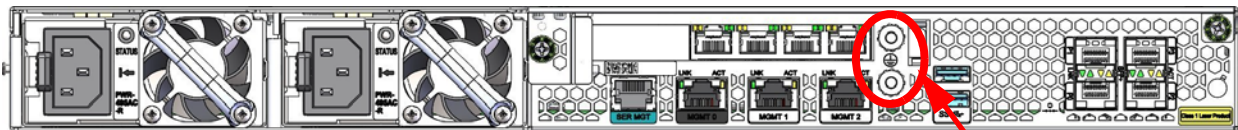


Chassis
Grounding Terminals

**Figure 3 - 57. Chassis Grounding Terminals**

This section shows you how to install the grounding cable on your Acme Packet 3900.

**Important:** Acme Packet 3900 equipment is suitable for installation as part of a Common Bonding Network (CBN).

> **Note:** The Common Bonding Network (CBN) is a term used for the connection of building steel, water pipes, cable racks, vertical and horizontal equalizer conductors, bonding conductors and electrical

metallic raceways within a building, when they are bonded together by either deliberate or incidental connections. The CBN is also connected to the building's grounding electrode system. Connections to the CBN are usually made from equipment frames to reduce voltage differences to acceptable levels when current flows through these frames, either during fault occurrences in the AC or DC power systems, or when lightning strikes.

**Caution**                    **Always make the ground connection first and disconnect it last when installing or removing the unit from an equipment rack.**

**To install the grounding cable on the Acme Packet 3900:**

1. Locate an 11/32″ nut driver, the grounding lug, and the grounding cable.

2. Using the 11/32″ nut driver, unscrew and remove the two kep nuts from the grounding posts located on the rear of the Acme Packet 3900. Place them aside.

3. Place the lug on the end of the grounding cable onto the grounding terminals.

4. Using the 11/32″ nut driver, tighten the two kep nuts onto the grounding Grounding Cable and Lug Attached to Grounding Terminal posts, securing the grounding lug in place. When attached correctly, the grounding lug fits snugly between the chassis's rear panel and the kep nuts. Kep Nuts Securing Grounding Cable to Grounding Terminals



**Figure 3 - 58. Chassis Grounding Cable with Lug Attached to Grounding Terminals**

5. Connect the other end of the grounding wire to a suitable grounding point at your site.

## AC Power Cord Installation

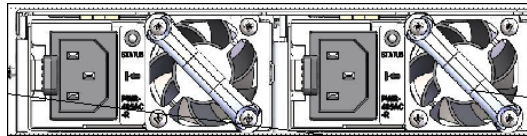This section explains you how to install an AC power cord.

**Important:** This equipment is intended for installation in locations where National Electrical Code (NEC) applies.

**To install the AC power cords in the Acme Packet 3900:**

1.  Locate the two AC power cords shipped with your Acme Packet 3900. Choose one power supply to work on first.



**Figure 3 - 59. Installed AC Power Supplies**

2.  Connect one power cord to the power supply by inserting the 3-lead IEC-60320 plug into the IEC connector located on the power supply.

3.  Connect the other power cord to the power supply by inserting the 3-lead IEC-60320 C13 plug into the IEC-60320 C14 IEC connector located on the power supply.

4.  Route the AC power cords through your rack and cabling system to the power outlets.

5.  Plug the supply end of each power cord into its own circuit.

    **Note: To remove AC power cables from the Acme Packet 3900, reverse the previous steps in this procedure.**

6.  You may wait to apply unit power until after you finish the cabling of the Acme Packet 3900, as is described in the rest of this chapter.
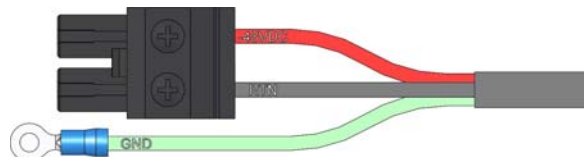
-- OR --

7.  Press the Power Pushbutton on the front panel of the Acme Packet 3900. The unit will start to boot.

## DC Power Cord Installation

This section explains you how to install a DC power cord.

**Important:** This equipment is intended for installation in Network Telecommunication Facilities.

| Caution | Use a 30 Amp fused circuit for each DC power supply. |
| --- | --- |

| Caution | Refer to the power supply's polarity label when connecting it to a power source. Failure to do so can result in equipment damage or serious injury. |
| --- | --- |

**To install the DC power cords in the Acme Packet 3900:**

1. Locate the DC power cord mating connector shipped with your Acme Packet 3900. Use this connector to fabricate a power cord as per your requirements. See Table 2-2 for wiring guide. Choose one power supply to work on first.



**Figure 3 - 60. Installed DC Power Supplies**

2. Using 5/16" nut driver, remove grounding nut from DC power supply and then use the same nut to secure #6 ring terminal from the DC cable.

3. Connect the plug from another 3-conductor power cord to the power connector located on the other DC power supply.

4. Route the DC power cords through your rack and cabling system to the power outlets.

5. Plug the supply end of each power cord into its own circuit.

   **Note: To remove DC power cables from the Acme Packet 3900, reverse the previous steps in this procedure.**

6. You may wait to apply unit power until after you finish the cabling of the Acme Packet 3900, as is described in the rest of this chapter.

-- OR --

7. Press the Power Pushbutton on the front panel of the Acme Packet 3900. The unit will start to boot.

# Cabling the Acme Packet 3900 System

After mounting the Acme Packet 3900 in an equipment rack and installing all components into the chassis, connect all appropriate data cables to the ports before powering the unit up and configuring it.

Oracle recommends using fully shielded CAT5e or CAT6 Ethernet cables for media and management Ethernet connections to protect the Acme Packet 3900 from potential damage.

You can install and remove Ethernet and GbE optical cables while the Acme Packet 3900 is operational. Not every port needs to be utilized for proper operation. However, when a cable is disconnected and the link is lost, an alarm is generated.

> **Warning:** The intra-building ports of the equipment are suitable for connection to intra-building or unexposed wiring or cabling only. The intra-building ports of the equipment must not be metallically connected to interfaces that connect to the Outside Plant (OSP) or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports, as described in GR-1089–CORE, Issue 6) and requires isolation from the exposed OSP cabling. The addition of primary protectors is not sufficient protection to connect these interfaces metallically to OSP wiring.

> **Note:** Intra-building ports include Media and Signaling Network Interfaces, Network Management Ports, Alarm Ports, and Console Port.

## Console Port

The Acme Packet 3900 has one console port located on the chassis rear panel. The Acme Packet 3900 ships with a console adapter that allows you to connect a standard DB-9 serial port to the Acme Packet 3900's RJ45 console port. Only one console port on the Acme Packet 3900 can be used at a time.
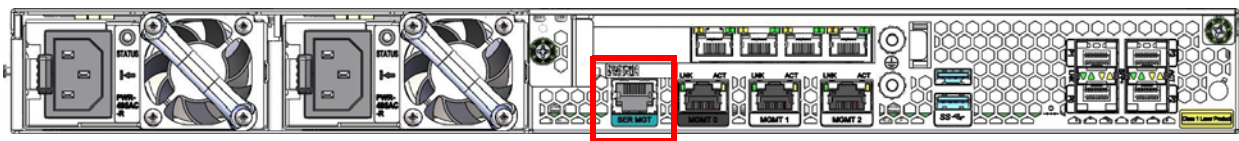


**Figure 3 - 61. Serial Management Port**

**Chassis Serial Management Port Cabling Procedure**

This section explains how to create a serial connection to the Acme Packet 3900 console port. Use the serial management port for permanent connections to a terminal server or other serial device.

**To connect a cable to the serial management port:**

1.  Locate a twisted pair cable to connect to the Acme Packet 3900.

2.  Remove the rubber dust cap from the Chassis console port if present.

3.  Insert the RJ45 connector on the end of the cable into the serial management port. The release tab on the RJ45 jack clicks into place when you insert it properly.

4.  Lead the cable neatly away from the rear panel toward a terminal server or other component where this serial connection terminates.

**Cabling the T1/E1 Port**

If you have purchased the optional four port T1/E1 interface module for TDM, you must cable the T1/E1 port(s). In centralized SIP trunking topologies this module preserves voice services in the event of a corporate WAN connectivity failure. In distributed SIP trunking topologies the module preserves dial-out voice services in the event of a local SIP trunk interface failure.

> **Note:** The RJ48C connector looks very similar to an RJ45 connector found on a typical CAT5 cable, but they are very different. A RJ48C connecter is fastened on to a STP (Shielded Twisted Pair) cable, not the standard UTP (Unshielded Twisted Pair) CAT-(1-5) cable. A RJ48C also uses a different pin out arrangement, voltage level, and line capacitance then a RJ45.

This section explains how to create a physical T1 or E1 connection to the Acme Packet 3900 T1/E1 port. Use the top rear bank of ports marked *T1/E1* for a permanent connection to Wide Area Network (WAN).
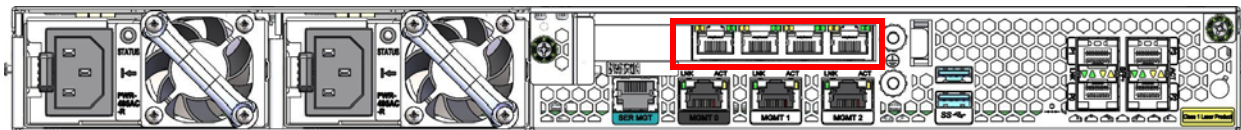


**Figure 3 - 62. T1/E1 Ports**

**To connect T1 or E1 cable to the WAN port:**

1.  Insert the RJ48C connector(s) on the end of the T1/E1 cable(s) into the port(s) labeled *T1/E1*.

2.  Lead the cable(s) neatly away from the rear panel toward the component where this connection terminates.

## Management Network Ports

Standard shielded CAT5e or CAT6 (or higher) Ethernet cables with RJ45 jacks are used for connecting the Acme Packet 3900 management Ethernet ports to your network. These ports support 10/100/1000 Mbps speeds.

All management ports can be used to connect the Acme Packet to your LAN. If you are going to use this Acme Packet 3900 for High Availability (HA), use ports 1 and 2.

> Note: Keep Ethernet cables separated from power cables by at least 60mm where possible and never run them in the same channel of a trunking system without segregation.

## Cabling Procedure

**To connect Ethernet cables to the rear panel Ethernet ports:**

1. Locate the Ethernet cables you plan to connect to the Acme Packet 3900.

2. Insert the RJ45 connector on the end of the Ethernet cable into one of the management Ethernet ports. These ports are labeled *Mgmt0*, *Mgmt1*, and *Mgmt2*. The release tab on the RJ45 jack will click into place when you insert it properly.

3. Route the cable away from the Acme Packet 3900. Make sure that the Ethernet cables are not stretched tightly or subject to extreme stress.

4. Repeat Steps 1 through 3 for each additional management Ethernet cable you will connect to your Acme Packet 3900.

> Note: As a rule, management network ports should be used in this way:

- *Mgmt0* should be reserved as the boot/maintenance interface.
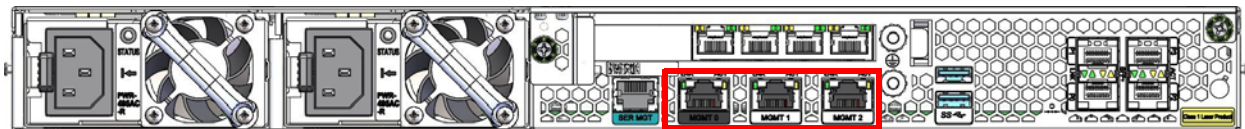- *Mgmt1* and *Mgmt2* are available for sharing HA information.



**Figure 3 - 63. Connect Ethernet Cables to Management Ports**

## Media and Signaling Network Interfaces

This section explains how to cable the rear panel of the Acme Packet 3900 for media and signaling. The rear panel is available with either copper or optical SFP Ethernet connectors. The media and signaling ports that can be configured are any combination of P01, P02, and P03; all of the ports are ethernet 10/100/1000 Ethernet ports.
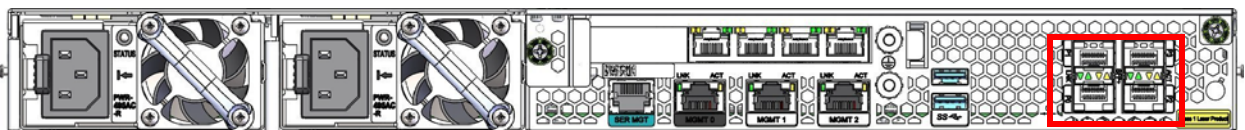


**Figure 3 - 64. Signaling & Media Ports**

Perform all cabling procedures according to the established standards for your organization.

**Copper Cabling Procedure**

Your Acme Packet 3900 will be shipped with the type of interface required for your production network when you ordered the unit.

Shielded CAT 5e or CAT 6 (or higher) Ethernet cables with RJ45 jacks are used for connecting the Acme Packet 3900 10/100/1000 Mbps signaling and media network

**To connect 1GbE Copper cables to the signaling and media ports:**

1. Locate the Ethernet cables you plan to connect to the Acme Packet 3900.

2. Insert the connector on the end of the cable into one of the media and signaling ports.

3. Route the cable away from the Acme Packet 3900. Make sure that the Ethernet cables are not stretched tightly or subjected to extreme stress.

4. Repeat Steps 1 through 3 for each additional cable you connect to your Acme Packet 3900.

**SFP Optical Cabling Procedure**

This section explains how to cable a Acme Packet 3900 configured with optical interfaces. Standard single mode or multimode fiber optic cabling with duplex LC connectors are used to connect the Acme Packet 3900 to your network.

**Fiber Optic Cable Handling**

When handling a fiber optic cable:

- Never touch the polished end of fiber cable.

- To prevent serious eye damage, never look directly into a fiber optic cable connector or mating adapter.

- Clean all fiber optics before installing them into your network according to prescribed procedures.

- Ensure that the bend radius of your fiber cables is kept to a minimum of 3″ or that specified by the fiber cable manufacturer.

- Perform all cabling procedures according to the established standards for your organization.

**To connect network optical cabling to the optical physical interface cards:**

1. **Locate the fiber optic cables you plan to connect to the Acme Packet 3900**; *P0, P1, P2 and P3* (1GbE).

2. Connect the optical cables to their corresponding ports.

3. Route the cable away from the Acme Packet 3900. Make sure that the fiber optic cables are not stretched tightly or subjected to extreme stress.

4. Repeat Steps 1 through 6 for each additional fiber optic cable you connect to your Acme Packet 3900.

# Cabling for High Availability Deployments

The information and instructions in this section explain how to cable an HA node.

**HA Cabling**

Category 5 (or higher) shielded Ethernet cables are required for cabling two HA nodes together.

You can use one or two connections for HA redundancy support between the two members of an HA node. Using two rear interfaces for sharing redundancy information provides a high level of reliability. As a rule, network management ports should be used in this way:

- *Mgmt0* should be reserved as the boot/maintenance interface.
- *Mgmt1* and *Mgmt2* are available for sharing HA information.
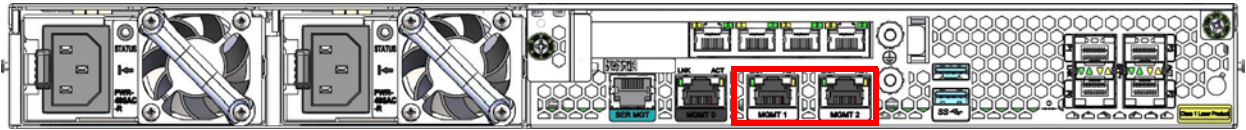


**Figure 3 - 65. Network Management Ports**

**Note:** Management network ports feature automatic crossover negotiation so that a crossover cable is not necessary for HA cabling.

**To cable Acme Packet 3900 in an HA configuration using single rear interface support:**

1. Insert one end of an Ethernet cable into either *Mgmt1* or *Mgmt2* on the rear panel of the Acme Packet 3900 A. The release tab on the RJ45 jack clicks into place when you insert it properly.

2. Insert the other end of the Ethernet cable into the corresponding management interface on the rear panel of the Acme Packet 3900 B. The release tab on the RJ45 jack clicks into place when you insert it properly. If you use *Mgmt1* on Acme Packet 3900 A, then you will connect it to *Mgmt1* on Acme Packet 3900 B.

3. Refer to the configuration procedures located in the *HA Nodes* chapter of the *Acme Packet Configuration Guide*.
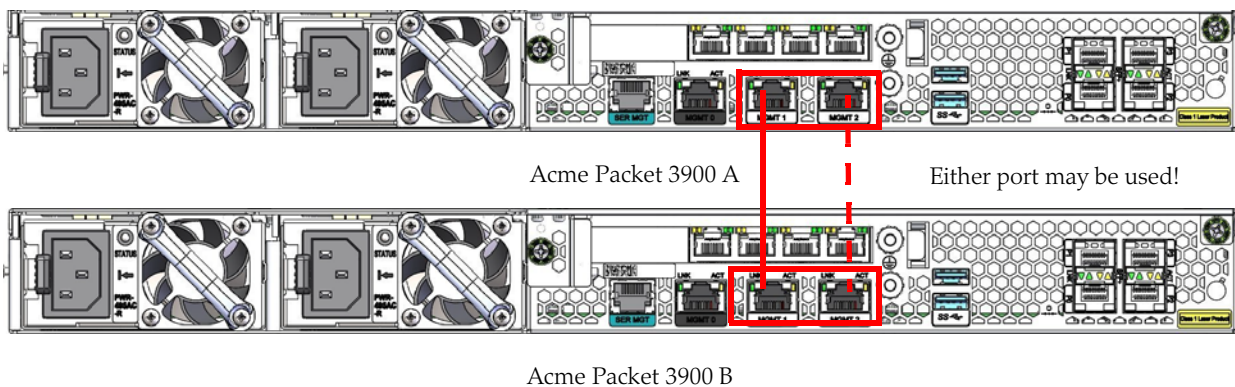


Acme Packet 3900 A          Either port may be used!

Acme Packet 3900 B

**Figure 3 - 66. HA Configuration (Either of the Cabling Connections Can Be Used)**

**To cable Acme Packet 3900 Systems in an HA configuration using dual rear interface support:**

1. Insert one end of an Ethernet cable into *Mgmt1* on the rear panel of Acme Packet 3900 A. The release tab on the RJ45 jack clicks into place when you insert it properly.

2. Insert the other end of the cable into the *Mgmt1* port on the rear panel of Acme Packet 3900 B.

3. Insert one end of a second Ethernet cable into *Mgmt2* on the rear panel of Acme Packet 3900 A.

4. Insert the other end of the cable into *Mgmt2* on the rear panel of Acme Packet 3900 B.

5. Refer to the configuration procedures located in the *HA Nodes* chapter of the *Acme Packet Configuration Guide*.



Acme Packet 3900 A                    Both Ports are Used
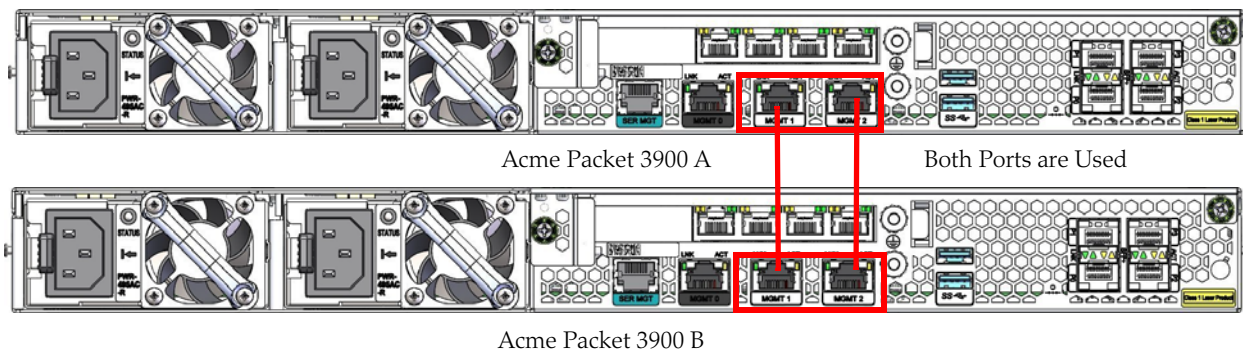
Acme Packet 3900 B

**Figure 3 - 67. HA Configuration (Both of the Cabling Connections Must Be Used)**

**Media Cabling for HA Nodes**

The rear panel media port cabling in an HA node depends on network topology. After a switchover between the two Acme Packet 3900 s in an HA node, the standby unit sends out an ARP message using a configured virtual MAC address, establishing that MAC on another physical port on the same Ethernet switch.

**Apply power to the Acme Packet 3900**

If you have not done so earlier in the installation procedure, press the Power Pushbutton on the front panel of the Acme Packet 3900. The unit will start to boot.

# 4                                                            Startup

## Introduction

This chapter describes Acme Packet 3900 startup that involves two tasks:

*   Powering on the Acme Packet 3900
*   Creating the first console connection to the Acme Packet 3900

You can perform these actions in any order. However, if your console connection is configured first, you can observe the booting processes as your Acme Packet 3900 goes online.

The last section of this chapter explains how to login to your system.

## Creating a Console Connection

This section explains how to create a console connection.

**Prerequisites**

In order to create a console connection to the Acme Packet 3900, you must configure the terminal hardware and software appropriately.

**Table 4 - 4.   Terminal Application Serial Settings for Use with the Console Port**

| Serial Connection Parameter | Setting |
| --- | --- |
| Baud Rate | 115,200 bps |
| Date Bits | 8 |
| Parity | No |
| Stop Bit | 1 |
| Flow Control | None |

Note:  Your terminal application and serial port MUST be capable of operating at 115.2 Kbps for creating a console session.

**Creating a Console Connection**

**To create a console connection:**

1.  Set the terminal application's parameters to match the Acme Packet 3900 default parameters.

2.  The Acme Packet 3900 console port is located on the Acme Packet 3900 rear panel. You <u>should</u> be connected to the console port when initially booting the Acme Packet 3900.

3.  If the Acme Packet 3900 is already powered on, press the Enter key a few times to activate the console connection. When ACLI text is displayed on the screen, the console connection has been successfully created.

4. If you have created the console connection before powering up the Acme Packet 3900, you can watch the boot process as it displays on your screen.

# Powering On the Acme Packet 3900 System

This section explains how to power on your Acme Packet 3900 System.

**Prerequisites**

The following procedure presumes that you know how to connect your Acme Packet 3900 to either AC or DC power.

**To power on the Acme Packet 3900 hardware:**

1. Plug in the appropriate AC or DC power cords for your device.

   **Note:** When operating with redundant power supplies, both power supplies must be plugged in either simultaneously or within a few seconds of each other. If the second power supply is on long enough after the first, an alarm is generated.

   **Note:** When operating with a single power supply, the LED on the power supply will flash continuously. The device has properly noted the absence of the other power supply and is logging it.

# Initial Log on

Once you have established the console connection, powered on the Acme Packet 3900 and a runtime image has been loaded, you are ready to login and begin configuring the system. After the Acme Packet 3900 has initialized, the ACLI login prompt appears in your terminal application as follows:

```
User Access Verification
Password:
```

If the Acme Packet 3900 completed booting before you connected to the console port, press the <Enter> key on the console keyboard a few times to activate the console connection.

The Acme Packet 3900 will be shipped with a default (manufacture) password for both user and admin level. Upon logging in the first time (for user and admin levels), you will be required to change your password.

Unit access in the following procedure uses User and Superuser passwords.

1. At the ACLI Password prompt, enter the appropriate User password information and press <return>. Your entries are not echoed on the screen.

   ```
   User Access Verification

   Password:
   ACMEPACKET>
   ```

   From the User prompt you can view various configuration states and operating statistics on the Acme Packet 3900 and perform configuration tasks.

2. Type **enable** and press <return> to enter Superuser mode. The prompt to enter the Superuser password appears.

```
ACMEPACKET> enable
Password:
```

3. Enter the Superuser password and press <return>. The unit prompt will end with a pound sign instead of a closed-angle-bracket to let you know are in Superuser mode.

```
Password:
ACMEPACKET#
```

4. You can now begin configuring your Acme Packet 3900. Refer to the *Acme Packet Configuration Guide* to learn how to establish an IP address for your Acme Packet 3900.

If you have any questions about booting or powering on your system, please contact customer support.

# 5                                      Maintenance

## Introduction

This chapter explains Acme Packet 3900 hardware maintenance procedures.

Although most user-replaceable components (also called Field Replaceable Units or FRUs) of the Acme Packet 3900 are hot-or warm-swappable, some limited Acme Packet 3900 maintenance procedures require that you shut down the system.

Examples of maintenance procedures which require you to shut down the unit include:

- Removing the unit from the equipment rack for any reason
- Removing the cover from the chassis
- Replacing transcoder DSP modules
- Replacing the T1/E1 TDM card.

General Caveats for Acme Packet 3900 maintenance:

- Always observe correct ESD procedures.
- Before you start any maintenance procedure which includes parts replacement, make sure you have the correct part on-hand. Any user-replaceable components may be ordered in advance from Oracle.
- Oracle recommends stocking replacement parts for:
    - Air filters
    - Fans
    - Power supplies
    - Optical Transceivers
    - DSP modules



**Figure 5 - 68.  ESD Grounding Strap**

# Unit Shutdown

Before you shut down or restart the Acme Packet 3900, ensure that there are no active calls in progress. The command to show active calls is "show sessions."

```
ACMEPACKET# show sessions
```

Procedures to reroute call and network traffic around the Acme Packet 3900 are outside the scope of this guide.

You can set the Acme Packet 3900 to reject all incoming calls from your unit with the ACLI *set-system-state* command. When set to offline, this command lets calls in progress continue uninterrupted, but no new calls are admitted.

After all call processing has stopped, you can power off your Acme Packet 3900. Shutting down the unit is appropriate when you are replacing a power supply or are removing the Acme Packet 3900 from the equipment rack.

## Rejecting Incoming Calls

**To reject all incoming calls on the Acme Packet 3900 System:**

1. In Superuser mode, type *show sessions* to see all the current calls.

   ```
   ACMEPACKET# show sessions
   ```

2. Type *set-system-state offline* and press <Enter>.

   ```
   ACMEPACKET# set-system-state offline
   Setting system state to going-offline, process will complete when all
   current calls have completed
   ACMEPACKET#
   ```

## Shutting Down the Acme Packet 3900 System

**To shut down the Acme Packet 3900 hardware:**

1. In Superuser mode, type *halt* and then press <Enter>.

2. To confirm the halt request, type *Y* and then press <Enter>.

3. When the console indicates shutdown is completed, unplug the AC power cords from the power supplies on the rear panel of the Acme Packet 3900.

4. Confirm that all fans are off.

# Rebooting, Resetting, and Power Cycling

## Reboot

Rebooting the Acme Packet 3900 shuts down the unit in an orderly fashion and then automatically restarts it. The operating system gracefully shuts down as processes are terminated and the file system is stopped. While the system and its processes are stopped, all call processing is immediately halted. You may therefore wish to perform tasks that call for a reboot during off-peak maintenance hours.

Rebooting the Acme Packet 3900 is required every time you upgrade with a new version of the Acme Packet 3900 software.

Save your configurations before rebooting the Acme Packet 3900. Refer to the *Maintenance and Troubleshooting Guide* for a full explanation of this procedure. The *save-config* command is used to save the configuration in the example below.

For a full explanation and all options for the **reboot** command used in the example below, refer to the *ACLI Reference Guide*.

**To reboot the Acme Packet 3900:**

1.  Save any configuration changes you have made in the ACLI while in Superuser mode by typing *save-config* <Enter>.

    ```
    ACMEPACKET# save-config
    Save-Config received, processing.
    waiting 1200 for request to finish
    Request to 'SAVE-CONFIG' has Finished,
    Save complete
    Currently active and saved configurations do not match!
    To sync & activate, run 'activate-config' or 'reboot activate'.
    ACMEPACKET#
    ```

2.  Execute the **reboot** command at the Superuser prompt by typing *reboot* **and** then pressing <Enter>.

    ```
    ACMEPACKET# reboot


    ---------------------------------------
    WARNING: you are about to reboot this SD!
    ```

3.  Type *Y* and then press <Enter> at the confirmation prompt to proceed with the reboot.

    ```
    Reboot this SD [y/n]?: y
    ```

## System Reset

Resetting the Acme Packet 3900 via the reset pushbutton on the right rear of the chassis panel performs a cold reboot. This action is the equivalent of disconnecting the power from the unit and then reconnecting it. There is no orderly termination of tasks, and the unit shuts down abruptly. You should only reset the Acme Packet 3900 when it becomes unstable and no other means of gaining administrative control is possible.

During a system reset, certain files are not closed properly, and they may become corrupted. If an unclean shutdown is detected, file system recovery/repair will be run to ensure the system returns to a stable state. File system verification also runs every 30 boots as a precautionary measure.

Caution    **Always try to first reboot the Acme Packet 3900 from the ACLI before performing a cold reset. Only reset the unit as a last resort.**

**To reset the Acme Packet 3900:**

1. Insert a rigid paperclip-sized tool into the small hole on the rear bottom of the chassis, between the USB ports and the Signaling and Media ports. The system immediately resets and begins its initialization and boot sequence.



USB Ports    Reset Button    Signaling/Media Interfaces
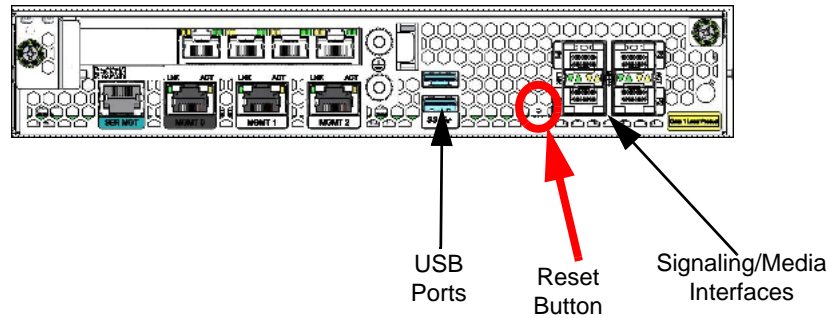
**Figure 5 - 69.  Reset Button**

## Power Cycling

Power Cycling the Acme Packet 3900 is the process of turning the chassis off and then on again. You can do this by pressing the power pushbutton on the front right bezel. When power cycling, it is imperative that you wait at least 10 seconds between power down and power up to ensure that all components are completely powered down before restarting the system.
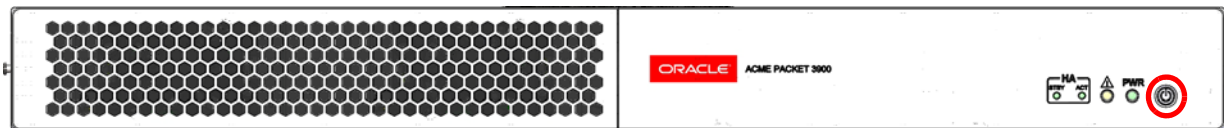


**Figure 5 - 70.  Power Pushbutton**

# Standby State for High Availability Nodes

When performing hardware maintenance on the Acme Packet 3900, it is best to minimize any risk of interrupting network traffic or losing data. If the Acme Packet 3900s are configured as High Availability (HA) nodes, you should only work on the Acme Packet 3900 that is in Standby state.

There are two ways to determine the HA state of each Acme Packet 3900 in an HA pair.

1. If you are in the same physical location as the Acme Packet 3900 you can view the HA LEDS on the front bottom right. A standby unit lights the STBY LED, while an active unit lights the ACT LED.
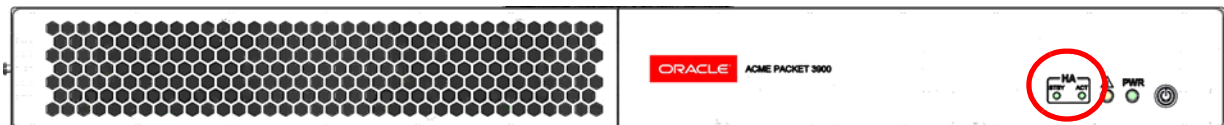


2. If you are not in the same physical location as the Acme Packet 3900, you can use the ACLI *show health* command. The output of this command indicates the current HA state of the Acme Packet 3900. See Figure 5-3 for examples.

Once you have determined that the Acme Packet 3900 due for maintenance is in standby state, you can continue with the appropriate procedures to replace a part.

If you need to perform maintenance on the active Acme Packet 3900 you need to manually force the two Acme Packet 3900s to switch HA states. Forcing a switchover renders the currently active Acme Packet 3900 in Standby state, and the current standby Acme Packet 3900 will assume all traffic processing and forwarding as the active system.

**Caution**

**This procedure is only applicable to Acme Packet 3900 in an HA deployment.**

**To force a Acme Packet 3900 into the standby HA state:**

1. Confirm that the relevant Acme Packet 3900 systems on active and standby are synchronized with the *show health* command. Type *show health* and press <Enter> on each unit as shown in the following.

```
NETNETSBC1# show health

        Media Synchronized            true
        SIP Synchronized              true
        MGCP Synchronized             true
        H248 Synchronized             disabled        synchronized
        Config Synchronized           true            applications
        Collect Synchronized          disabled
        Radius CDR Synchronized       disabled
        Rotated CDRs Synchronized     disabled
        Active Peer Address           0.0.0.0

Redundancy Protocol Process (v3):
        State                         Active      ◄── active system
        Health                        100
        Lowest Local Address          169.254.1.1:9090
        1 peer(s) on 2 socket(s):
        SML-STIC-39002: v3, Standby, health=100, max silence=1050
                        last received from 169.254.1.2 on wancom1:0


        Switchover log:
        Jun 25 19:03:02.029: Active to Becoming Standby
        Jun 25 19:04:54.684: Standby to Becoming Active
NETNETSBC1#


NETNETSBC2# show health

        Media Synchronized            true
        SIP Synchronized              true
        MGCP Synchronized             true
        H248 Synchronized             disabled
        Config Synchronized           true            synchronized
        Collect Synchronized          disabled        applications
        Radius CDR Synchronized       disabled
        Rotated CDRs Synchronized     disabled
        Active Peer Address           169.254.2.1

Redundancy Protocol Process (v3):
        State                         Standby     ◄── standby system
        Health                        100
        Lowest Local Address          169.254.1.2:9090
        1 peer(s) on 2 socket(s):
        SML-STIC-39001: v3, Active, health=100, max silence=1050
                        last received from 169.254.2.1 on wancom2:0

        Switchover log:
```

**Figure 5 - 71. Show Health Command Examples**

2.  Confirm that current configurations of both the active and standby Acme Packet 3900 match by typing *display-current-cfg-version* and press <Enter> at the ACLI prompt.

    NETNETSBC1# **display-current-cfg-version**
    Current configuration version is 5
    NETNETSBC1#

    NETNETSBC2# **display-current-cfg-version**
    Current configuration version is 5
    NETNETSBC2#

    **Note:** While the two current configuration version numbers on the two systems do not need to match each other, they MUST match the shared running configuration version.

3.  Confirm that running configurations of the active and standby Acme Packet 3900 match by typing *display-current-cfg-version* and press <Enter> at the ACLI prompt.

    NETNETSBC1# **display-running-cfg-version**
    Running configuration version is 5
    NETNETSBC1#

    NETNETSBC2# **display-running-cfg-version**
    Running configuration version is 5
    NETNETSBC2#

    **Note:** While the two running configuration version numbers on the two systems do not need to match each other, they MUST match the shared current configuration version.

4.  Initiate a switchover between active and standby Acme Packet 3900s by typing *notify berpd force* on the standby Acme Packet 3900 and then pressing <Enter> at the ACLI prompt.

    NETNETSBC1# **notify berpd force**

5.  Wait for the other Acme Packet 3900 to transition to the standby state. Confirm that it is in the standby state by typing *show health* and pressing <Enter> at the ACLI prompt.

    NETNETSBC2# **show health**

Preparing the Acme Packet 3900 for Maintenance

The Acme Packet 3900 was designed so that it is not necessary to remove the chassis from the equipment rack for maintenance if there is adequate room to access the chassis for the desired procedure. The chassis cover is secured by the two thumb screws on the rear panel of the chassis.

> **Note:** Any time you are going to remove the cover from the Acme Packet 3900 for maintenance (for example, if you are going to replace a faulty DSP or T1/E1 TDM module), be sure to gracefully power down the system, then remove the power cords. You must also ensure that you are grounded before you remove the chassis cover.

# Maintenance Procedures that do not require powering down the system

You can perform these maintenance tasks without powering down the Acme Packet 3900 system:

- Clean air inlets in the front left bezel
- Replace air filters
- Clean fan modules
- Remove and replace individual fans
- Remove and replace power supplies
- Remove and replace optical transceivers

**Maintaining the Cooling Components**

The Acme Packet 3900 air filter removes airborne particles before they are drawn into the Acme Packet 3900 chassis. To prevent unit malfunction and prolong the life of the unit's cooling components, do these things:

- Replace the air filter every three months
- Clean the air inlets once a week.

Cooling maintenance encompasses cleaning the fan module and cleaning the air inlets on the front of the Acme Packet 3900 chassis. Cleaning the fan module requires that you remove the module itself. If you are not shutting down the Acme Packet 3900, this procedure must be performed quickly or else the unit may overheat and cause packet processing to stop.

This maintenance should be performed alongside other preventive maintenance to take place within a planned maintenance or downtime window, during off-peak hours.

**Fan and Air Filter Maintenance**

This section explains how to replace the air filter and install a fan and on your Acme Packet 3900.

> **Note:** You can perform routine maintenance on the Acme Packet 3900 front panel fans and air filter with the unit normally installed in the equipment rack. Also, you do not need to remove the the power from the chassis.

**Cleaning the Cooling Components**

**To clean the perforated air inlets:**

1. Remove the bezel from the chassis by gripping the two left corners and pulling on it. The bezel is held on magnetically.
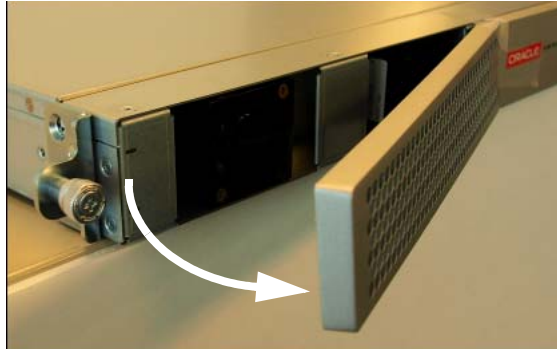


**Figure 5 - 72.  Removing the Front Bezel Covering the Chassis Fans**

2. Place the bezel face down.

3. On the back of the bezel, pull off the air filter.
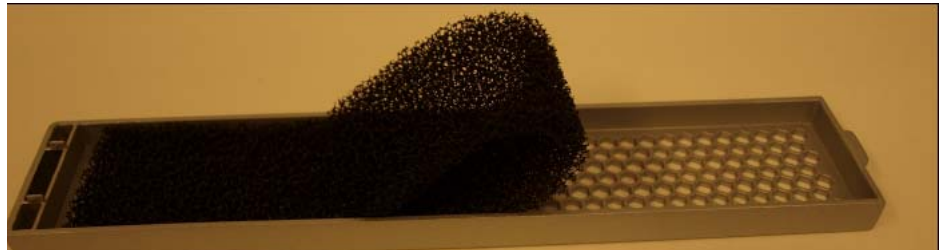


**Figure 5 - 73.  Removing and Replacing the Air Filter from Behind the Front Bezel**

4. Gently wipe the front fan bezel that contains the perforated air inlets with a clean, dry cloth. You can alternatively remove the fan bezel from the unit and use compressed air to clean out the perforated air inlets.

**Caution**

**To prevent damage to the painted finish, do not use any solvents or liquids to clean the perforated air inlets on the front of the chassis.**

5. Replace the air filter with a new one. Do not reuse the worn air filter. You can order air filters from Oracle.

6. Install the new air filter carefully in place behind the front bezel.
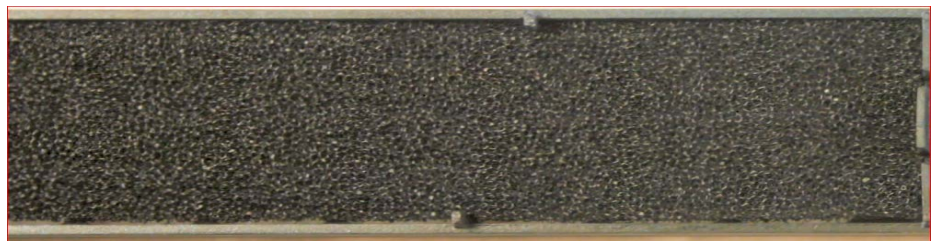


**Figure 5 - 74.  Air Filter Installed Behind the Front Bezel**

**Note:** Only the removable fan bezel has vent holes that require cleaning.

7. Install the front bezel onto the Acme Packet 3900 by hooking the right side of the bezel into the slot cut out on the right bezel and then pivoting the bezel to the left until the magnet catches the chassis.

## Removing and Replacing Individual Fans

The individual fan is a user-serviceable, hot-swappable component. There are two individual fans in the Acme Packet 3900. If the Acme Packet 3900 experiences a fan malfunction, you must remove the faulty fan and replace it with a functional one.

**Note:** When removing and replacing a fan, remember to first ground yourself using appropriate ESD grounding equipment such as a wrist or heel strap.

The hot-swappable fan removal and replacement procedures require that you have a replacement fan on hand. In order to maintain unit operations, you must be able to remove the malfunctioning fan and quickly replace it with a functioning one to prevent the unit from overheating. To obtain a replacement fan, contact Oracle customer support.

The Acme Packet 3900 air filter is located behind the front bezel and is a Field Replaceable Unit (FRU).

Caution

---

**An over temperature condition can stop packet processing.**

---

If you do not have a replacement fan nearby, always shut down the unit and disconnect the power before removing the malfunctioning fan to replace at a later time.

## Cleaning a fan module

**To clean the fan module:**

1. Remove the fan module from the chassis.
2. Spray compressed air into the fan module to dislodge and blow away any contaminants and clean out the fans.
3. Replace the fan module.

**To remove a fan:**

1. Press two fingers against the back of the left end of the plastic fan bezel and pull it directly toward you. The fan bezel comes off the chassis. Set the fan bezel aside. The individual fans are now exposed.
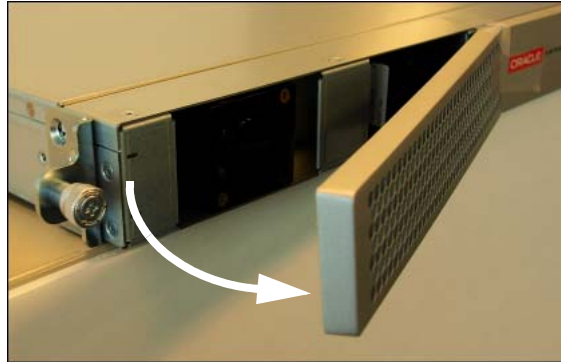


**Figure 5 - 75.  Removing the Front Bezel**

2. Using a small bladed screwdriver, unscrew the captive screws at the upper left and lower right corners of the individual fan you are replacing.

   **Note:** There are two silver slot head screws - one on the upper left and one on the lower right of the fan case. They have a label with a green arrow pointing to each of them. These are the screws you loosen or tighten.

3. Pull the individual fan you just unscrewed directly toward you, out of the chassis. Move the fan to an ESD-safe location.
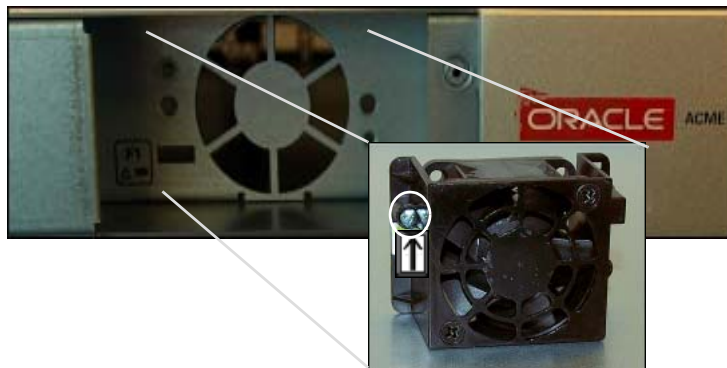


**Figure 5 - 76.  Removing the Fan**

## Install Individual Fans

Replacing the fan is the reverse process as removing it.

**To install a fan:**

Note: The PCB power connector must be on the lower left side of the fan module when inserted into the Acme Packet 3900 chassis.

1. Remove the fan you need to replace.

2.  Carefully align the pins on the back of the new fan with the holes in the chassis midplane and insert the fan into the slot.



Empty Fan Slot

Back of Fan Module
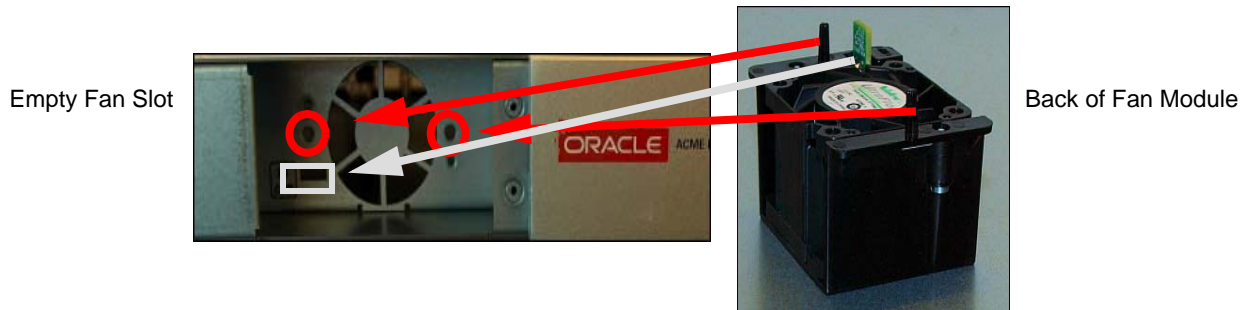
**Figure 5 - 77.  Fan Slot Pin Holes (Red) and Chassis Slot and Fan Plug (Yellow)**

3.  Using a small flat-blade screwdriver, tighten the two captive screws to hold the fan in place.

4.  Install the front bezel onto the Acme Packet 3900 by hooking the right side of the fan bezel behind attached right front bezel and then pivoting the fan bezel to the left until the magnet catches the chassis. You may need to push on the left side of the fan bezel to fully seat it.
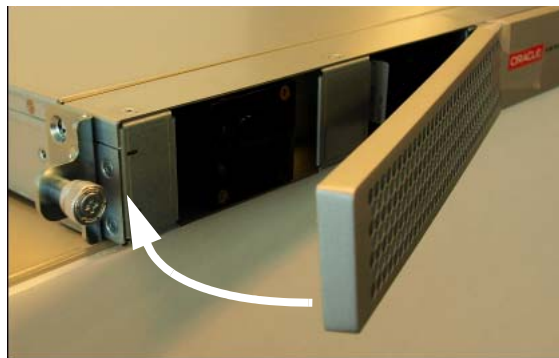


**Figure 5 - 78.  Replacing the Front Bezel**

5.  The replacement fan and Bezel are installed onto the Acme Packet 3900.

If you do not have a replacement fan nearby, always shut down the unit and disconnect the power before removing the malfunctioning fan to replace at a later time.

## Power Supply Removal and Replacement

This section explains how to remove and replace the power supplies in the Acme Packet 3900 chassis.

Caution

**After physically unplugging a power supply, disconnect it from the power source before you remove or install it in the chassis.**

The power supply is a user-replaceable component. If an Acme Packet 3900 power supply malfunctions, you should remove the malfunctioning power supply and replace it.

**Note:** Power supplies can be removed from the chassis while it is still installed in the rack and while the second power supply is providing unit power; this is called a *warm swap*.

**Note:** When removing and replacing a power supply, remember to first ground yourself using appropriate ESD grounding equipment such as a wrist strap.

## Remove power supplies

**To remove a power supply from the Acme Packet 3900 chassis:**

1. Remove the power cables from the power supplies.
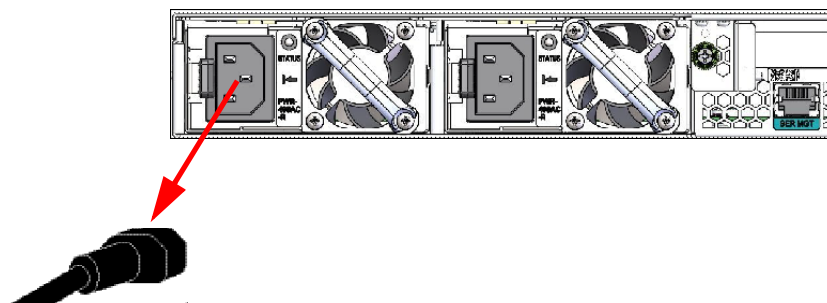


**Figure 5 - 79. Removing the Power Cords**

2. With your thumb, push the black locking tab to the right to unlock the power supply from the chassis.
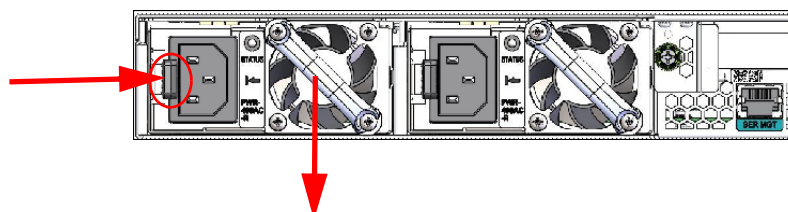


**Figure 5 - 80. Releasing the Locking Tab**

3. Holding the handle, pull the power supply towards you. This will disengage the power supply from the midplane and the chassis.

4. Continue pulling the power supply towards you until it is completely out of the chassis.

5. Move the power supply to an ESD-safe location.

**Caution**

NEVER power up a power supply before it is installed in the Acme Packet 3900 chassis.

**Note:** Ground yourself with an ESD wrist strap before installing a power supply.

## Replace power supplies

**To install a power supply in the Acme Packet 3900 chassis:**

1. Locate the power supply to be installed.

2. Locate the empty power supply slot in the chassis.

3. Insert the power supply into the empty power supply slot located on the rear panel of the Acme Packet 3900 chassis. The labels on the power supply face upward.
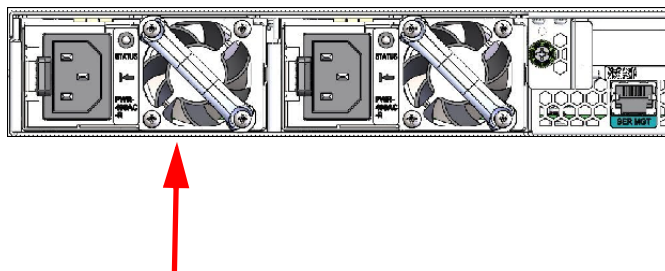


**Figure 5 - 81.  Installing the Power Supply**

4. Push the power supply handle until the power supply is engaged with the mid plane.

5. The power supply is installed in the Acme Packet 3900 chassis.

6. Connect the power cord to the inserted power supply.
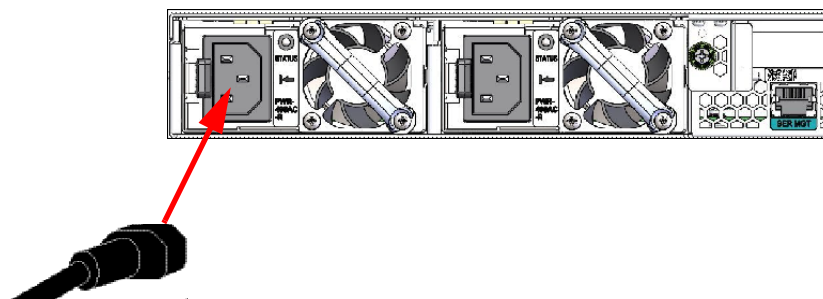


**Figure 5 - 82.  Installed Power Supplies**

## Optical Transceiver Removal and Replacement

Your troubleshooting and diagnostics might reveal that the optical transceiver component of an optical physical interface card needs to be replaced. The optical transceiver serves two functions:

• Converts electrical signals into optical signals used to communicate with other optical networking equipment.

• Serves as the receptacle for the LC duplex fiber optic connectors.

Optical transceivers are hot swappable and may be replaced while the Acme Packet 3900 is powered on.

To obtain a replacement optical transceiver, contact customer support.

| Caution | To prevent damage to the optical lens, Oracle recommends that the protective dust cover stay on the optical transceiver port when the physical interface card is not cabled. |
|---|---|

## Removing an Optical Transceiver

**To remove the transceiver from an chassis rear panel transceiver port:**

1. Unplug all fiber optic cables from the optical transceiver to be replaced.



**Figure 5 - 83.  Transceiver Ports**

2. Pull the bale clasp latch out and down. It will pivot downwards on its hinge.
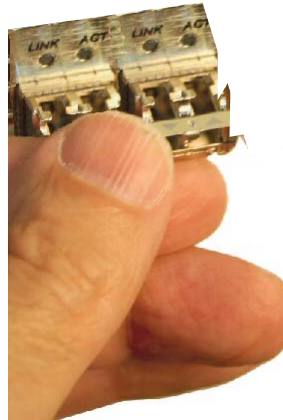


**Figure 5 - 84.  Lowering the Bale Clasp Latch**

3.  Holding the extended bale clasp latch, pull the optical transceiver fully out of its socket of the physical interface card.



**Figure 5 - 85.  Removing the Optical Transceiver**

**Install an Optical Transceiver**

**To install an optical transceiver:**

1.  Slide the replacement optical transceiver into the socket on the rear chassis panel.
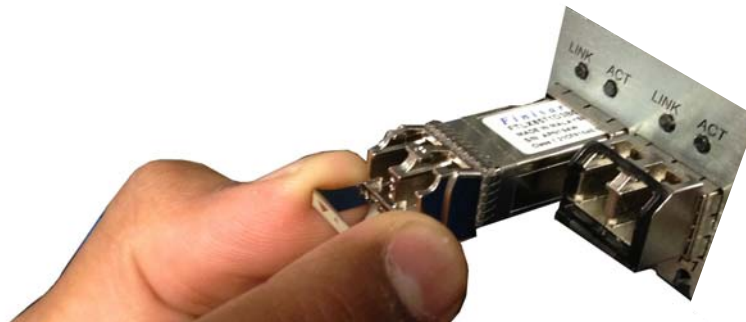


**Figure 5 - 86.  Inserting the Optical Transceiver into the Socket**

2.  Press on the face of the optical transceiver to seat it in the socket.



**Figure 5 - 87.  Seating the Optical Transceiver**

3. Flip the bale clasp latch back into the rest position.
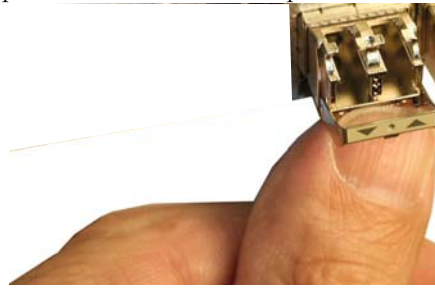
**Figure 5 - 88.  Closing the Clasp Latch**

4. Reconnect the optical cables to their corresponding ports.
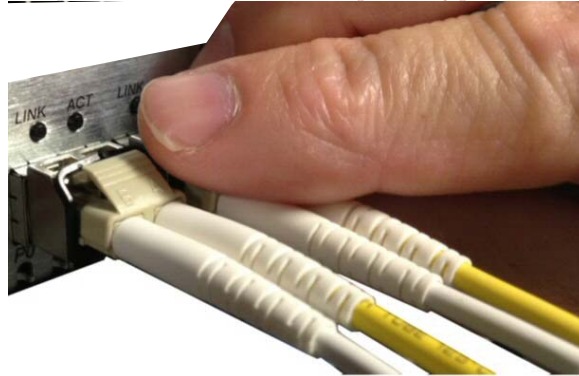
**Figure 5 - 89.  Reconnecting Optical Cables**

**Copper Transceivers**

Copper transceivers are also available for the Acme Packet 3900 System. They are removed and replaced similarly to the optical transceivers.

# Maintenance Procedures that require powering down the system

You must power down the Acme Packet 3900 in order to:

- Remove the chassis cover from the Acme Packet 3900
- Remove the Acme Packet 3900 from an equipment rack
- Remove and replace transcoder DSP modules
- Remove and replace T1/E1 TDM modules

## Removing the Acme Packet 3900 Chassis Cover

You can leave the Acme Packet 3900 mounted in the rack if you have room to perform your maintenance without removing it. Rack mounting does not interfere with removing the chassis cover.

Caution

**Always gracefully power down the Acme Packet 3900 then disconnect the power supplies from the power source when removing the chassis cover**

**To remove the Acme Packet 3900 chassis cover:**

1. Ensure that there is enough space surrounding the Acme Packet 3900 to allow for the type of maintenance you are to preform.

2. Ensure that there is enough slack in the unit cabling to allow the chassis to slide forwards far enough to comfortably perform maintenance tasks.

3. Remove the power from the Acme Packet 3900 system.

4. Locate the two captive thumbscrews on the rear panel of the the system.
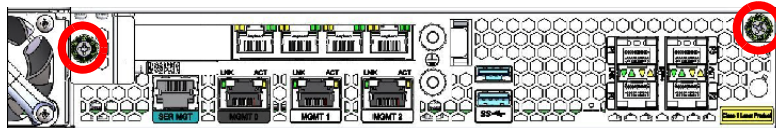


Figure 5 - 90. Captive thumbscrews on the rear chassis of the system.

5. Turn the thumbscrews counter-clockwise until they turn freely.

6. Locate the two captive thumbscrews on the front panel of the the system.

7. Turn the thumbscrews counter-clockwise until they turn freely.

8. Pull the Acme Packet 3900 to the front of the rack until the chassis assembly stops.



**Figure 5 - 91.  Extended chassis system**

9. Push the chassis cover backwards about 1/2 inch.

10. Lift the cover upwards until it is free from the chassis.

11. Set the cover aside.

# Chassis Removal

This section explains how to remove the Acme Packet 3900 from an equipment rack. To prevent injury, Acme Packet recommends that any time a Acme Packet 3900 is installed or removed from an equipment rack, two people complete the procedure.

| Caution | You must first review the safety precautions for the Acme Packet 3900 prior to removing from an equipment rack. |
|---|---|

| Caution | Always gracefully power down the Acme Packet 3900 then disconnect the power supplies from the power source when removing a chassis from an equipment rack |
|---|---|

| Caution | Label and disconnect all cables from the Acme Packet 3900 unit when removing a chassis from an equipment rack |
|---|---|

## Removing the Acme Packet 3900 Unit from an Equipment Rack

**To remove the Acme Packet 3900 from an equipment rack:**

1. Power down the unit gracefully using the ACLI commands.

2. Depress the power pushbutton.

3. Remove the two power cords from the power supplies in the rear of the system. (There are no on/off switches on these power supplies).

4. Remove and label all attached network cables and console cable from their respective ports on the chassis.

5. Loosen the thumbscrews that secure the Acme Packet 3900 to the equipment rack slide rails. This may require using a #2 Phillips screwdriver.



**Figure 5 - 92.  Loosening Thumbscrews**

6. Pull the unit toward you.

7. When mounted in slide rails, the chassis will stop when the locking clip pin on the chassis slide rail engages with the equipment rack slide rail.

Locking Clip Latch
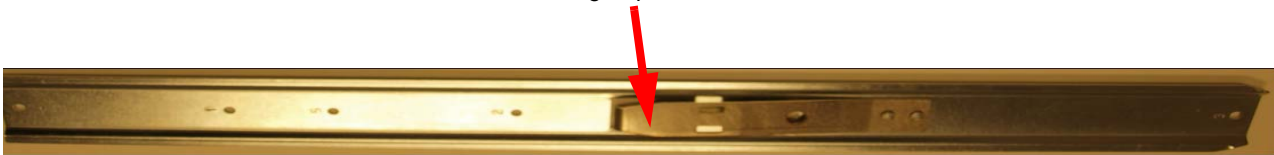


**Figure 5 - 93.  Locking Clip Fastens the Chassis and Rack Slide Rails**

8. Push the locking clip latches on both sides of the chassis inwards to unlock the slide rails from each other.

9. Pull the the Acme Packet 3900 chassis completely from the slide rails.

10. Pull the unit with the slide rails still attached out of the equipment rack, and move it to an ESD-safe location.

Caution

**Beginning in this step, one person should support the Acme Packet 3900 from below while the other person removes the chassis from the equipment rack.**

*Acme Packet 3900 Hardware Installation and Maintenance Guide*

## Removing and Replacing Transcoder DSP Modules

Up to five transcoder Digital Signal Processors (DSP) modules may be installed on the Acme Packet 3900 printed circuit board (PCB).



**Figure 5 - 94. Transcoder DSP Module**

There are slots for installing the transcoder DSP modules in one location on the Acme Packet 3900 PCB. The slots are numbered 0-4. Slot 0 is the closest slot to the edge of the unit when looking at it from the front of the chassis. Transcoder DSP modules should be installed consecutively in numerical order, starting with slot 0.
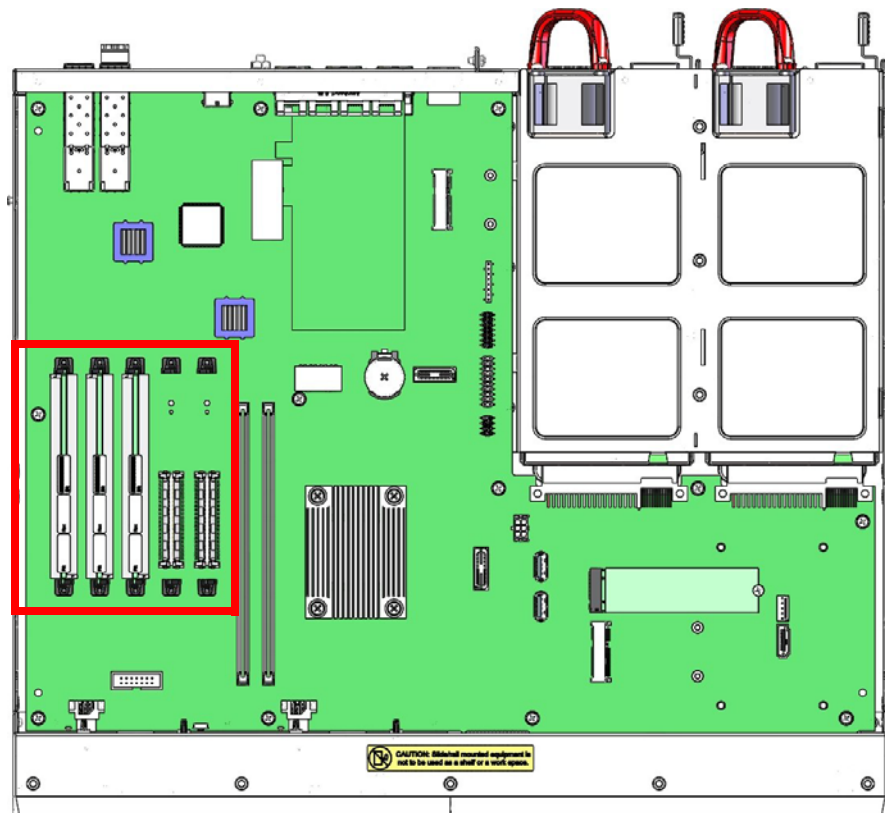


**Figure 5-1     Location of Transcoder DSP Modules**

## Removal and Replacement Guidelines

Please read and follow these guidelines prior to installing or removing the transcoder DSP module:

- The transcoder DSP module can be installed only in the designated location.
- Ground yourself and follow proper ESD grounding procedures.
- Remove the transcoder DSP module from the shipped packaging.
- The installation of these modules should be performed during low-traffic periods or during times of scheduled maintenance.
- Follow industry-standard procedures to ensure ESD protection.
- Remove and install the transcoder DSP module according to the procedures below.

**Caution**

**Before handling a Acme Packet 3900 PCB and components, follow the proper ESD grounding procedures. Failure to do so could damage the PCB card and its components.**

## Required Parts

The following parts are required to replace the transcoder DSP module.

- ESD wrist strap
- ESD-safe location
- Transcoder DSP module

## Removing the Transcoder DSP Module

The following procedure describes how to remove the transcoder DSP module from the chassis PCB.

Prerequisites:

- Wear an ESD wrist strap or take similar equivalent actions to prevent stat ic damage to the PCB card or other ESD-sensitive components.
- Note the location of the transcoder DSP module connector on the PCB card.
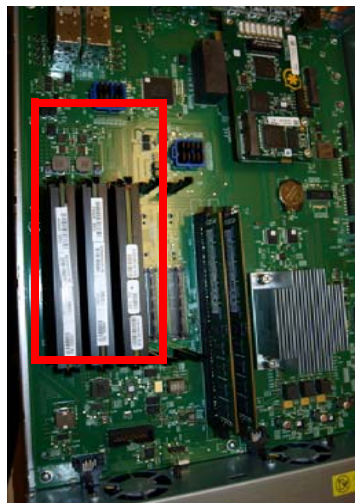


**Figure 5 - 95.  Location of Transcoder DSP Modules**

**To remove the transcoder DSP module:**

1.  Remove the Acme Packet 3900 chassis cover as directed in this guide. To remove the module (as shown in the photos below), use a fingertip to release the catch holding both ends of the transcoder DSP module.
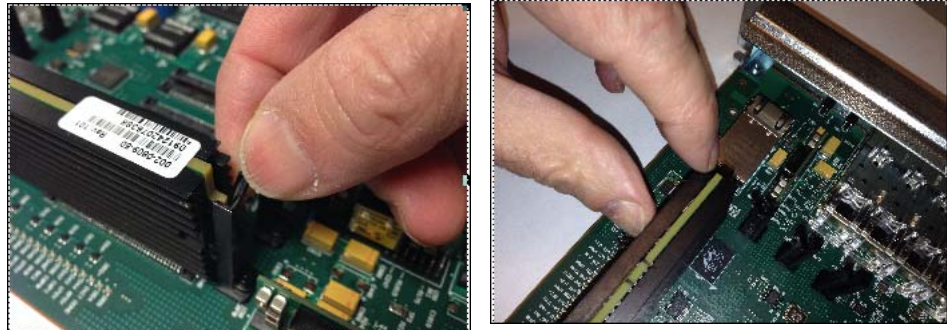


**Figure 5 - 96.   Releasing the Fastener Holding the Transcoder DSP Module**

2.  Once the fasteners are detached from both sides of the transcoder DSP module, hold the center of the module between your finger and thumb and slowly remove the module. Be careful to keep the module level while removing it and guide it smoothly through the guide slots on either side.



**Figure 5 - 97.   Removing the Transcoder DSP Module**

3.  Place the transcoder DSP module on an ESD-safe antistatic surface.

## Replacing the Transcoder DSP Module

The following procedure describes how to install the transcoder DSP module onto the unit PCB.

Prerequisites:

*   Place the new transcoder DSP module in an ESD-safe location.

*   Wear an ESD wrist strap or take similar equivalent actions to prevent static damage to the PCB or other ESD-sensitive components.

*   Note the location of the transcoder DSP module connector on the chassis PCB.

**To install the transcoder DSP module:**

1.  Grasp the transcoder DSP module between your thumb and index finger and line up both sides of the module with the slot guides attached to the unit PCB (see below).



**Figure 5 - 98. Installing the Transcoder DSP Module**

2.  Using your thumb on your other hand, guide the module evenly into the slot guides located on each side as you lower the component into the connector. Press evenly across the top of the connector to fully seat the transcoder DSP module on the PCB as shown below. Note that the module is fastened to the connector at one end while at the other end, the board rests on two standoffs attached to the PCB as shown in the figure below.



**Figure 5 - 99. Installed Transcoding DSP Module**

## Removing and Replacing the T1/E1 TDM Module

Location of the T1/E1 TDM module on Acme Packet 3900 PCB

PCI Express x4 connector
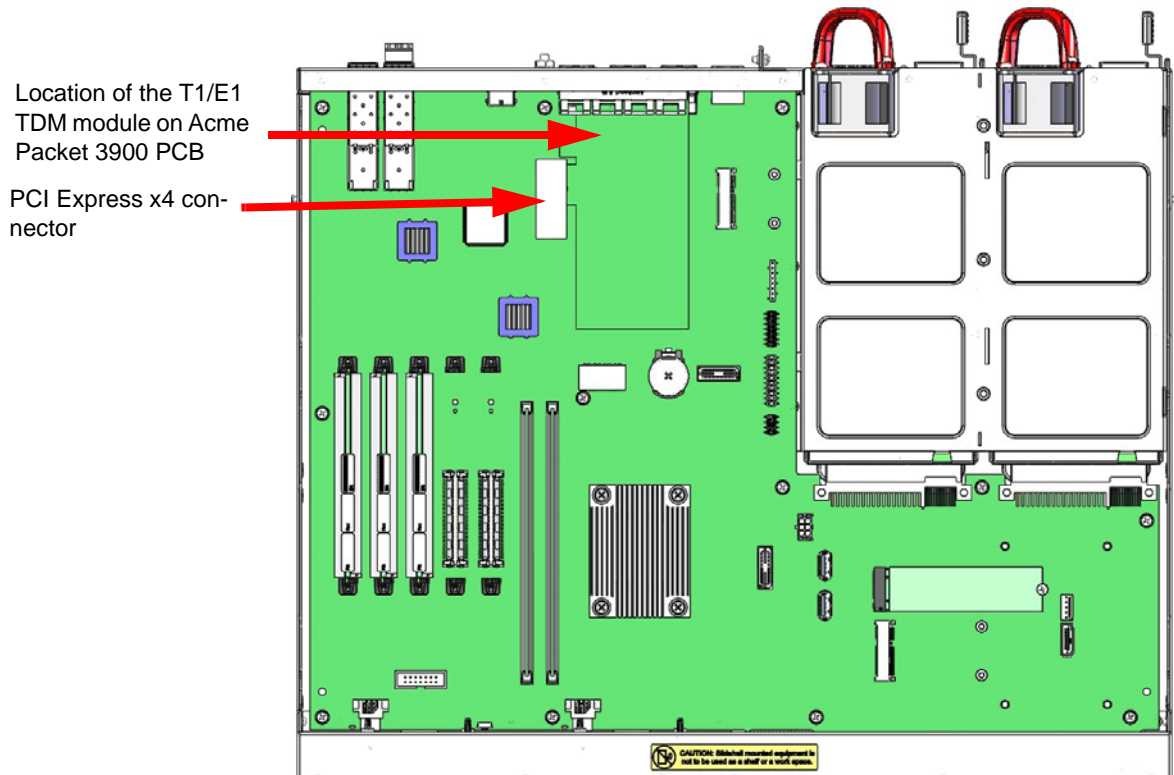
**Figure 5 - 100. Location of 1/E1 TDM module**

**Figure 5 - 101. T1/E1 TDM module**
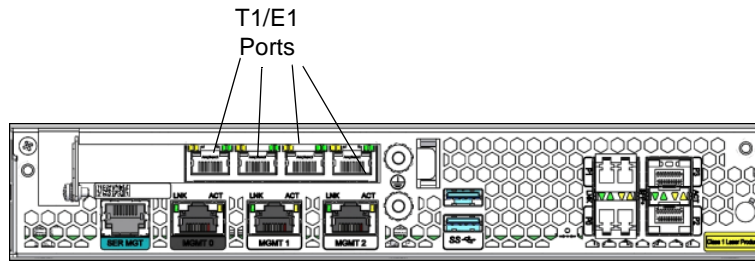
T1/E1
Ports



**Figure 5 - 102. Location of T1/E1 Ports**

**Removal and Replacement or Initial Installation Guidelines**

Read and follow these guidelines prior to installing or removing the T1/E1 TDM module:

- Ground yourself and follow proper ESD grounding procedures.
- Remove the replacement T1/E1 TDM module from the shipped packaging.
- Remove and install the T1/E1 TDM module according to the procedures below.

  **Note:** In the box with the new T1/E1 TDM modules, there will be a Telecom label in a plastic envelope. Attach the Telecom label to the chassis cover as described below.

  **Note:** The installation of these modules should be performed during low-traffic periods or during times of scheduled maintenance.

Caution

Before handling a Acme Packet 3900 PCB and components, follow the proper ESD grounding procedures. Failure to do so could damage the PCB card and its components.

**Required Parts**

The following parts are required to replace the transcoder DSP module.

- ESD wrist strap
- ESD-safe location
- Replacement/newly acquired T1/E1 TDM module
- Telecom label to attach to the chassis cover

## Removing the T1/ E1 TDM module

**To remove the T1/E1 TDM module:**

1. Remove the Acme Packet 3900 cover.

2. Identify the T1/E1 TDM module. It is a daughter PCB card, installed into the rear panel of the chassis and attached to the chassis PCB through the PCI Express x4 connector. The entire module is raised about a quarter of an inch off of the chassis PCB.



Captured end of T1/E1 TDM frame

Protruding end of T1/E1 TDM frame with screw

**Figure 5 - 103.  Internal view of T1/E1 TDM module and connections**

3. Part of the module is a piece of metal connected at 90 degrees to the module PCB. This piece contains the four T1/E1 ports visible when looking at the rear panel of the chassis. The metal extends on either side of the port area. When looking from the inside of the chassis, the part of the metal to the left of the ports continues straight and is attached to the inside of the rear panel. To the right of the ports, the metal bends 90 degrees towards the rear of the chassis, and is inserted through the rear panel.

4. Remove the screw on the outside of the chassis that holds the module seated against the rear panel of the chassis.

5. Grasp the module by its edges. Pull the right side of the module out of the rear panel slot, and, at the same time, slide the left side of the piece of metal from the rear panel.
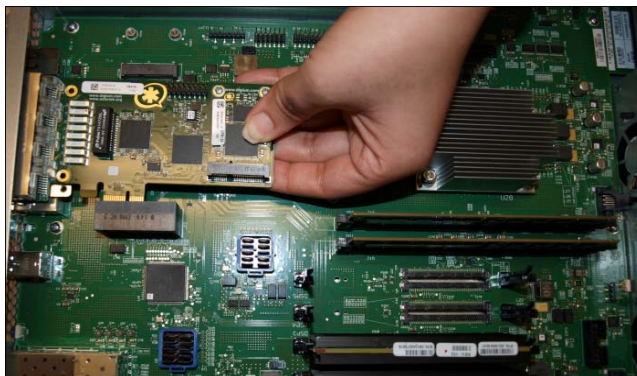


**Figure 5 - 104.  Internal view of T1/E1 TDM module disconnected**

6. Pull the module laterally out of the plug and away from the rear panel of the chassis. You may have to work the module back and forth as you pull, in order to disengage the module from the two directions.
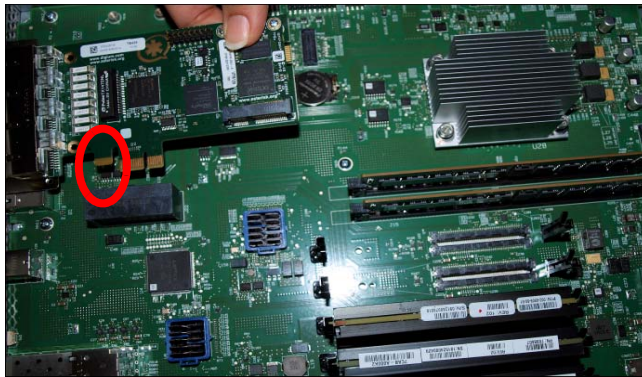


**Figure 5 - 105.  Internal view of T1/E1 TDM module showing key**

7. Note that there is a gap in the edge connector of the module PCB. There are metal bands on either side of the gap. The left-most part of the connector section is outside of the plug.



**Figure 5 - 106.  Internal view after T1/E1 TDM module removed**

8. When the module is fully disengaged, remove it from the chassis area to an ESD-safe location.

### Replace/install the T1/E1 TDM module

1. Identify the new/replacement T1/E1 TDM module.

2. Identify the clear plastic envelope with the Telecom label inside and put it aside.

3. Grasp the module by its edges. Orient it towards the plug and the rear panel of the chassis as you found the original module.

4. Push the right side of the module into the chassis rear panel slot, and, at the same time, slide the left side of the piece of metal into the rear panel.

5. Push the module laterally into the plug and toward the rear panel of the chassis. You may have to work the module back and forth as you pull, in order to secure the module from the two directions.

6. Note that there is a gap in the edge connector of the module PCB. There are metal bands on either side of the gap. The left-most part of the connector section is outside of the plug.

7. Attach the screw that secures the piece of metal attached to the module to the rear panel.

8. After you finish installing the module, replace the cover of the unit.
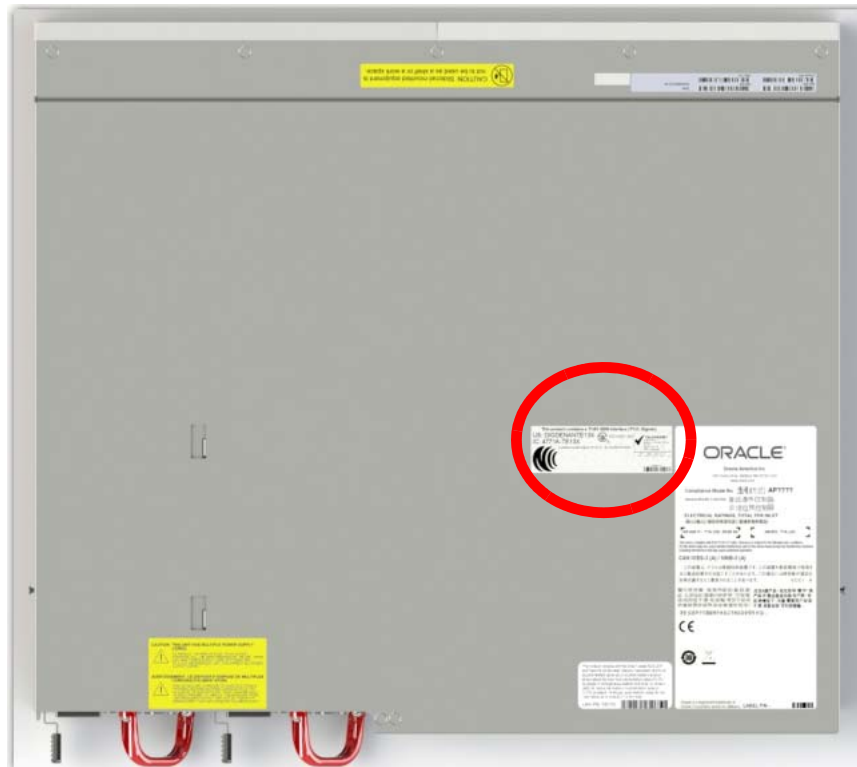


**Figure 5 - 107.  Placement of Regulatory label**

9. If this is not a replacement T1/E1 card, affix the previously set aside Telecom label to the top cover as shown in this image.

# 6                                                                          Specifications

## Introduction

This chapter provides information regarding the physical, electrical, environmental, and connector specifications of the Acme Packet 3900.

## Environmental, Safety, and Regulatory Certifications

For information regarding safety and regulatory certifications applicable to the Acme Packet 3900, refer to the *Acme Packet Platforms Safety and Compliance Guide*.

## Physical Specifications

### Acme Packet 3900 Chassis Specifications

This table lists the physical dimensions and weight of the Acme Packet 3900 chassis.

Table 6 - 5.   Acme Packet 3900 Physical Specifications

| Specification | Description |
| --- | --- |
| Height | 1.72" (4.37 cm) (1U) |
| Width | 17.10" (43.4 cm) (+ mounting ear width: 19" (48.26 cm)) |
| Depth | 15.75" (40.10 cm) (+ mounting slide bar depth) |
| Weight | approximately 14.2 lbs (6.44 kg), fully loaded |

### AC Power Supply Physical Dimensions

This table lists the physical dimensions and weight of the Acme Packet 3900 AC power supply.

Table 6 - 6.   Acme Packet 3900 AC Power Supply Physical Dimensions

| Specification | Description |
| --- | --- |
| Height | 1.58" (4.01 cm) |
| Width | 3.402" (8.64 cm) |
| Depth | 9.33" (23.70 cm) |
| Weight | 2.34 lbs. (1.06 kg) |

Important: This equipment is intended for installation in locations where National Electrical Code (NEC) applies.

**DC Power Supply Physical Dimensions**

This table lists the physical dimensions and weight of the Acme Packet 3900 DC power supply.

**Table 6 - 7.   Acme Packet 3900 DC Power Supply Physical Dimensions**

| Specification | Description |
|---|---|
| Height | 1.58" (4.01 cm) |
| Width | 3.4" (8.63 cm) |
| Depth | 9.33" (23.70 cm) |
| Weight | 2.34 lbs (1.06 kg) |

Important: This equipment is intended for installation in Network Telecommunication Facilities.

**Fan Module Specifications**

This table lists the fan module specifications for the Acme Packet 3900.

**Table 6 - 8.   Acme Packet 3900 Fan Module Specifications**

| Specification | Description |
|---|---|
| Number of Fans | 2 |
| Total Maximum Airflow | 40 CFM |

# Electrical Specifications

Refer to the following tables for information regarding the electrical specifications of the Acme Packet 3900 System.

**Power Supply Input Circuit Fuse Requirements**

This table lists the input circuit fuse and cable size requirements for the Acme Packet 3900.

**Table 6 - 9.   Acme Packet 3900 Power Supply Input Circuit Fuse Requirements**

| Power Circuit | Fuse Rating | Power Cable Size |
|---|---|---|
| 120 VAC | 15 AMP | 18 AWG |
| 240 VAC | 7.5 AMP | 18 AWG |
| -48 VDC | 10 AMP | 14 AWG |

# Environmental Specifications

For the Acme Packet 3900 to function properly, Acme Packet recommends that you follow the environmental guidelines in the following table.

**Table 6 - 10.  Acme Packet 3900 Environmental Specifications**

| Specification | Description |
|---|---|
| Temperature | The Acme Packet 3900 is required to operate within the temperature range of:<br>0° C to +40° C, 32° F to 104° F (operating)<br>-20° C to +65° C, -4° F to 149° F (storage) |
| Relative Humidity | Operating conditions of 10% to 85% humidity under non-condensing operating conditions |
| Maximum Altitude | The Acme Packet 3900 is required to operate below the maximum altitude of 10,000 feet. |
| Air Flow | 40 CFM front to back |
| Power Dissipation | 160W typical 220W maximum |

# Connector Specifications

Refer to the following table for information about the connector specifications for the Acme Packet 3900.

**Table 6 - 11.  Acme Packet 3900 Connector Specifications**

| Specification | Description |
|---|---|
| AC Connector Port | The IEC lead connector port on each power supply accepts a 3-lead IEC-60320 C14 connector for AC power installations (2). |
| RJ45/Management Ethernet Ports | The 3 x 8-pin RJ45 10/100/1000BaseT ports are compliant with IEEE's 802.3, 802.3u, and 802.3ab. |
| RS232/Serial Port | The RS232 serial port uses an 8-pin RJ45 connector that supports RS232 protocol. |
| 1GbE Media Port | The four 1GbE fiber optic connection ports (P0-P3) are implemented as SFP sockets. Duplex LC or copper SFPs may be used. |
| Terminal Block Connections | The terminal block connections accept a bare (tinned) wire for DC power installations on each DC power supply (2). |
| DC Input Connector | The Input connector on each DC power supply is a 2-circuit plug. |
| RJ48C T1/E1 Ports (Optional) | Mechanical Arrangement: 4 Miniature 8-position jacks.<br>Usage: 1.544 Mbps digital services.<br>Electrical Network Connection: T&R, T1 R1, conductors 7 and 8 provide cable shield integrity. |

# Optical Transceiver Interface Module Specification

Refer to the following table for information about the optical specifications of the optical transceivers for the Acme Packet 3900.

**Table 6 - 12. Acme Packet 3900 Optical Transceiver Interface Module Specifications**

| Specification | Single Mode (SX) Fiber Module | Multi Mode (LX) Fiber Module |
|---|---|---|
| Wavelength $\lambda$ | 1310 nm | 850 nm |
| Laser Type | VCSEL | VCSEL |
| Fiber type / Transmission Distance | 0.5 to 550 m — 50 μm MMF<br>0.5 to 550 m — 62.5 μm MMF | 300 m |

# Appendix A    Acme Packet 3900 Alarms

## Introduction

The Acme Packet 3900 generates internal alarms that correspond to internal hardware fault conditions. Hardware faults are divided into two types:

- Hardware and environmental
- Media link

Each alarm is assigned a severity level, depending on the details of the fault.

**Table Appendix A - 1.  Descriptions of Alarm Severity Levels**

| Alarm Severity | Description |
|---|---|
| Minor | Functionality is impaired to a small degree (e.g., a single fan has failed) |
| Major | Pending failures or unexpected events are imminent (e.g., an LOS) |
| Critical | Catastrophic condition has occurred (e.g., the unit is overheating) |

The Acme Packet 3900 polls its hardware components to ensure they are functioning properly. If it encounters a fault condition, it will report alarms in these categories:

- Hardware temperature
- Fan speed
- Environmental sensor
- Power supply
- Voltage
- Physical interface cards

## Hardware and Environmental Alarms

This section provides details about hardware and environmental alarms.

### Hardware Temperature Alarm

The following table lists the hardware temperature alarm.

**Table Appendix A - 2.  Hardware Temperature Alarm Information**

| Alarm Name | Alarm ID | Alarm Severity | Causes | Example Log Message | Graphic Display Window Message |
|---|---|---|---|---|---|
| TEMPERATURE HIGH | 65538 | CRITICAL: ≥100°C<br>MAJOR: ≥95°C<br>MINOR: ≥90°C | Fans are obstructed or stopped. The room is abnormally hot. | Temperature: XX.XXC (where XX.XX is the temperature in degrees) | Temperature X C (where X is the temperature in degrees) |

**Fan Speed Alarms**  The following table lists the fan speed alarm.

**Table Appendix A - 3.  Fan Speed Alarm Information**

| Alarm Name | Alarm ID | Alarm Severity | Causes | Example Log Message | Graphic Display Window Message |
|---|---|---|---|---|---|
| FAN STOPPED | 65537 | CRITICAL: any fan speed is <50%.<br><br>MAJOR: speed of two fans is > 75% and ≤ 90%. Or speed of one fan is >50% and ≤75% and the other fan is at normal speed.<br><br>MINOR: speed of one fan> 75% and ≤90%, the other fan is at normal speed | Fan failure. | Fan speed: XXXX XXXX XXXX where xxxx xxxx xxxx is the revolutions per minute (RPM) of each fan on the fan module | Fan stopped |

**Environmental Sensor Alarm**  The following table lists the environmental sensor alarm.

**Table Appendix A - 4.  Environmental Sensor Alarm Information**

| Alarm Name | Alarm ID | Alarm Severity | Cause(s) | Example Log Message | Graphic Display Window Message |
|---|---|---|---|---|---|
| ENVIRONMENTAL SENSOR FAILURE | 65539 | CRITICAL | The environmental sensor component cannot detect fan speed and temperature. | Hardware monitor failure! Unable to monitor fan speed and temperature! | HW Monitor Fail |

## Link and SDP Alarms

Link alarms are generated when a network cable is plugged into or unplugged from a configured network interface. For each possible network interface, an alarm exists that indicates whether the link goes up or down.

The following tables list detailed information about the Acme Packet 3900 link alarms, including their ID assignments, severities, causes, log messages, and messages printed in the graphic display window.

### Media Ethernet Link Alarms

The following table lists the Ethernet interface link up/link down alarms.

**Table Appendix A - 5.  Media Ethernet Link Alarm Information**

| Alarm Name | Alarm ID | Alarm Severity | Cause(s) | Example Log Message | Graphic Display Message |
|---|---|---|---|---|---|
| LINK UP ALARM GIGPORT | 131073 | MAJOR | GigE S0P0 link up | Slot 0 port 0 UP | X LINK ALARMS (where X is number of alarming links) |
| LINK DOWN ALARM GIGPORT | 131074 | MINOR | GigE S0P0 link down | Slot 0 port 0 DOWN | X LINK ALARMS |
| LINK UP ALARM GIGPORT | 131075 | MAJOR | GigE S0P1 link up | Slot 0 port 1 UP | X LINK ALARMS |
| LINK DOWN ALARM GIGPORT | 131076 | MINOR | GigE S0P1 link down | Slot 0 port 1 DOWN | X LINK ALARMS |
| LINK UP ALARM GIGPORT | 131073 | MAJOR | GigE S0P2 link up | Slot 0 port 2UP | X LINK ALARMS (where X is number of alarming links) |
| LINK DOWN ALARM GIGPORT | 131074 | MINOR | GigE S0P2 link down | Slot 0 port 2DOWN | X LINK ALARMS |
| LINK UP ALARM GIGPORT | 131075 | MAJOR | GigE S0P3 link up | Slot 0 port 3 UP | X LINK ALARMS |
| LINK DOWN ALARM GIGPORT | 131076 | MINOR | GigE S0P3 link down | Slot 0 port 3 DOWN | X LINK ALARMS |

### Management Ethernet Link Alarms

The following table lists the management Ethernet port alarms.

**Table Appendix A - 6.  Management Ethernet Link Alarm Information**

| Alarm Name | Alarm ID | Alarm Severity | Cause(s) | Example Log Message | Graphic Display Message[a] |
|---|---|---|---|---|---|
| LINK UP ALARM VXINTF | 131077 | MINOR | Mgmt0 link up | Port 0 UP | X LINK ALARMS |
| LINK DOWN ALARM VXINTF | 131080 | MAJOR | Mgmt0 link down | Port 0 DOWN | X LINK ALARMS |

a. X denotes the number of alarming links.

# Appendix B    Acme Packet 3900 Glossary

## Acronyms, Definitions, and Terms

ACLI — Acme Command Line Interface is the command line interface used by Acme Packet to configure, maintain, and monitor Acme Packet SBCs and other Acme Packet products.

AC — Alternating Current refers to the 120-volt electricity delivered by power utilities to three-pin power outlets. This type of power is called "alternating current" because the polarity of the current alternates between plus and minus, 60 times per second.

AWG — American Wire Gauge is a United States standard set of non-ferrous wire conductor sizes. The gauge means the diameter.

DC — Direct Current refers to the flow of electrons in one direction within an electrical conductor, such as a wire.

ESD — Electrostatic Discharge is the rapid discharge of static electricity from one conductor with an electrical charge to another of a different electrical charge.

CE — European Compliance

EN — European Norm

FG — Frame ground

Flash memory — Flash memory is a solid-state, non-volatile, rewritable memory that functions like a combination of RAM and a hard disk drive.

FQME — Flow Quality Measurement Engine is responsible for monitoring, measuring, and maintaining statistics (e.g., latency, jitter, flow stoppage, flow creation, etc.) on a flow-by-flow basis.

1GbE — Gigabit Ethernet is an Ethernet type that supports data transfer rates of 1 gigabit per second.

10GbE — 10GbE is an Ethernet type that supports data transfer rates of 10 gigabits per second.

IEEE — Institute of Electrical and Electronics Engineers is an organization composed of engineers, scientists, and students. The IEEE is best known for developing standards for the computer and electronics industry.

IEC — International Electrotechnical Commission

IP — Internet Protocol is the method by which data is sent from one computer to another on the Internet.

LED — Light Emitting Diode is an electronic device that lights up when electricity is passed through it.

LAN — Local Area Network is a group of computers and associated devices that share a common communications line within a small geographic area.

LOS — Loss of Signal occurs when the signal level falls below an acceptable level. LOS is a physical layer error and typically results in an alarm.

NVRAM — Non-volatile Random Access Memory is a type of memory that retains its contents when power is turned off.

Optical Transceiver — The fiber connection to the Acme Packet 3900 plugs into an optical transceiver. Through this connection, light energy is converted into electrical energy.

PCMCIA — Personal Computer Memory Card International Association is an organization consisting of approximately 500 companies that has developed a standard for small, credit-card sized devices (PC cards). This standard is designed for attaching input/output devices such as network adaptors, fax/modems, or hard drives to notebook computers.

Physical Interface Card — The physical interface card is synonymous with the network interface cards on the Acme Packet 3900 System.

PROM — Programmable Read-only Memory is a memory chip on which data can only be written once. A PROM is non-volatile; it is a memory chip on which data can be written only once.

QoS — Quality of Service is a networking term that refers to the capability of a network to provide better service to selected network traffic over various technologies.

RAM — Random Access Memory is a type of computer memory that can be accessed randomly. RAM is the same as main memory.

RS-232 — Recommended Standard 232 is a standard interface approved by the Electronic Industries Association for connecting serial devices.

RJ45 — Registered Jack 45 is an eight-wire connector commonly used to connect computers onto a LAN.

RJ48 — Registered Jack 48 is an eight-wire connector commonly used to connrct T1 lines.

SNMP — Simple Network Management Protocol is a set of protocols used for managing complex networks and network devices.

SDRAM — Synchronous Dynamic Random Access Memory is a type of DRAM that can run at much higher clock speeds than conventional memory.

SFTP — Secure File Transfer Protocol is a method of transferring files between computers over a secure SSH secure data stream.

SSH— Secure Shell is a program to log into another computer over a network, to execute commands in a remote machine, and to move files from one machine to another

STELNET— Aa standard terminal emulation program that allows remote login and connection to systems/servers on a network. Telnet uses a single TCP/IP network connection to provide this remote login, control, and communication functionality

TDM — Time-Division Multiplexing allows transmitting and receiving telephone switches to create channels within a transmission stream. A standard DS0 voice signal has a data bit rate of 64 kbit/s. A TDM circuit runs at a much higher signal bandwidth, permitting the bandwidth to be divided into time frames (time slots) for each voice signal which is multiplexed onto the line by the transmitter.

Telnet — Telnet is a standard terminal emulation program that allows remote login and connection to systems/servers on a network. Telnet uses a single TCP/IP network connection to provide this remote login, control, and communication functionality. STELNET is the secure version of this program.

TCP — Transmission Control Protocol provides a reliable stream delivery and virtual connection service to applications through the use of sequenced acknowledgment with the retransmission of packets when necessary.

UPS — Uninterruptible Power Supply is a power supply that can run off of a backup battery when primary power is lost.

UDP — User Datagram Protocol provides a simple, but unreliable message service for transaction-oriented services. Each UDP header carries both a source port identifier and a destination port identifier, allowing high-level protocols to target specific applications and services among hosts.

VLAN — Virtual Local Area Network refers to a network of computers are connected to a single physical segment of a wire but behave as if they are connected to the physically diverse LANs.

VAC — Volts Alternating Current

VDC — Volts Direct Current

VCCI — Voluntary Control Council for Information Technology Equipment (Japan)

WAN—Wide Area Network is a computer network that spans a relatively large geographical area. Typically, a WAN consists of two or more LANs.

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## Numerics