



Cisco AS5350XM and Cisco AS5400XM Universal Gateways INCLUDING LICENSE AND WARRANTY

- 1 Cisco 90-Day Limited Hardware Warranty Terms
- 2 Documents, Equipment, and Tools
- 3 Install Chassis
- 4 Install Modules
- 5 Connect Cables
- 6 Power Up the Universal Gateway
- 7 Perform Initial Configuration
- 8 Slot Numbering
- 9 Obtaining Documentation
- 10 Documentation Feedback
- 11 Cisco Product Security Overview
- 12 Obtaining Technical Assistance
- 13 Obtaining Additional Publications and Information



1 Cisco 90-Day Limited Hardware Warranty Terms

There are special terms applicable to your hardware warranty and various services that you can use during the warranty period. Your formal Warranty Statement, including the warranties and license agreements applicable to Cisco software, is available on Cisco.com. Follow these steps to access and download the *Cisco Information Packet* and your warranty and license agreements from Cisco.com.

1. Launch your browser, and go to this URL:

http://www.cisco.com/univercd/cc/td/doc/es_inpck/cetrans.htm

The Warranties and License Agreements page appears.

- **2.** To read the *Cisco Information Packet*, follow these steps:
 - a. Click the Information Packet Number field, and make sure that the part number 78-5235-03A0 is highlighted.
 - **b.** Select the language in which you would like to read the document.
 - c. Click Go.

The Cisco Limited Warranty and Software License page from the Information Packet appears.

d. Read the document online, or click the **PDF** icon to download and print the document in Adobe Portable Document Format (PDF).



You must have Adobe Acrobat Reader to view and print PDF files. You can download the reader from Adobe's website: http://www.adobe.com

- 3. To read translated and localized warranty information about your product, follow these steps:
 - **a.** Enter this part number in the Warranty Document Number field:

78-5236-01C0

- **b.** Select the language in which you would like to read the document.
- c. Click Go.

The Cisco warranty page appears.

d. Review the document online, or click the **PDF** icon to download and print the document in Adobe Portable Document Format (PDF).

You can also contact the Cisco service and support website for assistance:

http://www.cisco.com/public/Support_root.shtml

Duration of Hardware Warranty

Ninety (90) days.

Replacement, Repair, or Refund Policy for Hardware

Cisco or its service center will use commercially reasonable efforts to ship a replacement part within ten (10) working days after receipt of a Return Materials Authorization (RMA) request. Actual delivery times can vary, depending on the customer location.

Cisco reserves the right to refund the purchase price as its exclusive warranty remedy.

To Receive a Return Materials Authorization (RMA) Number

Contact the company from whom you purchased the product. If you purchased the product directly from Cisco, contact your Cisco Sales and Service Representative.

Complete the information below, and keep it for reference:

Company product purchased from	
Company telephone number	
Product model number	

Product serial number	
Maintenance contract number	

2 Documents, Equipment, and Tools

User Documentation

All of the documents described here are available online and on the Documentation DVD. To be sure of obtaining the latest information, you should access the online documentation.



The information in this document applies to the Cisco AS5350XM and Cisco AS5400XM universal gateways.

To access online user documentation:

From Cisco.com at http://www.cisco.com, choose Technical Support & Documentation.

Cisco AS5350XM and Cisco AS5400XM Universal Gateway Documentation

Regulatory Compliance and Safety Information

The Regulatory Compliance and Safety Information document provides essential safety information applicable to your universal gateway. A printed copy of this document is shipped with this device.

You can access this document at Technical Support & Documentation > Product Support > Universal Gateways and Access Servers > Cisco AS5300 or Cisco AS5400 Series Universal Gateways > Install and Upgrade Guides.

Hardware Installation

The chassis installation guide provides additional detailed description, installation, and cabling information.

You can access this document at Technical Support & Documentation > Product Support > Universal Gateways and Access Servers > Cisco AS5300 or Cisco AS5400 Series Universal Gateways > Install and Upgrade Guides.

Software Configuration

The software configuration guide provides additional detailed configuration information.

You can access this document at Technical Support & Documentation > Product Support > Universal Gateways and Access Servers > Cisco AS5300 or Cisco AS5400 Series Universal Gateways > Configuration Guides.

Cisco IOS Software Documentation

Master Index to Software Documentation

The master index provides links to topics and commands for specific Cisco IOS software releases.

You can access these documents at Technical Support & Documentation > Product Support > Cisco IOS Software > Cisco IOS Software Release you are using > Master Index.

Configuration Guides

The Cisco IOS software configuration guides provide detailed configuration procedures and examples.

You can access these documents at Technical Support & Documentation > Product Support > Cisco IOS Software > Cisco IOS Software Release you are using > Configuration Guides.

Command References

The Cisco IOS software command references provide detailed information about each command.

You can access these documents at Technical Support & Documentation > Product Support > Cisco IOS Software > Cisco IOS Software Release you are using > Command References.

New Feature Documentation

New feature documentation contains detailed information about new features introduced in specific Cisco IOS releases.

You can access these documents at Technical Support & Documentation > Product Support > Cisco IOS Software > Cisco IOS Software Release you are using > Feature Guides.

If you have an account on Cisco.com, you can get updated information about platform support for features by accessing Feature Navigator at the following URL:

http://tools.cisco.com/ITDIT/CFN/jsp/index.jsp

Release Notes

Cisco IOS release notes for all platforms provide up-to-date information about specific Cisco IOS software releases.

You can access these documents at Technical Support & Documentation > Product Support > Cisco IOS Software > Cisco IOS Software Release you are using > Release Notes.

Items Included with Cisco AS5350XM and Cisco AS5400XM Universal Gateways

- 19-inch (48.26-cm) and 24-inch (60.96-cm) rack-mount kits
- Rubber feet for desktop installation
- RJ-45-to-DB-9 female DTE adapter (labeled TERMINAL)
- RJ-45-to-DB-25 female DTE adapter (labeled TERMINAL)
- RJ-45-to-DB-25 male DCE adapter (labeled MODEM)
- RJ-45-to-RJ-45 rollover console cable
- ESD-preventive wrist strap
- Nylon cable ties
- Cable tie holder
- Grounding lug
- Cisco Information Package

Items Not Included

Individual items in this list may be required for your particular application:

- Straight-through RJ-45-to-RJ-45 cable for an Ethernet connection
- Straight-through RJ-45-to-RJ-45 cables for T1 connections
- E1 cables for E1 connections
- Ethernet hub, Gigabit Ethernet switch, or PC with a network interface card for Ethernet LAN connections
- PC running terminal emulation software for local administrative access
- Modem for remote administrative access
- One breakout cable consisting of a 36-pin connector connected to eight RJ-45 adapters for CT1/CE1 connections
- 75-ohm coaxial cable for a CT3 connection

3 Install Chassis



The information in this document applies to the Cisco AS5350XM and Cisco AS5400XM universal gateways.

Safety Information

For safety information you need to know before working on your Cisco universal gateway, see the *Regulatory Compliance and Safety Information* document that accompanied this device.

Setting Up the Chassis

You can install the chassis in a rack or set it on a desktop. Select the procedure that best meets the needs of your network:

- Rack-Mounting the Chassis, page 5
- Desktop Installation, page 7



This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security. Statement 1017

Rack-Mounting the Chassis

This section describes how to rack-mount the chassis. The universal gateway arrives with 19-inch (48.26-cm) rack-mount brackets and larger brackets for use with a 23-inch (58.42-cm) or 24-inch (60.96-cm) rack.

Figure 1 Cisco AS5350XM Universal Gateway Rack-Mount Brackets

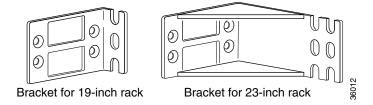
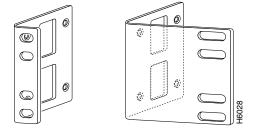


Figure 2 Cisco AS5400XM Universal Gateway Rack-Mount Brackets



Bracket for 19-inch rack Bracket for 23- or 24-inch rack

The following information will help you plan your equipment rack configuration:

• Enclosed racks must have adequate ventilation. Ensure that the rack is not congested, because each unit generates heat. An enclosed rack should have louvered sides and a fan to provide cooling air. Heat generated by equipment near the bottom of the rack can be drawn upward into the intake ports of the equipment above.

- When mounting a chassis in an open rack, ensure that the rack frame does not block the intake or exhaust ports. If the chassis is installed on slides, check the position of the chassis when it is seated in the rack.
- Baffles can isolate exhaust air from intake air, which also helps to draw cooling air through the chassis. The best placement of the baffles depends on the airflow patterns in the rack, which can be found by experimenting with different configurations.
- When equipment installed in a rack (particularly in an enclosed rack) fails, try operating the equipment by itself, if possible. Power down other equipment in the rack (and in adjacent racks) to allow the unit under test a maximum of cooling air and clean power.
- Install the chassis and external devices to which it will connect in a contiguous stack.

Required Tools and Equipment

You need the following tools and equipment to rack-mount the chassis:

- Number 2 Phillips screwdriver (not included)
- Medium flat-blade screwdriver (not included)
- Screws for attaching the chassis to the rack (not included)
- Standard rack-mount brackets (included)
- Screws for attaching the brackets to the chassis (included)

Attaching Brackets

Attach the mounting brackets to the chassis as shown, using the screws provided. Attach the second bracket to the opposite side of the chassis.



The chassis may be installed with either the front panel or the back panel facing forward.

Figure 3 Cisco AS5350XM Universal Gateway Bracket Installation – Front Panel Forward (19-Inch Rack)

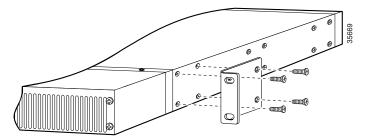
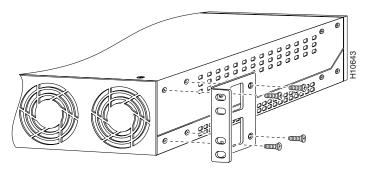


Figure 4 Cisco AS5400XM Universal Gateway Bracket Installation – Front Panel Forward (19-Inch Rack)



Installation in a Rack

Install the chassis in the rack. Rack-mounting screws are not provided. Use two screws for each side (supplied with the rack).

Figure 5 Installing the Cisco AS5350XM Universal Gateway in a Rack (19-Inch Rack)

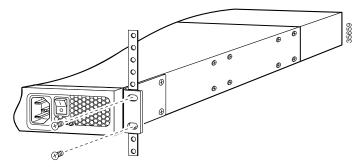
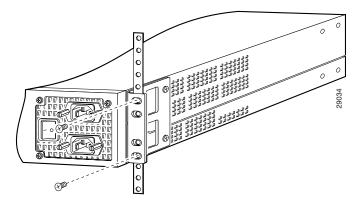


Figure 6 Installing the Cisco AS5400XM Universal Gateway in a Rack (19-Inch Rack)



Desktop Installation

For desktop or shelf mounting, use the rubber "feet" shipped on a black adhesive strip with the chassis. They protect the chassis and provide a nonskid surface.

The location of the chassis is extremely important for proper operation. Equipment placed too close together, inadequate ventilation, and inaccessible panels can cause malfunctions and shutdowns, and can make maintenance difficult. The following information will help you to plan the location of the chassis:

- Plan for access to both front and back panels of the chassis.
- Ensure that the room where the chassis operates has adequate ventilation. Remember that electrical equipment generates heat. Ambient air temperature may not cool equipment to acceptable operating temperatures without adequate ventilation.

To attach the rubber feet, follow these steps:

- **Step 1** Locate the rubber feet that shipped with the chassis.
- **Step 2** Place the universal gateway upside-down on a smooth, flat surface.
- **Step 3** Peel the rubber feet off the black adhesive strip, and attach them adhesive-side-down at each corner of the underside of the chassis.
- **Step 4** Place the universal gateway top-side-up on a flat, smooth, secure surface.



Do not place anything on top of the universal gateway that weighs more than 10 lb (4.5 kg). Excessive weight on top could damage the chassis.

Chassis Ground Connection

You must connect the chassis to a reliable earth ground by using the ground lug (provided) and size AWG 6 (13 mm²) wire. To attach the chassis ground, follow these steps:

- **Step 1** Strip one end of the ground wire to expose approximately 0.75 in. (20 mm) of conductor.
- **Step 2** Crimp the ground wire to the ground lug, using a crimp tool of the appropriate size.
- **Step 3** Attach the ground lug to the chassis as shown in Figure 7 and Figure 8. Use a medium flat-blade screwdriver and the screws supplied with the ground lug. Tighten the screws to a torque of 8 to 10 in-lb (0.9 to 1.1 N-m).

Figure 7 Cisco AS5350XM Universal Gateway Ground Lug Attachment

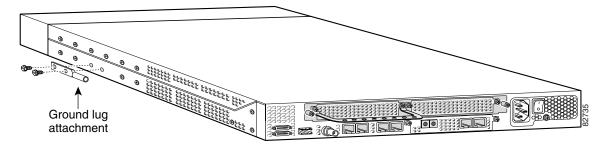
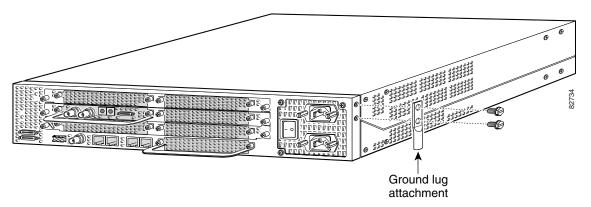


Figure 8 Cisco AS5400XM Universal Gateway Ground Lug Attachment



Step 4 Connect the other end of the ground wire to a suitable grounding point at your site.

4 Install Modules



The information in this document applies to the Cisco AS5350XM and Cisco AS5400XM universal gateways.



The Cisco AS5350XM and Cisco AS5400XM universal gateways come with carrier cards and feature cards already installed. If you are not installing additional carrier cards or feature cards, proceed to the "Connect Cables" section on page 15.

For additional information about installing carrier cards and feature cards, see the Cisco AS5350XM and Cisco AS5400XM Universal Gateways Card Installation Guide.

You can access this document at Technical Support & Documentation > Product Support > Universal Gateways and Access Servers > Cisco AS5300 or Cisco AS5400 Series Universal Gateways > Install and Upgrade Guides.

Installing Carrier Cards



The carrier cards that carry the feature cards are not hot-swappable. Removing or replacing a carrier card while the system is still powered up may cause permanent damage to electronic circuits on the card.



Do not work on the system or connect or disconnect cables during periods of lightning activity. Statement 1001



Before opening the unit, disconnect the telephone-network cables to avoid contact with telephone-network voltages. Statement 1041

Installing a Carrier Card

If you need to install a carrier card, follow these steps:

Step 1 Make sure the chassis is powered down.



Before working on a chassis or working near power supplies, unplug the power cord on AC units; disconnect the power at the circuit breaker on DC units. Statement 12

- **Step 2** Attach an ESD-preventive wrist strap.
- **Step 3** Slide the carrier card into the slot until it touches the backplane connector. (See Figure 9 and Figure 10.)

Figure 9 Install the Carrier Card in the Cisco AS5350XM Universal Gateway

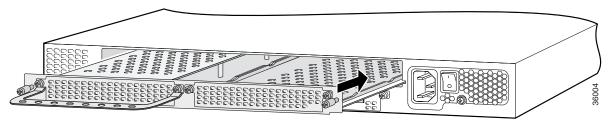
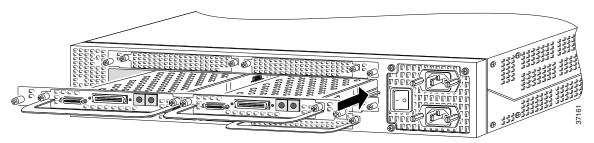


Figure 10 Install the Carrier Card in the Cisco AS5400XM Universal Gateway



- **Step 4** Align the captive screws with their holes, and seat the card completely.
- **Step 5** Tighten the two captive screws to secure the carrier card to the chassis. (See Figure 11 and Figure 12.)

Figure 11 Tighten the Captive Screws on the Cisco AS5350XM Universal Gateway

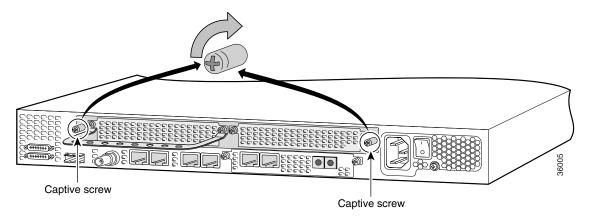
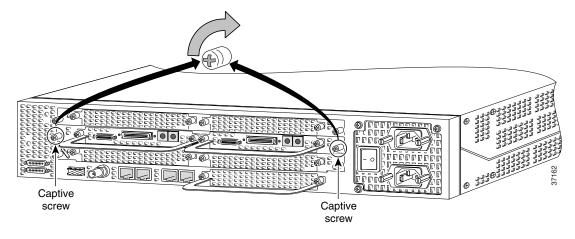
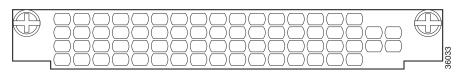


Figure 12 Tighten the Captive Screws on the Cisco AS5400XM Universal Gateway



Step 6 If the carrier card has a blank feature card slot, install a blank cover over the open feature card slot to ensure proper airflow inside the chassis.

Figure 13 Blank Feature Card Cover



- **Step 7** For AC-powered units, reconnect the AC power cord. For DC-powered units, reinstate power at the circuit breaker. For more information on the AC and DC power supplies, see the chassis installation guide. To access the chassis installation guide, see the "Documents, Equipment, and Tools" section on page 3.
- **Step 8** Reconnect all interface cables.

Installing Feature Cards

For detailed information on installing and connecting feature cards, see the Cisco AS5350XM and Cisco AS5400XM Universal Gateways Card Installation Guide.

You can access this document at Technical Support & Documentation > Product Support > Universal Gateways and Access Servers > Cisco AS5300 or Cisco AS5400 Series Universal Gateways > Install and Upgrade Guides.



Warning

The telecommunications lines must be disconnected 1) before unplugging the main power connector and/or 2) while the housing is open. Statement 89



Warning

Do not work on the system or connect or disconnect cables during periods of lightning activity. Statement 1001



When you replace a feature card with a new feature card of the same type in the same slot, the system software recognizes the new trunk interfaces and brings them up automatically. If you replace the existing feature card with a new feature card of a different type, you must reconfigure the system. For configuration details, see the Cisco AS5350XM and Cisco AS5400XM Universal Gateways Software Configuration Guide.



The Cisco AS5350XM and Cisco AS5400XM universal gateways does not support the mixing of T1 and E1 feature cards in the same chassis. For more information about mixing WAN feature cards, see the *Cisco AS5350XM and Cisco AS5400XM Universal Gateways Card Installation Guide*.

To install a feature card, follow these steps:

- **Step 1** Attach an ESD-preventive wrist strap.
- **Step 2** Slide the feature card into the slot until the connector pins make contact with the carrier card backplane connector. (See Figure 14 and Figure 15.)

Figure 14 Installing a Feature Card in a Cisco AS5350XM Universal Gateway

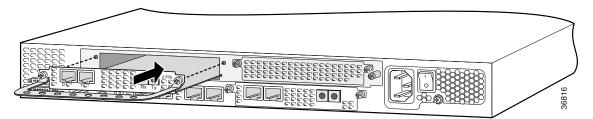
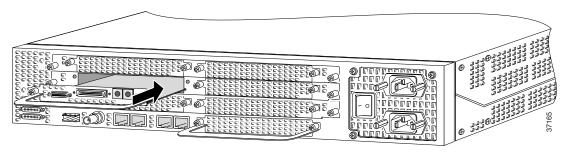


Figure 15 Installing a Feature Card in a Cisco AS5400XM Universal Gateway



- **Step 3** Align the captive screws with their holes, and seat the card completely.
- **Step 4** Tighten the screws to secure the feature card to the chassis. (See Figure 16 and Figure 17.)

Figure 16 Tighten the Captive Screws on the Cisco AS5350XM Universal Gateway

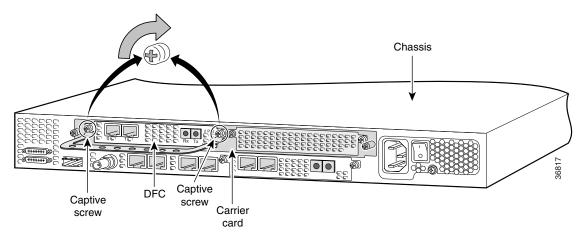
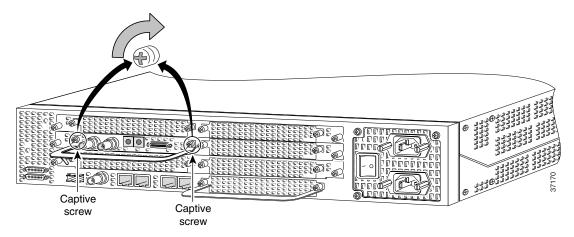


Figure 17 Tighten the Captive Screws on the Cisco AS5400XM Universal Gateway



Step 5 Check the card LEDs to verify that the card is working properly. The following table summarizes the LED functions for the feature cards.

Table 1 LEDs

Feature Card	LED	State	Description	
T1 or E1	ACTIVITY (ACT)	Fast flicker (green)	The feature card is up and running.	
feature card		Slow flicker (green)	The feature card is not yet fully functional.	
	OK/MAINT	Green	The feature card has passed initial power-up diagnostics tests and is operating normally.	
		Yellow	The feature card is busied out, but there are active calls. Once all the calls are terminated the feature card will be powered off.	
			The feature card is not functioning correctly.	
		Off	All calls associated with the card have been shut down, and it is safe to remove the card with the system powered on.	
	• Remote Alarm (RA)	On (yellow)	One LED below each T1/E1 port indicates one of the following:	
	Local Alarm (LA)Loopback (LB)		• A local or remote loopback diagnostic test is running on the associated T1 port.	
	Doopeack (DD)		• An alarm has been received on the associated T1/E1 port, indicating loss of signal (LOS) or loss of multiframe alignment (LOF) at the local or remote node.	

Table 1 LEDs (continued)

Feature Card	LED	State	Description	
CT3 feature card	ACTIVITY (ACT)	Fast flicker	The feature card is up and running.	
		Slow flicker	The feature card is not yet fully functional.	
	OK/MAINT	On (green)	The feature card passed initial power-up diagnostics tests and is operating normally.	
		Yellow	 The feature card is busied out, but there are active calls. Once all the calls are terminated the feature card will be powered off. 	
			 The feature card is not functioning correctly. 	
		Off	All calls associated with the feature card have been shut down, and it is safe to remove the card with the system powered on.	
	M13 Alarm (MA)	On	One of the following is present on the T3 line:	
			Received alarm indication signal (RAIS)	
			• Loss of signal (LOS)	
			• Receive RED alarm (RRED)	
			• Far-end receive failure (RFERF) ¹	
		Off	The operating condition is normal.	
	Remote Alarm (RA)	On	A T1 alarm condition has been encountered by software.	
		Off	The operating condition is normal.	
	Local Alarm (LA)	On	A T1 alarm condition has been encountered by software for a particular port.	
		Off	The operating condition is normal.	
	T3 EN/DIS	Green	A CT3 feature card line connection exists, enabling normal operation.	
		Yellow	Normal operation is disabled.	
	Low signal (LOS)	On	The T3 line interface unit (LIU) is experiencing a loss of signal.	
		Off	Remains off when operating condition is normal.	
	Network Loop	On	At least one T1 is unavailable.	
	(LOOP)	Off	The operating condition is normal.	
Universal	ACTIVITY (ACT)	Flickering	There is call activity on the feature card.	
port and dial-only feature card	OK/MAINT	Green	The feature card passed initial power-up diagnostic tests and is operating normally.	
		Yellow	 The feature card is busied out, but there are active calls. Once all the calls are terminated the feature card will be powered off. 	
			 The feature card is not functioning correctly. 	
		Off	All calls associated with the feature card have been shut down, and it is safe to remove the card with the system powered on.	

Table 1 LEDs (continued)

Feature Card	LED	State	Description	
Voice feature	ACTIVITY	Green (blinking)	There is call activity on the feature card.	
card		Off	There is no activity on the feature card.	
	OK/MAINT	Green	The feature card passed initial power-up diagnostic tests and is operating normally.	
		Yellow	The feature card is busied out, but there are active calls. Once all the calls are terminated the feature card will be powered off.	
			The feature card is not functioning correctly.	
		Off	All calls associated with the feature card have been shut down, and it is safe to remove the card with the system powered on.	

^{1.} To display information about an M13 alarm, use the show controllers t3 user EXEC command.

5 Connect Cables



The information in this document applies to the Cisco AS5350XM and Cisco AS5400XM universal gateways.

System Management and Power Connections

The connections described here provide electrical power and management access. For cable pinouts, see the chassis and card installation guides for the Cisco AS5350XM and Cisco AS5400XM universal gateways.

You can access these documents at Technical Support & Documentation > Product Support > Universal Gateways and Access Servers > Cisco AS5300 or Cisco AS5400 Series Universal Gateways > Install and Upgrade Guides.

The following table summarizes the power and management cable connections.

Table 2 Power and Management Cable Connections

Port or Connection	Color or Type	Connection	Cable
Console	Light blue	PC or ASCII terminal communication port (usually labeled COM)	RJ-45-to-RJ-45 rollover cable (included) and terminal adapter (included).
Auxiliary	Black	Modem for remote access	RJ-45-to-RJ-45 rollover cable and a modem adapter (included).
Power (AC)	Power cable	100 to 240 VAC, 50 to 60 Hz	Grounding power cord (included).
Power (DC)	See the "Connect DC Power" section on page 28 for instructions about the DC power connections.		
Bantam jack port		Test device	
Alarm		Alarm device	12 or 14 AWG copper wire
BITS port		Signal generator	Coax cable

WAN, LAN, and Voice Connections

The following table summarizes the WAN, LAN, and voice connections.

Table 3 WAN, LAN and Voice Connections

Port or Connection	Color or Type	Connection	Cable
Ethernet	RJ-45, yellow	Ethernet hub or Gigabit Ethernet switch	Straight-through Ethernet
T1 or E1 WAN	RJ-45	T1 or E1 network	RJ-45-to-DB-15
			RJ-45 to BNC interface cable for unbalanced connections
			RJ-45 to Twinax interface cable for balanced connections
			RJ-45-to-RJ-45
			RJ-45 to bare wire
	36-pin serial		8-port interface cable
CT3 WAN	BNC	T3 network	BNC to BNC

Connect a Console Terminal

Use the console terminal for local administrative access to the universal gateway. You can connect a terminal only to the console port. You can use the auxiliary port to connect a terminal or a modem for remote access to the universal gateway.

To connect a terminal (an ASCII terminal or a PC running terminal emulation software) to the console port on a Cisco AS5350XM or Cisco AS5400XM universal gateway, follow this procedure.

Step 1 Connect the terminal to the console port by using an RJ-45 rollover cable and an RJ-45-to-DB-25 or RJ-45-to-DB-9 adapter. (See Figure 18 and Figure 19.) The adapters provided are labeled TERMINAL. The adapters and the rollover cable are included in the accessory kit that ships with the universal gateway.

Figure 18 Connecting the Cisco AS5350XM Universal Gateway to a Console Terminal

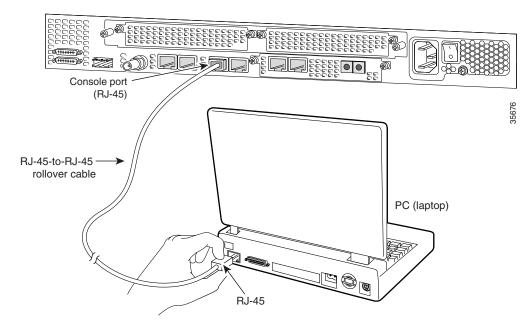
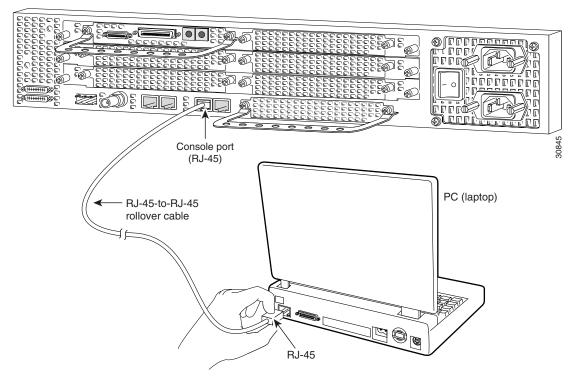


Figure 19 Connecting the Cisco AS5400XM Universal Gateway to a Console Terminal

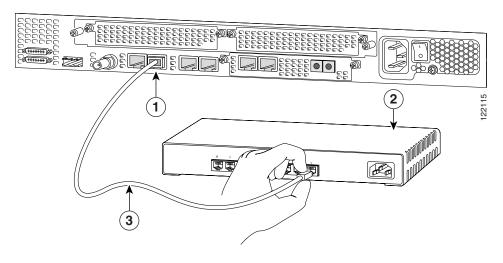


Step 2 Configure your terminal or PC terminal emulation software for 9600 baud, 8 data bits, no parity, and 1 stop bit. To configure the console port, see the *Cisco AS5350XM and Cisco AS5400XM Universal Gateways Software Configuration Guide*.

Connect to an Ethernet Network

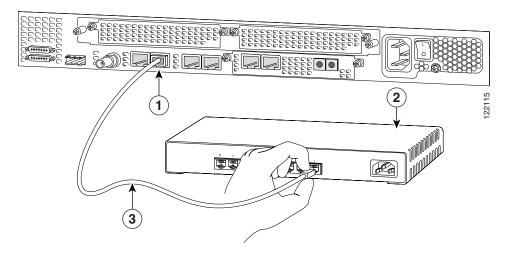
Connect the universal gateway to an Ethernet network by using a straight-through RJ-45-to-RJ-45 Ethernet cable to connect the Gigabit Ethernet port to an Ethernet hub or Gigabit Ethernet switch. (See Figure 20 and Figure 21.)

Figure 20 Connecting the Cisco AS5350XM Universal Gateway to an Ethernet Hub



1	GE1 10/100/1000BASE-T port
2	Ethernet hub
3	Straight-through Ethernet cable

Figure 21 Connecting the Cisco AS5400XM Universal Gateway to an Ethernet Hub



1	GE1 10/100/1000BASE-T port
2	Ethernet hub
3	Straight-through Ethernet cable

Connect to a WAN

A

Warning

The telecommunications lines must be disconnected 1) before unplugging the main power connector and/or 2) while the housing is open. Statement 89



Hazardous network voltages are present in WAN ports regardless of whether power to the unit is OFF or ON. To avoid electric shock, use caution when working near WAN ports. When detaching cables, detach the end away from the unit first. Statement 1026



To reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cord. Statement 1023



The ISDN connection is regarded as a source of voltage that should be inaccessible to user contact. Do not attempt to tamper with or open any public telephone operator (PTO)-provided equipment or connection hardware. Any hardwired connection (other than by a nonremovable, connect-one-time-only plug) must be made only by PTO staff or suitably trained engineers. Statement 23



To avoid electric shock, do not connect safety extra-low voltage (SELV) circuits to telephone-network voltage (TNV) circuits. LAN ports contain SELV circuits, and WAN ports contain TNV circuits. Some LAN and WAN ports both use RJ-45 connectors. Use caution when connecting cables. Statement 1021



Incorrect connection of this or connected equipment to a general purpose outlet could result in a hazardous situation. Statement 87

You can connect the Cisco AS5350XM and Cisco AS5400XM universal gateways to a WAN in the following ways:

• Connect each T1/PRI port to an RJ-45 jack with a straight-through RJ-45-to-RJ-45 cable. (See Figure 23, and Figure 24.)

Figure 22 Connecting a 2-Port or 4-Port Feature Card on the Cisco AS5350XM Universal Gateway to an RJ-45 Jack

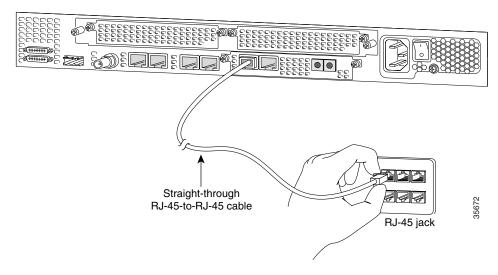


Figure 23 Connecting an 8-Port Feature Card on the Cisco AS5350XM Universal Gateway to an RJ-45 Jack

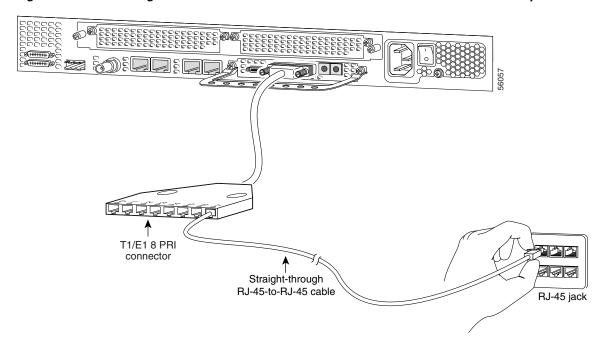
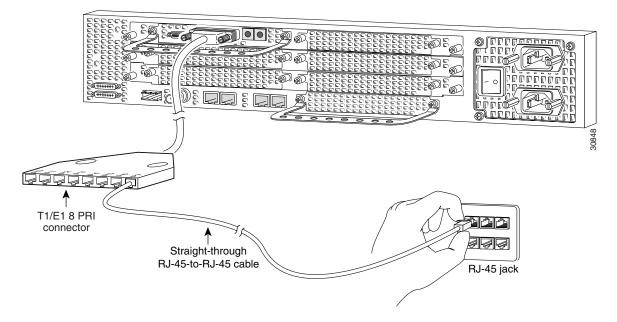


Figure 24 Connecting an 8-Port Feature Card on the Cisco AS5400XM Universal Gateway to an RJ-45 Jack





For other T1 cabling options, see the card installation guide for the Cisco AS5350XM and Cisco AS5400XM universal gateways. You can access this document at Technical Support & Documentation > Product Support > Universal Gateways and Access Servers > Cisco AS5300 or Cisco AS5400 Series Universal Gateways > Install and Upgrade Guides.

• Connect each E1/PRI port to an RJ-45 jack with a straight-through RJ-45-to-RJ-45 cable. (See Figure 25, Figure 26, and Figure 27.)



If you choose a port with 75-ohm input impedance, use an RJ-45-to-75-ohm coaxial cable adapter and plug it into that port. Use software commands to choose a particular port and the line termination on that port. For information on software commands, see the *Cisco AS5350XM and Cisco AS5400XM Universal Gateways Software Configuration Guide*.



The E1 interface card may only be installed in an ACA-permitted customer equipment or a Data Terminal Equipment (DTE) that is exempted from ACA's permit requirements. The customer equipment must only be housed in a cabinet that has screw-down lids to stop user access to overvoltages on the customer equipment. The customer equipment has circuitry that may have telecommunications network voltages on them. Statement 90

Figure 25 Connecting a 2-Port or 4-Port Feature Card on the Cisco AS5350XM Universal Gateway to an RJ-45 Jack

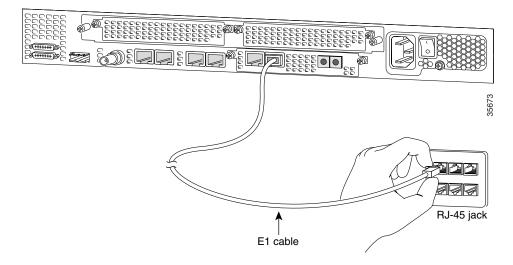


Figure 26 Connecting an 8-Port Feature Card on the Cisco AS5350XM Universal Gateway to an RJ-45 Jack

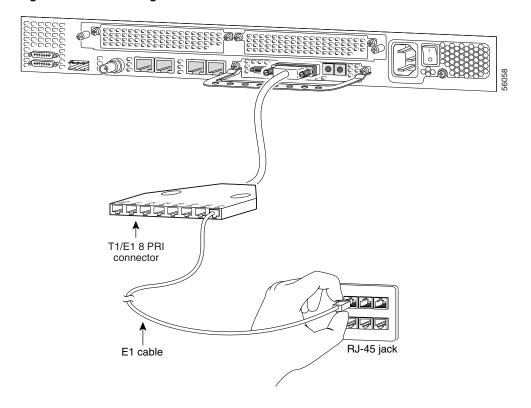
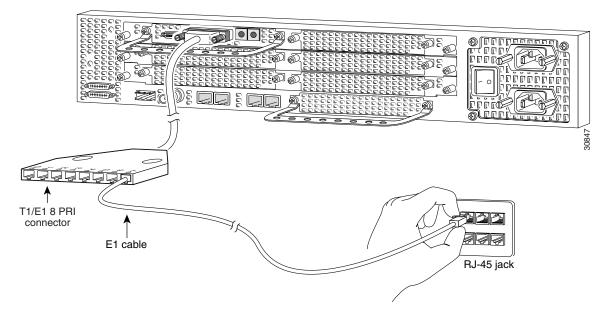


Figure 27 Connecting an 8-Port Feature Card on the Cisco AS5400XM Universal Gateway to an RJ-45 Jack



• Connect each CT3 feature card to a T3 CSU/DSU with two 75-ohm BNC cables. (See Figure 28 and Figure 29.)

Figure 28 Connecting a Channelized T3 Feature Card on the Cisco AS5350XM Universal Gateway to a T3 CSU/DSU

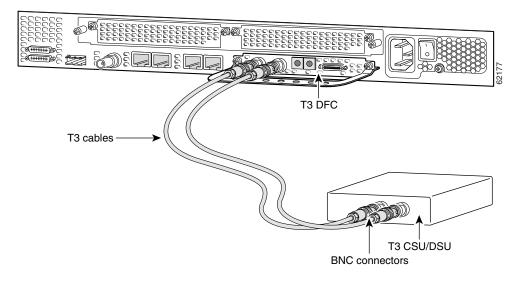
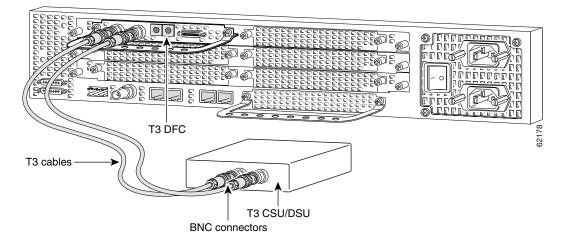


Figure 29 Connecting a Channelized T3 Feature Card on the Cisco AS5400XM Universal Gateway to a T3 CSU/DSU



• Connect a synchronous serial port to a modem or a CSU/DSU with a serial transition cable. (See Figure 30 and Figure 31.)

Figure 30 Connecting a Serial Port on the Cisco AS5350XM Universal Gateway to a CSU/DSU

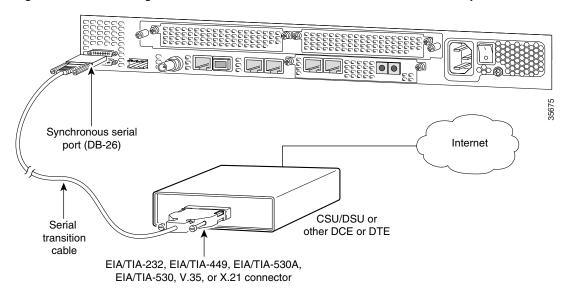
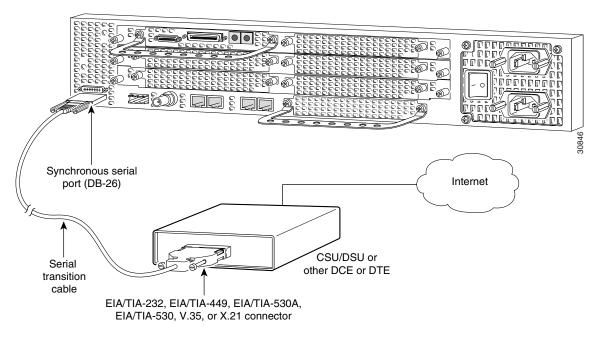
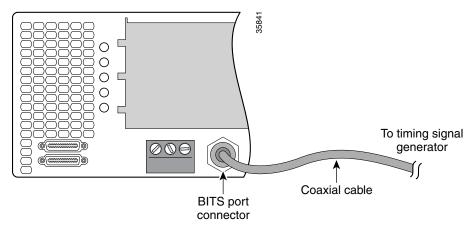


Figure 31 Connecting a Serial Port on the Cisco AS5400XM Universal Gateway to a CSU/DSU



• Use a coaxial cable to connect a timing signal generator (TSG) to the building integrated timing supply (BITS) port. The BITS port is used for external clocking. (See Figure 32.)

Figure 32 Connecting the Cisco AS5350XM and Cisco AS5400XM Universal Gateways to a TSG



• Use a copper wire cable to connect to the alarm port.



The plug-socket combination must be accessible at all times, because it serves as the main disconnecting device. Statement 1019



Incorrect connection of this or connected equipment to a general purpose outlet could result in a hazardous situation. Statement 87

To connect an alarm device to the alarm port, follow these steps.



The alarm connector is a 3-wire connector that plugs into a receptacle on the back of the chassis. The connector is provided in the accessory kit that ships with the universal gateway.

- **Step 1** Insert the 3-pin alarm port connector (included in the accessory kit) into the alarm port terminal block.
- **Step 2** Strip a minimum of 1/4 in. (0.625 cm) off the wire insulation to connect the stranded wires to the alarm connector. The maximum insulation strip length is 0.31 in. (0.78 cm).



Use stranded number 12 or number 14 AWG copper wires to connect an alarm device to the alarm port connector.

Step 3 Secure the wires to the alarm connector with the screws on the connector. (See Figure 33 and Figure 34.)



The maximum tightening torque on the screws is 7 in.-lb (0.79 N-m).

Figure 33 Connecting an Alarm Device to the Cisco AS5350XM Universal Gateway

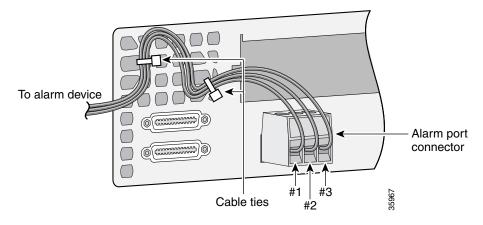
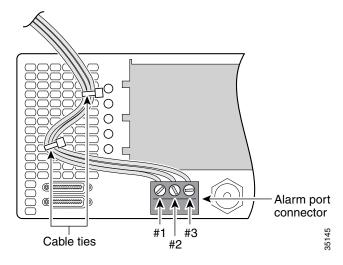


Figure 34 Connecting an Alarm Device to the Cisco AS5400XM Universal Gateway



Step 4 Attach two cable ties to the chassis, and connect the wires to the cable ties.

Step 5 Attach the alarm wires to the alarm device. Table 4 describes the alarm pinouts.

Table 4 Alarm Pinouts

Pin ¹	Description
1	Normally open
2	Pole
3	Normally closed

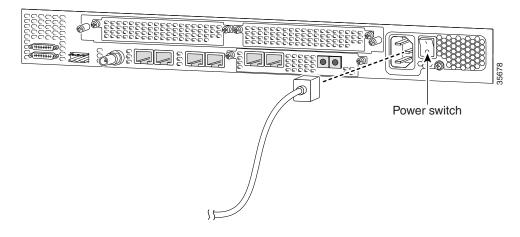
^{1.} The pins are numbered from left to right (facing the back of the chassis), starting with pin 1.

Connect AC Power

To connect AC power, follow these steps:

Step 1 Connect the black power cable to the receptacle on the power supply at the back of the universal gateway. (See Figure 35, Figure 36, and Figure 37.)

Figure 35 Connecting the AC Power Cable to the Cisco AS5350XM Universal Gateway Single Power Supply





If you are using the Cisco AS5350XM redundant power supply, use the special power cable that came with your universal gateway.

Figure 36 Connecting the AC Power Cables to the Cisco AS5350XM Universal Gateway Redundant Power Supply

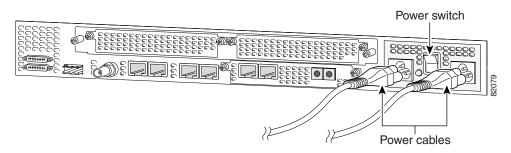
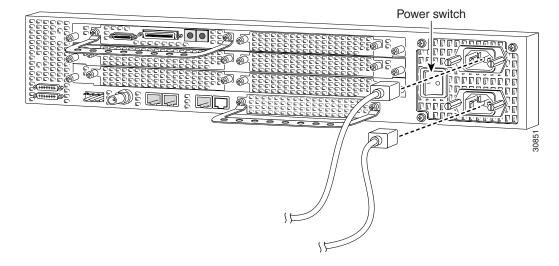


Figure 37 Connecting the AC Power Cables to the Cisco AS5400XM Universal Gateway



- Connect the other end of the power cable to the electrical outlet.
- Step 3 If your universal gateway has a redundant power supply installed, repeat Step 1 and Step 2 for the second power supply.

Connect DC Power



A readily accessible two-poled disconnect device must be incorporated in the fixed wiring. Statement 1022



This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that a UL Listed and Certified fuse or circuit breaker no larger than 60 VDC, 15 A is used on all current-carrying conductors. Statement 96

If you ordered the universal gateway with a DC-input power supply, follow the directions in this section for proper wiring.



Caution

In a DC power supply installation, do not connect the 48 VDC Return wire to chassis ground at the universal gateway. A single-point ground is recommended at the power distribution rack.



This product is intended for installation in restricted access areas and is approved for connection using number 12 or number 14 AWG copper conductors only. The installation must comply with all applicable codes.

To connect DC power, follow these steps:

Step 1 Remove power from the DC circuit.



Before connecting or disconnecting ground or power wires to the chassis, ensure that power is removed from the DC circuit. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position. Statement 140

Step 2 Note the orientation of the DC power supply. The power supply cord should have three wires: 48 VDC Return, -48 VDC, and a safety ground (green wire). (See Figure 38, Figure 39, and Figure 40.)



Warning

The illustration shows the DC power supply terminal block. Wire the DC power supply using the appropriate lugs at the wiring end, or with no lugs, as illustrated. The proper wiring sequence is ground to ground, positive to positive, and negative to negative. Note that the ground wire should always be connected first and disconnected last. Statement 197

Figure 38 Cisco AS5350XM Universal Gateway DC Power Supply Connections—Single Power Supply

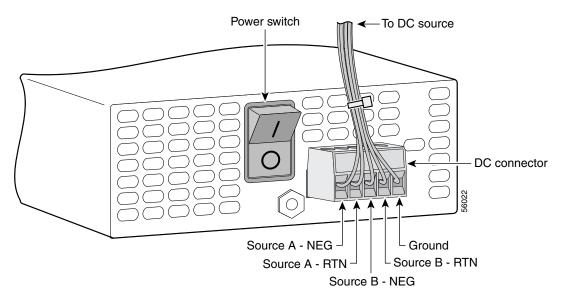


Figure 39 Cisco AS5350XM Universal Gateway DC Power Supply Connections – Redundant Power Supply

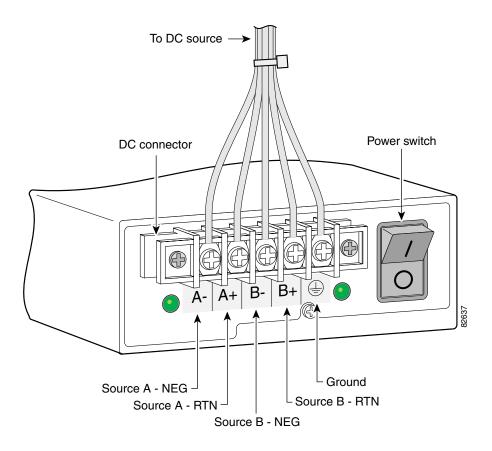
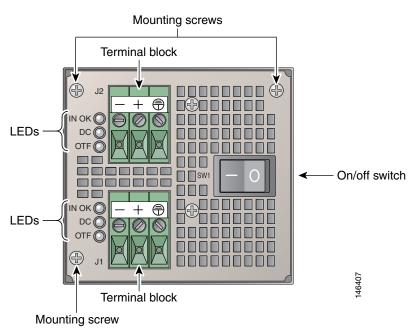


Figure 40 Cisco AS5400XM Universal Gateway DC Power Supply Connections



Step 3 Strip 1/4 in. (0.625 cm) of insulation off the safety ground, the 48 VDC Return, and the -48 VDC input wires.



If you are installing a redundant power supply in the Cisco AS5350XM universal gateway, you should attach spade terminals of the appropriate size to the stripped ends of the ground and input wires.

Step 4 Install the safety grounds (green wire) in the terminal block ground connectors and tighten the locking screws. Ensure that no bare wire is exposed.



For central office installations, we recommend using a green number 6 AWG copper ground wire with one end connected to reliable earth ground. The other end of the wire should be crimped onto the double-hole lug provided in the installation pack. The lug should be secured to the mating holes on either side of the chassis with the two screws included in the accessory pack.

Step 5 Insert the 48 VDC Return wires into the terminal block positive connectors (+) and tighten the locking screws. Ensure that no bare wire is exposed.



Do not overtorque the terminal block contact screws. The recommended torque is 5 in.-lb (0.56 N-m).

- **Step 6** Insert the –48 VDC wires into the terminal block negative connectors (–) and tighten the locking screws. Ensure that no bare wire is exposed.
- **Step 7** Make sure that the power supply wires are secured to cable strain-relief clamps with cable ties.



After wiring the DC power supply, remove the tape from the circuit breaker switch handle and reinstate power by moving the handle of the circuit breaker to the ON position. Statement 8

Step 8 Power up the universal gateway. The internal power supply fan should power up.

6 Power Up the Universal Gateway



The information in this document applies to the Cisco AS5350XM and Cisco AS5400XM universal gateways.

Checklist for Power Up

You are ready to power up the Cisco universal gateway if the following steps have been completed:

- The chassis is securely mounted.
- Power and interface cables are connected.
- Your PC terminal emulation program is configured for 9600 baud, 8 data bits, 1 stop bit, and no parity.
- You have selected passwords for access control.
- You have determined the IP addresses for the Ethernet and serial interfaces.

Power-Up Procedure

Perform this procedure to power up your Cisco universal gateway and verify that it goes through its initialization and self-test. When this is finished, the Cisco universal gateway is ready to configure.



To view the boot sequence through a terminal session, you must have a console connection to the Cisco universal gateway before it powers up. To connect to the console, see the "Connect a Console Terminal" section on page 16.

Move the power switch to the ON position. The system board OK LED should come on, and messages will begin to Step 1 appear in your terminal emulation program window.



Do not press any keys on the keyboard until the messages stop. Any keys pressed during this time are interpreted as the first command typed when the messages stop, which might cause the universal gateway to power down and start over. It takes a few minutes for the messages to stop.



A Cisco AS5350XM or Cisco AS5400XM universal gateway with the maximum number of packet voice data modules, version 2 (PVDM2) modules installed can take up to six minutes to boot from power-on to system ready.



The messages displayed depend on the Cisco IOS software release and on the cards that are installed in your system. The screen displays in this section are for reference only and might not exactly match the messages on your console.

The messages look similar to the following:

Self decompressing the image :

System Bootstrap, Version 12.3(12r)PI6, RELEASE SOFTWARE (fc1) Technical Support: http://www.cisco.com/techsupport Copyright (c) 2004 by cisco Systems, Inc. AS5400XM platform with 524288 Kbytes of main memory

Restricted Rights Legend

Use, duplication, or disclosure by the Government is subject to restrictions as set forth in subparagraph (c) of the Commercial Computer Software - Restricted Rights clause at FAR sec. 52.227-19 and subparagraph (c) (1) (ii) of the Rights in Technical Data and Computer Software clause at DFARS sec. 252.227-7013.

> cisco Systems, Inc. 170 West Tasman Drive San Jose, California 95134-1706

Cisco IOS Software, 5400 Software (C5400-JS-M), Version 12.3(14)T, RELEASE SOFTWARE (fc1) Technical Support: http://www.cisco.com/techsupport Copyright (c) 1986-2005 by Cisco Systems, Inc. Compiled Sat 29-Jan-05 02:10 by yiyan Image text-base: 0x60011068, data-base: 0x61F80000 Cisco AS5400XM (BCM) processor (revision 0x21) with 393215K/131072K bytes of memory. Processor board ID JAB082904P4 SB-1 CPU at 750MHz, Implementation 1025, Rev 0.3, 256KB L2 Cache

```
Last reset from IOS reload
Manufacture Cookie Info:
EEPROM Version 0x4, Board ID 0x4BD,
Board Hardware Version 1.11, Item Number 800-6572289-01,
Board Revision 02, Serial Number JAB082904P4.
Processor 0x0, MAC Address badb.adba.d044
2 Gigabit Ethernet interfaces
6 Serial interfaces
648 terminal lines
1 Channelized T3 port
512K bytes of NVRAM.
125184K bytes of ATA External CompactFlash (Read/Write)
```

Press RETURN to get started!



If the rommon 1> prompt appears, your system has booted in ROM monitor mode. For information on the ROM monitor, see the universal gateway ROM monitor information in the *Cisco IOS Configuration Fundamentals Configuration Guide* for your Cisco IOS software release.

7 Perform Initial Configuration



The information in this document applies to the Cisco AS5350XM and Cisco AS5400XM universal gateways.

At this point you can continue, using the setup command facility, or you can configure the universal gateway manually using the command-line interface (CLI).

- The following section describes the procedure for the setup command facility for the initial configuration.
- See the "Initial Configuration Using the CLI (Manual Configuration)" section on page 36 for information about manual configuration using the CLI.

Initial Configuration Using the Setup Command Facility

This section shows how to prepare the system to perform basic communication functions through its Ethernet and WAN interfaces.



The messages displayed depend on the Cisco IOS software release and cards installed in your system. The screen displays in this section are for reference only and might not exactly match the messages on your console.



If you make a mistake while using the **setup** command facility, you can exit and run the facility again. Press **Ctrl-C**, and type **setup** at the enable mode prompt (Router#).

Step 1 To proceed using the setup command facility, enter yes:

Would you like to enter the initial configuration dialog? [yes/no]: yes

At any point you may enter a question mark `?' for help. Use ctrl-c to abort configuration dialog at any prompt. Default settings are in square brackets `[]'.

Step 2 When the following message appears, enter **no** to configure all interfaces:



Note that, if you enter yes, your system will not be configured correctly.

Basic management setup configures only enough connectivity for management of the system. Extended setup will ask you to configure each interface on the system.

Would you like to enter basic management setup? [yes/no]: no

Step 3 When the following message appears, press **Return** to see the current interface summary:

First, would you like to see the current interface summary? [yes]:

Any interface listed with OK? value "NO" does not have a valid configuration

Interface	IP-Address	OK? Method Status	Protocol
Async1/00	unassigned	NO unset up	up
Async1/01	unassigned	NO unset up	up
•			
•			
GigbitEthernet0/0	unassigned	NO unset up	up
GigbitEthernet0/1	unassigned	NO unset up	up
Group-Async0	unassigned	NO unset up	up
Serial0/0	unassigned	NO unset up	down
Serial0/1	unassigned	NO unset up	down

Step 4 Enter a hostname for the gateway:

Configuring global parameters:

Enter host name [Router]: Gateway

Step 5 Enter an enable secret password. This password is encrypted (more secure) and cannot be seen when viewing the configuration.

The enable secret is a password used to protect access to privileged EXEC and configuration modes. This password, after entered, becomes encrypted in the configuration.

Enter enable secret: xxxx

Step 6 Enter an enable password that is different from the enable secret password. This password is *not* encrypted (less secure) and can be seen when viewing the configuration.

The enable password is used when you do not specify an enable secret password, with some older software versions, and some boot images.

Enter enable password: guessme

Step 7 Enter the virtual terminal password, which prevents unauthenticated access to the universal gateway through ports other than the console port:

The virtual terminal password is used to protect access to the router over a network interface.

Enter virtual terminal password: guessagain

Step 8 Respond to the following prompts as appropriate for your network:

```
Configure System Management [yes/no] no
Configure SNMP Network Management? [yes]:
    Community string [public]:
Configure LAT? [yes]: no
Configure AppleTalk? [no]:
Configure DECnet? [no]:
Configure IP? [no]: yes
    Configure IGRP routing? [yes]:
    Your IGRP autonomous system number [1]:
Configure CLNS? [no]:
Configure IPX? [no]:
```

```
Configure Vines? [no]:
Configure XNS? [no]:
Configure Apollo? [no]:
Configure bridging? [no]:
Async lines accept incoming modems calls. If you will have
users dialing in via modems, configure these lines.
  Configure Async lines? [yes]:
    Async line speed [115200]:
    Will you be using the modems for inbound dialing? [yes]:
      Would you like to put all async interfaces in a group and configure
      them all at one time ? [yes]:
      Allow dial-in users to choose a static IP address? [no]:
      Configure for TCP header compression? [yes]:
      Configure for routing updates on async links? [no]:
      Enter the starting address of IP local pool? [X.X.X.X]: 10.1.2.1
      Enter the ending address of IP local pool? [X.X.X.X]: 10.1.2.59
      You can configure a test user to verify that
      your dial-up service is working properly
    Would you like to create a test user? [no]:
    Will you be using the modems for outbound dialing? [no]:
       Enter the letter corresponding to the ISDN switch type that matches your telco switch type, or press Enter to accept the
       default:
Do you want to configure ISDN switch type? [yes]:
  The following ISDN switch types are available:
   [a] primary-4ess
   [b] primary-5ess
   [c] primary-dms100
```

```
[d] primary-net5
 [e] primary-ntt
 [f] primary-ts014
Enter the switch type [b]:
```

Next, you will be prompted to configure controllers. These controllers enable users to dial in via ISDN or analog modems.

Step 10 Enter yes to allow users to dial in using ISDN or analog modems:

Do you intend to allow users to dial in? [yes]:

There are 2 controllers on this access server. If you want to use the full capacity of the access server configure all controllers.

Controller T3 0,1...etc in software corresponds to Port 0,1...etc on the back of the access server.

PRI configuration can be configured to controllers all at once based on your PRI controllers selection. Whereas CAS configuration will be configured individually for each controller.

Step 11 Enter the number of controllers that you will be using for the PRI configuration, or press Enter to configure all controllers:

Enter # of controllers, you will be using for PRI configuration [2]:

Configuring controller parameters:

Step 12 Press Enter for every slot, port, and channel:

```
Configuring controller t1 3/0:
Configuring PRI on this controller.
Configuring controller t1 3/1:
Configuring PRI on this controller.
```

Step 13 Enter yes to configure the Gigabit Ethernet 0/0 interface to connect the gateway to a LAN, and then respond to the remaining questions to configure the Fast Ethernet port:

```
Do you want to configure GigabitEthernet0/0 interface? [no]: yes

Configure IP on this interface? [no]: yes

IP address for this interface: 172.22.50.10

Subnet mask for this interface [255.255.0.0]: 255.255.255.128

Class B network is 172.22.0.0, 25 subnet bits; mask is /25

Do you want to configure GigabitEthernet0/1 interface? [no]:
```



The Gigabit Ethernet interfaces in the Cisco AS5350XM universal gateway can be configured as Fast Ethernet interfaces in ROM monitor mode. For information on the ROM monitor, see the universal gateway ROM monitor information in the Cisco IOS Configuration Fundamentals Configuration Guide for your Cisco IOS software release.

Step 14 Configure your serial interfaces by responding to the following prompts:

```
Do you want to configure Serial0/0 interface? [no]: yes
Configure IP on this interface? [no]: yes
Configure IP unnumbered on this interface? [no]:
    IP address for this interface interface: 172.22.50.11
    Subnet mask for this interface: 255.255.0.0

Do you want to configure Serial0/1 interface? [yes]: no
Configuring interface Group-Async1:
```

Step 15 After you complete the configuration script, the setup script displays the configuration command script. Review your new configuration and then make the appropriate selection below:

```
[0] Go to the IOS command prompt without saving this config.[1] Return back to the setup without saving this config.[2] Save this configuration to nvram and exit.Enter your selection [2]:
```

Initial Configuration Using the CLI (Manual Configuration)

This section shows how to perform basic configuration using the command-line interface (CLI).

```
Step 1 To proceed with manual configuration using the CLI, enter no.

Would you like to enter the initial configuration dialog? [yes/no]: no
```

Step 2 To terminate autoinstall and continue with manual configuration, press Return:

Would you like to terminate autoinstall? [yes] Return

Step 3 To bring up the Router> prompt, press Return:

Router>

Step 4 Enter privileged EXEC mode.

Router> enable Router#

Step 5 Enter global configuration mode. You are in global configuration mode when the prompt changes to Router (config) #.

Router# configure terminal

```
Enter configuration commands, one per line. End with {\tt CNTL/Z}. Router(config)#
```

Step 6 Change the name of the gateway to a meaningful name:

```
Router(config) # hostname Gateway
Gateway(config) #
```

Step 7 Create a secret password. This password provides access to privileged EXEC mode. Substitute your enable secret password for **guessme**.

```
Gateway(config)# enable secret guessme
```

Step 8 Enable password encryption. When password encryption is enabled, the encrypted form of the password is displayed when a **show configuration command** is entered. You cannot recover a lost encrypted password.

```
Gateway(config)# service password-encryption
```

Step 9 Configure debugging messages to include milliseconds in the date and time stamp:

```
Gateway(config) # service timestamps debug datetime msec
```

Step 10 Configure logging messages to include milliseconds in the date and time stamp:

```
Gateway(config)# service timestamps log datetime msec
```

Step 11 Enter line configuration mode to configure the console port. You are in line configuration mode when the prompt changes to Gateway (config-line) #.

```
Gateway(config)# line con 0
Gateway(config-line)#
```

Step 12 Prevent the gateway's EXEC facility from timing out if you do not type any information on the console screen for an extended period:

```
Gateway(config-line)# exec-timeout 0 0
```

Step 13 Exit line configuration mode:

```
Gateway(config-line)# exit
Gateway(config)#
```

Step 14 Return to privileged EXEC mode:

```
Gateway(config)# Ctrl-Z
Gateway#
```

Step 15 Save the configuration:

```
Gateway# write memory
Building configuration ...
[OK]
Gateway#
```

Verifying the Hostname and Passwords

To verify that you configured the right hostname and passwords, follow these steps:

Step 1 Enter the show configuration command:

```
Gateway# show configuration
Using 1888 out of 512000 bytes!
version XX.X
```

```
!
hostname Gateway
!
enable secret 5 $1$60L4$X2JYOwoDc0.kqa1lo0/w8/
.
```

Step 2 Exit privileged EXEC mode and attempt to log in by using the new enable secret password. The **show privilege** command shows the current security privilege level.

```
Gateway# exit

Gateway con0 is now available

Press RETURN to get started.

Gateway> enable

Password:

Gateway# show privilege

Current privilege level is 15

Gateway#
```

Configuring Local AAA Security

Configure authentication, authorization, and accounting (AAA) to perform login authentication by using the local username database. The **login** keyword authenticates EXEC shell users. Additionally, configure PPP authentication to use the local database if the session was not already authenticated by the **login** command.

AAA (called *triple A*) is the Cisco IOS security model used on all Cisco devices. AAA provides the primary framework through which you set up access control on the Cisco AS5350XM or Cisco AS5400XM universal gateway.

The same authentication method is used on all interfaces. AAA is set up to use the local database configured on the gateway. This local database is created with the **username** configuration commands.

To configure AAA, follow these steps:

Step 1 Enter global configuration mode. You are in global configuration mode when your prompt changes to Gateway(config)#.

Step 2 Create a local login username database in global configuration mode. In this example, the administrator's username is *admin*. The remote client's login username is *Harry*.

```
Gateway(config)# username admin password adminpasshere
Gateway(config)# username Harry password Harrypasshere
```

Step 3 Configure local AAA security in global configuration mode. You *must* enter the **aaa new-model** command before the other two authentication commands.

```
Gateway(config)# aaa new-model
Gateway(config)# aaa authentication login default local
Gateway(config)# aaa authentication ppp default if-needed local
```

Step 4 Return to privileged EXEC mode:

```
Gateway(config)# Ctrl-Z
Gateway#
```

Step 5 Log in with your username and password.



Caution

After you have configured AAA security, all access will require a username and password. Make sure that your login name and password are working before you exit or reboot. If you are unable to get back into your universal gateway, see the password recovery instructions at the following URL:

 $http://www.cisco.com/warp/public/474/pswdrec_as 5300.shtml$

Gateway# login

User Access Verification

Username: admin
Password:
Gateway#



To save the gateway configuration, save it to NVRAM. See the "Saving Configuration Changes" section on page 60.



Note

For comprehensive information about how to implement a Cisco AAA-based security environment, see the relevant documents at Technical Support & Documentation > Product Support > Cisco IOS Software > Cisco IOS Software Release you are using > Configuration Guides.

Configuring Basic Dial Access

To commission a basic dial access service, use the procedure below to perform the following tasks:

- Create two loopback interfaces.
- Bring up the Gigabit Ethernet interface.
- Add an IP route to the default gateway.

Step 1 Enter global configuration mode. You are in global configuration mode when your prompt changes to Gateway(config)#.

Gateway# configure terminal

Enter configuration commands, one per line. End with \mathtt{CNTL}/\mathtt{Z} . Gateway(config)#

Step 2 Assign the IP addresses as in the following example, and create an IP route to the default gateway:

```
Gateway(config)# interface loopback 0
Gateway(config-if)# ip address 172.22.99.1 255.255.255.255
Gateway(config-if)# exit
Gateway(config)# interface loopback 1
Gateway(config-if)# ip address 172.22.90.1 255.255.255.0
Gateway(config-if)# exit
Gateway(config)# interface GigabitEthernet 0/0
Gateway(config-if)# ip address 172.28.186.55 255.255.255.240
Gateway(config-if)# no shutdown
Gateway(config-if)# exit
Gateway(config-if)# exit
Gateway(config)# ip route 0.0.0.0 0.0.0.0 172.28.186.49
```

In this example:

- Interface loopback 0—Identifies the universal gateway with a unique and stable IP address. One unique IP address from a common block of addresses is assigned to each device in the IP network. This technique makes security-filtering easy for the Network Operations Center (NOC). One Class C subnet used for device identification can support 254 distinct devices with unique loopback addresses.
- Interface loopback 1—Hosts a pool of IP addresses for the remote nodes. In this way, one route, instead of 254 routes, is summarized and propagated to the backbone. Pick the IP address for loopback 1 from the range of addresses that you will assign to the local address pool.

Step 3 Return to privileged EXEC mode:

```
Gateway(config)# Ctrl-Z
```

Gateway#

Step 4 Verify that the Gigabit Ethernet interface is up. Ping the default gateway to verify this.

```
Gateway# ping 172.28.186.49
```

```
Type escape sequence to abort. Sending 5, 100-byte ICMP Echos to 172.28.186.49, timeout is 2 seconds: .!!!! Success rate is 80 percent (4/5), round-trip min/avg/max = 1/1/4 ms
```



To save the gateway configuration, save it to NVRAM. See the "Saving Configuration Changes" section on page 60.



An 80 percent success rate is normal for the first time you ping an external device. The universal gateway does not have an Address Resolution Protocol (ARP) entry for the external device. A 100 percent success rate is achieved the next time you ping the device.

Configuring the Asynchronous Group Interface

This section shows how to configure asynchronous interfaces. Asynchronous group interfaces allow administrators to easily configure a large number of asynchronous interfaces by allowing them to clone interfaces from one managed copy. This can also reduce the number of lines in the configuration file, because each individual asynchronous interface configuration can be replaced by at least one group-async interface. To assign the asynchronous interfaces to a group-async interface, first determine the number of asynchronous lines that need to be aggregated. This can be determined from the running configuration.

Step 1 Enter the **enable** command and password to go to privileged EXEC mode. You are in privileged EXEC mode when the prompt changes to <code>Gateway#</code>.

```
Gateway> enable
Password: password
Gateway#
```

Step 2 Enter global configuration mode. You are in global configuration mode when the prompt changes to Gateway (config) #.

```
Gateway# configure terminal
```

```
Enter configuration commands, one per line. End with CNTL/Z. Gateway(config)#
```

Step 3 Place all asynchronous interfaces in a single group, so that you configure the same parameters quickly on all interfaces at one time:

```
Gateway(config)# interface group-async 1
Gateway(config-if)#
```

Step 4 Define the slot/port group range of the interface. The range that you specify depends on the number of asynchronous interfaces you have on your gateway. If your gateway has 108 asynchronous interfaces, you can specify **group-range** 1/1 1/107.

```
Gateway(config-if)# group-range slot/port slot/port
Building configuration...
Gateway(config-if)#
```

Step 5 Return to privileged EXEC mode:

```
Gateway(config-if)# Ctrl-Z
Gateway#
```



To save the gateway configuration, save it to NVRAM. See the "Saving Configuration Changes" section on page 60.

Verifying the Group Interface Configuration

To verify your group interface configuration, enter the show interface async command in privileged EXEC mode:

Gateway# show interface async 4/0

```
Async4/00 is down, line protocol is down
  modem(slot/port)=4/0, state=IDLE
  dsx1(slot/unit/channel)=NONE, status=VDEV_STATUS_UNLOCKED
  Hardware is Async Serial
  MTU 1500 bytes, BW 115 Kbit, DLY 100000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation SLIP, loopback not set
  DTR is pulsed for 5 seconds on reset
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/10/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: weighted fair
  Output queue: 0/1000/64/0 (size/max total/threshold/drops)
     Conversations 0/1/32 (active/max active/max total)
     Reserved Conversations 0/0 (allocated/max allocated)
     Available Bandwidth 86 kilobits/sec
  5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 packets output, 0 bytes, 0 underruns
     O output errors, O collisions, O interface resets
     0 output buffer failures, 0 output buffers swapped out
     0 carrier transitions
```

If you are having trouble, check for errors as well as local and remote addresses. Enter the **show async status** command in privileged EXEC mode:

Gateway# show async status

Async protocol statistics:

Int	Local	Remote	Qđ	InPack	OutPac	Inerr	Drops	MTU
1/00	42.1.1.1	None	0	0	0	0	0	1500
1/01	192.168.10.100	None	0	0	0	0	0	1500
1/02	192.168.10.100	None	0	0	0	0	0	1500
1/03	192.168.10.100	None	0	0	0	0	0	1500
1/04	192.168.10.100	None	0	0	0	0	0	1500
1/05	192.168.10.100	None	0	0	0	0	0	1500

Rcvd: 25762 packets, 1052214 bytes 0 format errors, 891 checksum errors, 0 overrun Sent: 8891 packets, 222264 bytes, 0 dropped

Configuring a T1 or E1 Feature Card

This section shows how to configure a T1 or E1 feature card. On a Cisco AS5350XM or Cisco AS5400XM universal gateway, you can allocate the available channels for channelized T1 and E1 in the following ways:

- You can configure all channels to support ISDN PRI.
- If you are not running ISDN PRI, you can configure all channels to support robbed-bit signaling (also known as channel-associated signaling).
- You can configure all channels in a single channel group.
- You can configure mix and match channels supporting ISDN PRI, channel grouping, and channel-associated signaling (CAS).
- You can configure mix and match channels supporting ISDN PRI, channel grouping, and robbed-bit signaling across the same T1 line. For example, on the same channelized T1 you can use the pri-group timeslots 1-10,24 command, channel-group 11 timeslots 11-16 command, and ds0-group 17 timeslots 17-23 type e&m-fgb command. This is an unusual configuration because it requires you to align the correct range of time slots on both ends of the connection.



For configuration information about leased-line or nondial use, see the Cisco IOS Dial Technologies Configuration Guide, available online. You can access this document at Technical Support & Documentation > Product Support > Cisco IOS Software > Cisco IOS Software Release you are using > Configuration Guides.



The T1 and E1 controller numbering convention is *slot/port* in CLI commands. Feature card slot numbering starts from the motherboard and works up from left to right. Slot 0 is reserved for the motherboard. The CT1/E1 feature card slots are numbered sequentially from 1 to 7. Port numbering is from 0 to 7.

Step 1 Use the **enable** command and password to enter privileged EXEC mode. You are in privileged EXEC mode when the prompt changes to <code>Gateway#</code>.

Gateway> **enable**Password: password
Gateway#

Step 2 Enter global configuration mode. You are in global configuration mode when the prompt changes to Gateway (config) #.

Gateway# configure terminal

Enter configuration commands, one per line. End with CNTL/Z.
Gateway(config)#

Step 3 Enter controller configuration mode to configure your controller slot and port. Slot values range from 1 to 7. Port values range from 0 to 7 for T1 and E1.

Gateway(config) # controller [t1 | e1] slot/port
Gateway(config-controller) #

- **Step 4** Enter the telco framing type.
 - For the CT1 controller, enter either esf or sf:

Gateway(config-controller) # framing esf

• For the CE1 controller, enter crc4:

Gateway(config-controller) # framing crc4

Step 5 Define the line code.

• For the CT1 controller, use binary 8 zero substitution (B8ZS):

Gateway(config-controller)# linecode b8zs

• For the CE1 controller, use high-density bipolar 3 (HDB3):

Gateway(config-controller)# linecode hdb3

Step 6 Return to privileged EXEC mode:

```
Gateway(config-controller)# Ctrl-Z
Gateway#
```



Tip

To save the gateway configuration, save it to NVRAM. See the "Saving Configuration Changes" section on page 60.

Verifying Channelized T1 or E1 Controller Operation

To verify that your controller is up and running and that no alarms have been reported, enter the **show controller** command and specify the controller type, slot, and port numbers:

```
Gateway# show controller t1 1/7

T1 1/7 is up.

No alarms detected.
Framing is ESF, Line Code is B8ZS, Clock Source is Line Primary.
Version info of slot 2: HW: 2, Firmware: 14, NEAT PLD: 13, NR Bus PLD: 19
Data in current interval (476 seconds elapsed):

0 Line Code Violations, 0 Path Code Violations
0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
Total Data (last 24 hours)
0 Line Code Violations, 0 Path Code Violations,
0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
```

If you are having trouble, consider these possibilities:

- First check that the configuration is correct. The framing type and line code should match what the service provider has specified. Then check channel group and PRI-group configurations, especially to verify that the time slots and speeds are what the service provider has specified. At this point, the show controller t1 or show controller e1 command should be used to check for T1 or E1 errors. Use the command several times to determine whether error counters are increasing, or whether the line status is continually changing. If error counters are increasing or line status is changing, work with your service provider to resolve the issue.
- Another common reason for failure is the **dial-tdm-clock priority** setting. The default setting is a free-running clock that causes clock slip problems if it is not set properly.

Configuring a Channelized T3 Feature Card

The CT3 feature card offers 28 individual T1 channels (bundled as a T3 line) for serial transmission of voice and data. The CT3 link supports the maintenance data link channel in C-bit parity mode and also in payload and network loopbacks. The T1 interfaces multiplexed in the CT3 link support facilities data link (FDL) in extended super frame (ESF) framing.



The CT3 controller numbering convention is *slot/port* in CLI commands. Feature card slot numbering starts from the motherboard and works up from left to right. Slot 0 is reserved for the motherboard. The feature card slots are numbered sequentially from 1 to 7. The port number value is always 0. Under the CT3 controller, the CT1 controller numbering convention is *slot/port:channel* in CLI commands. Port numbering values range from 1 to 28.

Step 1 Use the **enable** command and password to enter privileged EXEC mode. You are in privileged EXEC mode when the prompt changes to Gateway#.

Gateway> **enable**Password: password
Gateway#

Step 2 Enter global configuration mode. You are in global configuration mode when the prompt changes to Gateway (config) #.

Gateway# configure terminal

Enter configuration commands, one per line. End with ${\tt CNTL/Z}$. Gateway(config)#

Step 3 Enter controller configuration mode to configure your T3 controller for slot 1 port 0. Slot values range from 1 to 7. The port number is always 0.

Gateway(config)# controller t3 1/0
Gateway(config-controller)#

Step 4 Enter the telco framing type, either c-bit or m23:

Gateway(config-controller)# framing c-bit

Step 5 Enter your clock source, either internal or line:

Gateway(config-controller) # clock source line

Step 6 Enter your cable length. Values range in feet from 0 to 450.

Gateway(config-controller)# cablelength 450

Step 7 Configure your T1 controllers. The range is 1 to 28.

• To configure all 28 T1 controllers at once, enter:

Gateway(config-controller)# t1 1-28 controller

• To omit specified T1 controllers while configuring others, specify them as needed. In this instance, T1 controllers 11–14, 21, 22, and 24–28 are not configured.

Gateway(config-controller)# t1 1-10,15-20,23 controller

Step 8 Return to privileged EXEC mode:

Gateway(config-controller)# Ctrl-Z
Gateway#



To save the gateway configuration, save it to NVRAM. See the "Saving Configuration Changes" section on page 60.

Verifying Channelized T3 Controller Operation

To verify that your controller is up and running and that no alarms have been reported, enter the **show controller** command and specify the controller type, slot, and port numbers:

Gateway# show controller t3 1/0

```
T3 1/0 is up.

Applique type is Channelized T3

No alarms detected.

MDL transmission is disabled

FEAC code received:No code is being received

Framing is C-BIT Parity, Line Code is B3ZS, Clock Source is Internal
Data in current interval (270 seconds elapsed):

0 Line Code Violations, 0 P-bit Coding Violation
```

```
0 C-bit Coding Violation, 0 P-bit Err Secs
0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
0 Unavailable Secs, 0 Line Errored Secs
0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
Total Data (last 32 15 minute intervals):
0 Line Code Violations, 0 P-bit Coding Violation,
0 C-bit Coding Violation, 0 P-bit Err Secs,
0 P-bit Severely Err Secs, 0 Severely Err Framing Secs,
0 Unavailable Secs, 0 Line Errored Secs,
0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
```

Configuring ISDN PRI

Channelized T1 ISDN PRI offers 23 B channels and 1 D channel. Channelized E1 ISDN PRI offers 30 B channels and 1 D channel. Channel 24 is the D channel for T1, and channel 16 is the D channel for E1. ISDN provides out-of-band signaling using the D channel for signaling and the B channels for user data.

For a complete description of the commands mentioned in this section, see the Cisco IOS Dial Technologies Configuration Guide, which is available online. You can access this document at Technical Support & Documentation > Product Support > Cisco IOS Software > Cisco IOS Software Release you are using > Configuration Guides.

Request PRI Line and Switch Configuration from a Telco Service Provider

Before configuring ISDN PRI on your Cisco universal gateway, you must order a correctly provisioned ISDN PRI line from your telecommunications service provider.

This process varies from provider to provider both nationwide and internationally. However, some general guidelines apply:

- Determine whether the outgoing B channel calls are made in ascending or descending order. The Cisco IOS software default is descending order; however, if the switch from the service provider is configured for outgoing calls made in ascending order, the universal gateway can be configured to match the switch configuration of the service provider.
- Ask for delivery of calling line identification. Providers sometimes call this CLI or automatic number identification (ANI).
- If the gateway will be attached to an ISDN bus (to which other ISDN devices might be attached), ask for point-to-multipoint service (subaddressing is required) and a voice-and-data line.

Configure ISDN PRI by following these steps:

Step 1 Use the **enable** command and password to enter privileged EXEC mode. You are in privileged EXEC mode when the prompt changes to <code>Gateway#</code>.

Gateway> **enable**Password: password
Gateway#

Step 2 Enter global configuration mode. You are in global configuration mode when the prompt changes to Gateway (config) #.

Gateway# configure terminal

Enter configuration commands, one per line. End with CNTL/Z.
Gateway(config)#

Step 3 Select a service provider switch type (see Table 5) that matches your service provider switch:

Gateway(config)# isdn switch-type switch-type

Table 5 ISDN Switch Types

Area	Keyword	Switch Type
Australia	primary-ts014	Australia PRI switches
Europe	primary-net5	European, New Zealand, and Asia ISDN PRI switches (covers the Euro-ISDN E-DSS1 signaling system and is European Telecommunication Standards Institute or ETSI-compliant)
Japan	primary-ntt	Japanese ISDN PRI switches
None	none	No switch defined
North America	primary-4ess	AT&T 4ESS switch type for the United States
	primary-5ess	AT&T 5ESS switch type for the United States
	primary-dms100	NT DMS-100 switch type for the United States
	primary-ni	National ISDN switch type

Step 4 Specify the T1, E1, or CT3 controller that you want to configure.



The T1/E1 controller numbering convention is *slot/port* in CLI commands. Feature card slot numbering starts from the motherboard and works up from left to right. Slot 0 is reserved for the motherboard. The feature card slots are numbered sequentially from 1 to 3 for the Cisco AS5350XM universal gateway and from 1 to 7 for the Cisco AS5400XM universal gateway. Port numbering is from 0 to 7, depending on the WAN feature card installed.

The CT3 controller numbering convention is *slot/port* in CLI commands. Feature card slot numbering starts from the motherboard and works up from left to right. Slot 0 is reserved for the motherboard. The feature card slots are numbered sequentially from 1 to 3 for the Cisco AS5350XM universal gateway and from 1 to 7 for the Cisco AS5400XM universal gateway. The port number value is always 0. Under the CT3, the T1 controller numbering convention is *slot/port:channel* in CLI commands. Channel values range from 1 to 28. For illustrations of slot locations, see the "Slot Numbering" section on page 62.

Gateway(config)# controller t1 1/0

or

Gateway(config)# controller t3 7/0:16

or

Gateway(config)# controller e1 1/0



When you configure the CT1or CE1 controller, a corresponding D-channel serial interface is created automatically.

Step 5 Specify the PRI channels:

Gateway(config-controller)# pri-group [timeslots range]



For CT1 ISDN PRI—If you do not specify the time slots, the specified controller is configured for 23 B channels and 1 D channel. B channel numbers range from 1 to 23; channel 24 is the D channel for T1. Corresponding serial interface numbers range from 0 to 23. In commands, the D channel is interface serial slot/port:23—for example, interface serial 1/0:23.



For CE1 ISDN PRI—If you do not specify the time slots, the specified controller is configured for 30 B channels and 1 D channel. B channel numbers range from 1 to 31; channel 16 is the D channel for E1. Corresponding serial interface numbers range from 0 to 30. In commands, the D channel is interface serial *slot/port*:15—for example, interface serial 1/0:15.

Step 6 Return to privileged EXEC mode:

Gateway(config-controller)# Ctrl-Z
Gateway#



Tip

To save the gateway configuration, save it to NVRAM. See the "Saving Configuration Changes" section on page 60.

Verifying Interface Configuration

To verify that you have configured the interfaces correctly, enter these commands:

• Enter the show controller t3 command and specify the slot and port numbers. Verify that the controller is up and that you do not have excessive errors; otherwise, your controller might go down frequently. This could indicate switch problems.

Gateway# show controller t3 1/0

```
T3 1/0 is up.
  Applique type is Channelized T3
 No alarms detected.
 MDL transmission is disabled
 FEAC code received: No code is being received
  Framing is C-BIT Parity, Line Code is B3ZS, Clock Source is Internal
  Data in current interval (270 seconds elapsed):
     O Line Code Violations, O P-bit Coding Violation
     0 C-bit Coding Violation, 0 P-bit Err Secs
     O P-bit Severely Err Secs, O Severely Err Framing Secs
     O Unavailable Secs, O Line Errored Secs
     O C-bit Errored Secs, O C-bit Severely Errored Secs
  Total Data (last 32 15 minute intervals):
     O Line Code Violations, O P-bit Coding Violation,
     O C-bit Coding Violation, O P-bit Err Secs,
     0 P-bit Severely Err Secs, 0 Severely Err Framing Secs,
     O Unavailable Secs, O Line Errored Secs,
     O C-bit Errored Secs, O C-bit Severely Errored Secs
```

• Enter the show controller t1 command and specify the slot and port numbers:

```
Gateway# show controller t1 1/0
```

```
T1 1/0 is up.

Applique type is Channelized T1
Cablelength is long gain36 0db
No alarms detected.
alarm-trigger is not set
Version info of slot 1: HW:768, PLD Rev:4
Framer Version:0x8

Manufacture Cookie Info:
EEPROM Type 0x0001, EEPROM Version 0x01, Board ID 0x041,
Board Hardware Version 3.0, Item Number 73-4089-03,
Board Revision 05, Serial Number JAB99432626,
PLD/ISP Version 0.1, Manufacture Date 11-Nov-1999.

Framing is ESF, Line Code is B8ZS, Clock Source is Line.
Data in current interval (264 seconds elapsed):
3 Line Code Violations, 1 Path Code Violations
```

```
5 Slip Secs, 0 Fr Loss Secs, 1 Line Err Secs, 1 Degraded Mins
5 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
```

• Enter the show isdn status command to view layer status information:

```
Gateway# show isdn status
```

```
Global ISDN Switchtype = primary-5ess
ISDN Serial1/0:1:23 interface
  dsl 0, interface ISDN Switchtype = primary-5ess
  Layer 1 Status:
    ACTIVE
  Layer 2 Status:
    TEI = 0, Ces = 1, SAPI = 0, State = MULTIPLE_FRAME_ESTABLISHED
  Layer 3 Status:
    0 Active Layer 3 Call(s)
  Activated dsl 0 CCBs = 0
  The Free Channel Mask: 0x807FFFFF
```

Enter the show isdn service command to monitor ISDN channels and service:

```
Gateway# show isdn service
```



Your Cisco AS5350XM or Cisco AS5400XM universal gateway supports a total of 248 ISDN channels per ingress feature card. If you are configuring individual T1 channels of your CT3 interface for backup links or serial backhaul connections, the T1 channels must be configured into channel groups. Each channel group uses 24 time slots or channels. For example, to configure six T1 channels (6 x 24), 144 ISDN channels are in use, leaving the remaining 104 (248–144) channels for ISDN use.

In the following show running-config example, five T1 channels are configured into channel groups:

Gateway# show running-config

```
Building configuration...

Current configuration:
!
! Last configuration change at 15:49:30 UTC Mon Apr 3 2000 by admin
! NVRAM config last updated at 01:35:05 UTC Fri Mar 17 2000 by admin
! version 12.0
service timestamps debug datetime msec localtime show-timezone
service timestamps log datetime msec localtime show-timezone
service password-encryption
!
---text omitted---
!
controller T3 1/0
framing m23
clock source line
t1 1-28 controller
!
controller T1 1/0:11
```

```
framing esf
channel-group 20 timeslots 1-24 speed 64
!
controller T1 1/0:12
framing esf
channel-group 20 timeslots 1-24 speed 64
!
controller T1 1/0:13
framing esf
channel-group 20 timeslots 1-24 speed 64
!
controller T1 1/0:14
framing esf
channel-group 20 timeslots 1-24 speed 64
!
controller T1 1/0:15
framing esf
channel-group 20 timeslots 1-24 speed 64
!
```

If you are having trouble, consider these possibilities:

- If the Layer 1 Status is "Deactivated," make sure that the cable connection is not loose or disconnected. This status message indicates a problem at the physical layer.
- There may be a problem with your telco, or the framing and line code types you entered may not match those of your telco. A Layer 2 error indicates that the universal gateway cannot communicate with the telco. There is a problem at the data link layer.

Configuring the D Channels for ISDN Signaling

The ISDN D channels carry the control and signaling information for your ISDN calls—for both circuit-switched data calls, and analog modem calls.

The D channel notifies the central office switch to send the incoming call to particular time slots on the Cisco universal gateway. Each one of the B channels carries data or voice. The D channel carries signaling for the B channels. The D channel identifies whether the call is a circuit-switched digital call or an analog modem call. Analog modem calls are decoded and then sent off to the onboard modems. Circuit-switched digital calls are directly relayed to the ISDN processor in the gateway.

When you configured your ISDN PRI on the CT1 or CE1 controller, you automatically created a serial interface that corresponds to the PRI group time slots. This interface is a logical entity that is associated with the specific controller. After the serial interface is created, you must configure the D channel serial interface that carries signaling. The configuration applies to all the PRI B channels (time slots) for that PRI group.

Figure 41 shows the logical contents of an ISDN PRI interface used in a T1 network configuration. The logical contents include 23 B channels, 1 D channel, 24 time slots, and 24 virtual serial interfaces (total number of B channels + D channel).

Figure 41 Relationship of ISDN PRI Components for T1

Cha ty	inne pe	el	Time slot number	Virtual serial interface number	
Ī	В	(data channel)	1	S0:0)
Ī	В	(data channel)	2	S0:1	
Ī	В	(data channel)	3	S0:2	
Ī	В	(data channel)	4	S0:3	
	•		•	•	
	•		•	•	
	•		•	•	├— Logical
	•		•	•	of a PRI
	•		•	•	interface
Ī	В	(data channel)	21	S0:20	
Ī	В	(data channel)	22	S0:21	
Ī	В	(data channel)	23	S0:22	řõ
(D)	(signaling channel)	24	S0:23	35765



When you configure your CT1 controller for a Non-Facility Associated Signaling (NFAS) backup D channel, a serial interface is automatically created only when your primary D channel fails.

To configure ISDN signaling, follow these steps:

Step 1 Enter the **enable** command and password to go to privileged EXEC mode. You are in privileged EXEC mode when the prompt changes to <code>Gateway#</code>.

Gateway> **enable**Password: password
Gateway#

Step 2 Enter global configuration mode. You are in global configuration mode when the prompt changes to Gateway (config) #.

Gateway# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Gateway(config)#

Step 3 Enter serial interface configuration mode. After the CT1 controller is configured, a corresponding D-channel serial interface is automatically created. For example, serial interface 1/0:23 is the D channel for CT1 controller 1. You must configure each serial interface to receive incoming signaling and send outgoing signaling.



On a CE1 PRI line, the serial interface for the D channel is 1/0:15.

Gateway(config)# interface serial 1/0:23
Gateway(config-if)#

Step 4 Assign an IP address and subnet mask to the interface:

Gateway(config-if)# ip address 172.16.254.254 255.255.255.0

Step 5 Configure all incoming voice calls.



This command has two possible keywords: data and modem. You must use the modem keyword to enable both modem and voice calls. The modem keyword represents bearer capabilities of speech.

Gateway(config-if)# isdn incoming-voice modem

Step 6 Return to privileged EXEC mode:

Gateway(config-if)# ctrl-z
Gateway#



To save the gateway configuration, save it to NVRAM. See the "Saving Configuration Changes" section on page 60.

Verifying D Channel Configuration

To verify your D channel configuration, enter the **show interface serial** command and make sure that the line protocol is up and that you are using the correct IP interface. Also, make sure that excessive errors are not being reported.

Gateway# show interface serial 1/0:23

```
Serial1/0:23 is up, line protocol is up (spoofing)
 Hardware is DSX1
  Internet address is 172.16.254.254/16
 MTU 1500 bytes, BW 64 Kbit, DLY 20000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation PPP, loopback not set
  Last input 00:00:03, output never, output hang never
  Last clearing of "show interface" counters 00:00:01
  Oueueing strategy:fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  1 minute input rate 0 bits/sec, 0 packets/sec
  1 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 packets output, 0 bytes, 0 underruns
     O output errors, O collisions, O interface resets
     O output buffer failures, O output buffers swapped out
     0 carrier transitions
  Timeslot(s) Used:24, Transmitter delay is 0 flags
```

Configuring the Universal Port or Dial-Only Feature Cards

The universal port or dial-only feature cards support all modem standards and features. In contrast to the more traditional line-to-modem mapping, lines are mapped to a system processing engine (SPE) that resides on the universal port and dial-only feature card. Associated SPE firmware serves a function similar to that of modem code on a modem ISDN channel aggregation (MICA) technologies modem.

One SPE provides services for six ports, with additional ports per SPE. Busyout and shutdown can be configured at the SPE or port level.

The universal port and dial-only feature card performs the following functions:

- Converts pulse code modulation (PCM) bitstreams to digital packet data
- Forwards converted and packetized data to the main processor, which examines the data and forwards it to the backhaul egress interface
- Supports all modem standards (such as V.34 and V.42bis) and features, including dial-in and dial-out



For detailed information about the universal port and dial-only feature card CLI commands, see the *Monitoring Voice* and Fax Services on the Cisco AS5350 and Cisco AS5400 Universal Gateway document, which is available online at the following URL:

http://www.cisco.com/en/US/docs/ios/12_1t/12_1t5/feature/guide/ftupspe.html

SPE Firmware

SPE firmware is automatically downloaded to universal port or dial-only feature cards from the Cisco AS5350XM or Cisco AS5400XM universal gateway when you boot the system for the first time or when you insert a universal port or dial-only feature card while the system is operating. When you insert feature cards while the system is operating, the Cisco IOS image recognizes the cards and downloads the required firmware to the cards.

The SPE firmware image is bundled with the universal gateway Cisco IOS image. The SPE firmware image uses an autodetect mechanism that enables the universal port and dial-only feature cards to service multiple call types. An SPE detects the call type and automatically configures itself for that operation. The firmware is upgradable independent of Cisco IOS upgrades, and different firmware versions can be configured to run on SPEs in the same feature card.

The universal port and dial-only feature cards support the modem standards and features listed in Table 6.

Table 6 Modem Standards and Supported Features

Feature	Description				
Carrier protocols	ITU V.23 at 75/1200 bps				
	Telcordia Technologies 103 at 300 bps				
	ITU V.21 at 300 bps				
	ITU V.22 at 1200 bps				
	Telcordia 212A at 1200 bps				
	ITU V.22bis at 2400 bps				
	ITU V.32 up to 9600 bps				
	ITU V.32 <i>bis</i> up to 14,400 bps				
	V.32 turbo up to 19,200 bps				
	V.FC up to 28,800 bps				
	V.34 up to 28,800 bps V.34+ up to 33.6 bps TIA/ITU V.90				
	K56flex				
Error-correcting link-access protocols	V.42 LAPM, MNP 2-4				
Compression protocols	V.42bis (includes MNP 5)				
Command interface	Superset of the AT command set				
In-band signaling/tone generation	Dual-tone multifrequency (DTMF) generation				
and detection	DTMF detection				
	Multifrequency (MF) generation				
	MF detection				
Other	Out-of-band access for management				
	PPP and SLIP framing				



Note

The modem speed 115200 bps and hardware flow control are the default settings for integrated modems.

To configure the lines and ports to allow users to dial in to your network, follow these steps:

Step 1 Use the **enable** command and password to enter privileged EXEC mode. You are in privileged EXEC mode when the prompt changes to <code>Gateway#</code>.

Gateway> **enable**Password: password
Gateway#

Step 2 Enter global configuration mode. You are in global configuration mode when the prompt changes to Gateway (config) #.

Gateway# configure terminal

Enter configuration commands, one per line. End with ${\tt CNTL/Z}$. Gateway(config)#

Step 3 Specify the country for which to set parameters such as country code and encoding. This setting is applied at the system level. All feature cards use the same country code. The default is **usa** if the gateway is configured with T1 interfaces; the default is **e1-default** if the gateway is configured with E1 interfaces. Use the **no** form of this command to set the country code to the default of **usa**.



All sessions on all feature cards in all slots must be idle for this command to run.

Gateway(config)# spe country country name

Step 4 Enter the numbers of ports to configure. If you want to configure 108 ports on slot 3, enter line 3/00 3/107. If you want to configure 324 ports on slots 3 through 5, enter line 3/00 5/323.

Gateway(config)# line slot/port slot/port
Gateway(config-line)#

Step 5 Allow all protocols to be used when connecting to the line:

Gateway(config-line)# transport input all

Step 6 Enable remote IP users running a PPP application to dial in, bypass the EXEC facility, and connect directly to the network:

Gateway(config-line)# autoselect ppp

Step 7 Enable incoming and outgoing calls:

Gateway(config-line) # modem inout

Step 8 Return to privileged EXEC mode:

Gateway(config-line)# Ctrl-Z
Gateway#



Tin

To save the gateway configuration, save it to NVRAM. See the "Saving Configuration Changes" section on page 60.

Verifying the SPE Configuration

To verify your SPE configuration, use the following commands:

• To display a summary for all the lines, enter the show spe command:

Gateway# show spe

```
SPE settings:
==========
Country code configuration: default T1 (u Law)
Polling interval: 8 secs.
History log events: 50 (per port)
Port legends:
_____
Port state: (s) shutdown (t) test (r) recovery (d) download
         (b) busiedout (p) busyout pending, (B) bad (a) active call
Call type: (m) modem (d) digital (f) fax-relay (v) voice (_) not in use
System resources summary:
Total ports: 108, in use ports: 0, disabled ports: 0, free ports: 108
Total active calls: modem 0, voice 0, digital 0, fax-relay
                            SPE SPE SPE Port
                 SPE
     Port # State
SPE#
                            Busyout Shut Crash State
4/00 0000-0005 ACTIVE
                             0 0 0 _____
4/01 0006-0011 ACTIVE
                             0 0 0 .....
                                0 0
4/02 0012-0017 ACTIVE
4/03 0018-0023 ACTIVE
                                 0 0
                                         0 _____
4/04 0024-0029 ACTIVE
                                 0 0
```

• To display a summary for a single line, enter the **show line** *number* command:

```
Gateway# show line 1
```

```
Tty Typ
           Tx/Rx
                  A Modem Roty AccO AccI Uses Noise Overruns Int
   1 AUX 9600/9600 - - - - 0 0 0/0
 Ready
Line 1, Location: "", Type: ""
Length: 24 lines, Width: 80 columns
Baud rate (TX/RX) is 9600/9600, no parity, 2 stopbits, 8 databits
Status: Ready
Capabilities: none
Modem state: Ready
Group codes: 0
Modem hardware state: noCTS noDSR DTR RTS
TTY NUMBER 1
Parity Error = 0 Framing Error = 0 Receive Error = 0 Overrun = 0
Outcount = 0 totalout = 39 incount = 0 totalin = 0
Special Chars: Escape Hold Stop Start Disconnect Activation
             ^^x none - -
                                    none
            Idle EXEC Idle Session Modem Answer Session Dispatch
            00:10:00
                         never
                                       none not set
                        Idle Session Disconnect Warning
                         never
                        Login-sequence User Response
```



If you are having trouble, make sure that you turned on the protocols for connecting to the lines (by using the **transport** input all command) and configured the lines for incoming and outgoing calls (by using the **modem inout** command).

Configuring the Voice Feature Card

A voice feature card with one to six PVDM2-64 modules supports different port densities, depending on codec complexity:

- Low complexity: up to 384 G.711 ports
- Medium complexity: up to 192 G.726, G.729a, G.729ab, Fax Relay ports

• High complexity: up to 144 G.729, G.729b, G.723.1, GSMAMR-NB ports (AMR-NB supports a packetization period of 20 ms only)

The voice feature card supports the following features:

- Support for packetization periods for all codecs: 10 ms to 30 ms with configurable increments of the minimum defined by the codec, or 5 ms, whichever is greater.
- Support for H.323, Session Initiation Protocol (SIP), and Media Gateway Control Protocol (MGCP) call control protocols.
- DSPware is bundled into the Cisco IOS image, but the DSPware is also supported as a standalone firmware image that can be loaded on the DSP (independent of the Cisco AS5350XM or Cisco AS5400XM universal gateway image).
- Software-configurable G.168-compliant echo cancellation for tail circuits up to 64 milliseconds.
- Voice Activity Deflection (VAD), comfort noise generation, adaptive jitter buffering, and caller ID.
- AMR-NB calls are brought up with the common modes from the *mode-set* of both endpoints.



For detailed information about the voice feature card CLI commands, see the *Voice Feature Card for Cisco AS5350XM* and Cisco AS5400XM Using PVDM2 as DSP document, which is available online at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/software/ios124/124newft/124limit/124x/124xc4/vfc_dsp.htm

Upgrade DSP Firmware on the Voice Feature Card

The voice feature card should work without specific modifications to the software configuration on these platforms. However, you might need to upgrade the firmware on the voice feature card, depending on the software release you are using.

To upgrade the firmware on the voice feature card, follow these steps:

Step 1 Use the enable command and password to enter privileged EXEC mode. You are in privileged EXEC mode when the prompt changes to Gateway#.

Gateway> **enable**Password: password
Gateway#

Step 2 Enter global configuration mode. You are in global configuration mode when the prompt changes to Gateway (config) #.

Gateway# configure terminal

Enter configuration commands, one per line. End with \mathtt{CNTL}/\mathtt{Z} . Gateway(config)#

Step 3 Enter voice DSP config mode and specify the slot/dsp location or a range of slots/DSPs.

- For the *slot* argument, specify a value from 1 to 7 to specify the location of the voice feature card.
- For the dsp argument, specify a value from 1 to 24 to specify the location of the DSP.
- To specify a range, the first two arguments specify the first slot/dsp in the range. The second two arguments specify the last slot/DSP in the range.
- Where slash marks appear in the command syntax, they are required.

Gateway(config) # voice dsp 3/1

Step 4 Specify that the firmware is in flash memory and identify the filename.

Gateway(config-voicedsp)# firmware location flash: filename

Step 5 Exit config-voicedsp mode and return to global configuration mode.

Gateway(config-voicedsp)# end

Step 6 Return to privileged EXEC mode:

Gateway(config)# Ctrl-Z
Gateway#

Verifying the Firmware Upgrade

To verify your firmware upgrade, use the show voice dsp version command.

Gateway# show voice dsp version

IOS-Bundled Default			Version	Version Firmware-Type				
=======================================			======	=========				
system:/bundled_fw_image			4.4.5	c5510				
On-Flash Dspware-Filename			Version	Firmware-Type				
			======	=========				
flash:dsp_c5510_flex.rbf			4.5.9051	c5510				
flash:new_flex.rbf			4.4.5	c5510				
flash:big	g.rbf		4.5.985x	c5510				
		_						
DSP#	Type	Version	Filename					
3/1	C5510	4.5.9051	flash:dsp_	c5510_flex.rbf				
3/2	C5510	4.4.5	system:/bundled_fw_image					
3/3	C5510	4.4.5	system:/bundled_fw_ima					
3/4	3/4 C5510 4.4.5			system:/bundled_fw_image				
3/5	C5510	4.4.5	system:/bundled_fw_image					
3/6	C5510	4.4.5	system:/bu	ndled_fw_image				
3/7	C5510	4.4.5	system:/bu	ndled_fw_image				
3/8	C5510	4.4.5	system:/bu	ndled_fw_image				
3/9	C5510	4.4.5	system:/bu	ndled_fw_image				
3/10	C5510	4.4.5	system:/bu	ndled_fw_image				
3/11	C5510	4.4.5	system:/bu	ndled_fw_image				

Configure Clocking

The time-division multiplexing (TDM) bus on a Cisco AS5350XM or Cisco AS5400XM universal gateway backplane can receive an input clock from one of four basic sources on the universal gateway:

- A T1 or E1 feature card
- A CT3 feature card
- An external T1/E1 clock source feed directly through the building integrated timing supply (BITS) interface port on the motherboard



A BITS is a single building master timing supply. The BITS generally supplies DS1- and DS0-level timing throughout an office. In North America, the BITS is the clock that provides and distributes timing to a wireline network's lower levels.

• A free-running clock that provides a clock from an oscillator

Feature Card Ports

The TDM bus can be synchronized with any feature cards. On the CT1/CE1 feature cards, each port receives the clock from the T1/E1 line. The CT3 feature card uses an M13 multiplexer to receive the DS1 clock. Each port on each feature card trunk slot has a default clock priority. Also, clock priority is configurable through the dial-tdm-clock priority CLI command.

External Clock

The TDM bus can be synchronized with an external clock source that can be used as an additional network reference. If no clocks are configured, the system uses a primary clock through a software-controlled default algorithm. If you want the external T1/E1 clock (through the BITS interface) as the primary clock source, you must configure it using the dial-tdm-clock priority CLI command; the external clock is never selected by default.

The BITS interface requires a T1 line composite clock reference set at 1.544 MHz and an E1 line composite clock reference set at 2.048 MHz.

Free-Running Clock

If there is no good clocking source from a feature card card or an external clock source, then specify the free-running clock from the local oscillator using the dial-tdm-clock priority CLI command.

To configure the clock source and clock source priority used by the TDM bus, follow these steps:

Step 1 Use the **enable** command and password to enter privileged EXEC mode. You are in privileged EXEC mode when the prompt changes to Gateway#.

```
Gateway> enable
Password: password
Gateway#
```

Step 2 Enter global configuration mode. You are in global configuration mode when the prompt changes to Gateway (config) #.

Gateway# configure terminal

```
Enter configuration commands, one per line. End with CNTL/Z. Gateway(config)#
```

- **Step 3** Perform one of the following, depending on your configuration:
 - Configure the CT1/CE feature card clock priority, trunk slot, and port that are providing the clocking source. Priority range is defined as a value from 1 to 99. Trunk slot is defined as a value from 1 to 7. DS1 port is defined as a value from 0 to 7.



DS1 port specifies T1 port.

```
Gateway(config) # dial-tdm-clock priority priority# {external | freerun | slot/dsl port}
```

• Configure the CT3 feature card clock priority, trunk slot, and port that are providing the clocking source. Priority range is defined as a value from 1 to 99. Feature card slot is defined as a value from 1 to 7. DS3 port specifies the T3 port. DS1 port number controller is defined as a value between 1 and 28.

```
Gateway(config) # dial-tdm-clock priority priority# {external | freerun | slot/ds3 port:ds1 port}
```

Step 4 Return to privileged EXEC mode:

```
Gateway(config)# Ctrl-Z
Gateway#
```



To save the gateway configuration, save it to NVRAM. See the "Saving Configuration Changes" section on page 60.

Clocking Configuration Examples

In the following example, a BITS clock is set at priority 1:

```
Gateway(config)# dial-tdm-clock priority 1 external
Gateway(config)# exit
Gateway#
```

In the following example, a trunk clock from an 8 PRI CT1 feature card is set at priority 2 and uses slot 4 and ds1 port (controller) 6:

```
Gateway(config)# dial-tdm-clock priority 2 4/6
Gateway(config)# exit
```

In the following example, a trunk clock from a CT3 feature card is set at priority 2 and uses slot 1, ds3 port 0, and ds1 port 19:

```
Gateway(config)# dial-tdm-clock priority 2 1/0:19
Gateway(config)# exit
```

In the following example, the free-running clock is set at priority 3:

```
Gateway(config) # dial-tdm-clock priority 3 free
Gateway(config) # exit
```

Verify Clocking

You can verify the system primary and backup clocks, the status of all trunk feature card controller clocks, and information about and the history of the last 20 TDM clock changes and the events that caused them. Use the following commands.

• T1 or E1 feature card—Verify your default system clocks and clock history by using the show tdm clocks command:

```
Gateway# show tdm clocks
```

CLOCK CHANGE HISTORY

CLOCK	Event		Time					
1/1	Loss Of Signal (LOS)		00:00:22	UTC	Tue	Nov	30	1999
1/2	Loss Of Signal (LOS)		00:00:22	UTC	Tue	Nov	30	1999
1/3	Alarm Indication Signal	(AIS)	00:00:22	UTC	Tue	Nov	30	1999
1/4	Alarm Indication Signal	(AIS)	00:00:22	UTC	Tue	Nov	30	1999
1/5	Alarm Indication Signal	(AIS)	00:00:22	UTC	Tue	Nov	30	1999
1/6	Alarm Indication Signal	(AIS)	00:00:22	UTC	Tue	Nov	30	1999
1/7	Alarm Indication Signal	(AIS)	00:00:22	UTC	Tue	Nov	30	1999
Gateway	#							

• CT3 feature card—Verify your TDM clock history by using the show tdm clocks command:

```
Gateway# show tdm clocks
```

Trunk cards controllers clock health information

CT3 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1

Slot Port Type 8 7 6 5 4 3 2 1 0 9 8 7 6 5 4 3 2 1 0 9 8 7 6 5 4 3 2 1

 $7 \qquad \qquad 0 \qquad \qquad \texttt{T3} \qquad \texttt{G} \; \texttt{G} \;$

CLOCK CHANGE HISTORY

CLOCK Event Time
---- 7/1 Signal recovered from LOS 00:03:29 UTC Sat Jan 1 2000
7/8 Alarm Indication Signal (AIS) 11:27:48 UTC Fri Feb 25 2000
7/1 Signal recovered from LOS 11:30:22 UTC Fri Feb 25 2000

Gateway#

• Verify your user-configured trunk clock selection by using the show tdm clocks command:

Gateway# show tdm clocks

Primary Clock:

System primary is slot 2 port 0 of priority 15 TDM Bus Master Clock Generator State = NORMAL

Backup clocks for primary:

Source Slot Port DS3-Port Priority Status State
-----Trunk 2 1 NO 205 Good Default

Trunk cards controllers clock health information

Slot Type 7 6 5 4 3 2 1 0 2 T1 B B B B G G G G

CLOCK CHANGE HISTORY

<u>CLOCK</u> <u>Event</u> <u>Time</u>

 2/1
 Controller shutdown
 23:23:06 UTC Tue Nov 30 1999

 2/0
 Change in CLI configuration
 23:27:25 UTC Tue Nov 30 1999

Gateway#

Verify your free-running clock selection by using the show tdm clocks command:

Gateway# show tdm clocks

Primary Clock:

System primary is FREE RUNNING with priority 2 TDM Bus Master Clock Generator State = FREERUN

Backup clocks for primary:

Source Slot Port DS3-Port Priority Status State
Trunk 2 0 NO 204 Good Default
Trunk 2 1 NO 205 Good Default

Trunk cards controllers clock health information

Slot Type 7 6 5 4 3 2 1 0

2 T1 BBBBGGGG

CLOCK CHANGE HISTORY

<u>CLOCK</u> <u>Event</u> <u>Time</u>

Freerun Change in CLI configuration 23:27:25 UTC Tue Nov 30 1999

Verify your BITS clock selection by using the show tdm clocks command:

Gateway# show tdm clocks

Primary Clock:

System primary is external with priority 1
TDM Bus Master Clock Generator State = NORMAL

Backup clocks for primary:

```
Source Slot Port DS3-Port Priority
Trunk 2 0
                NO 204
                                     Good
                                                Default
Trunk 2
           1
                  NO
                          2.05
                                     Good
                                                Default
Trunk cards controllers clock health information
Slot Type 7 6 5 4 3 2 1 0
          BBBBGGGG
     T1
CLOCK CHANGE HISTORY
CLOCK
          Event
                                           Time
                                          23:27:25 UTC Tue Nov 30 1999
External Change in CLI configuration
Gateway#
```



The most common cause of clock slip problems is an improperly set dial-tdm-clock priority parameter. Change the default setting for dial-tdm-clock priority from free-running clock to a setting that matches your system requirements.

Saving Configuration Changes

To prevent the loss of the gateway configuration, follow these steps to save it to NVRAM:

Step 1 Enter the **enable** command and password to go to privileged EXEC mode. You are in privileged EXEC mode when the prompt changes to Gateway#.

Gateway> enable
Password: password
Gateway#

Step 2 Save the configuration changes to NVRAM so that they are not lost during resets, power cycles, or power outages:

Gateway# copy running-config startup-config

Step 3 Return to privileged EXEC mode:

Gateway(config-if)# Ctrl-Z
Gateway#

Voice over IP

Follow these guidelines when configuring voice over IP on your universal gateway.

Prerequisites

Before you can configure your universal gateway to use voice over IP, you must first do the following:

• Establish a working IP network. For more information about configuring IP, see the appropriate release of the Cisco IOS IP Routing Protocols Configuration Guide.

You can access this document at Technical Support & Documentation > Product Support > Cisco IOS Software > Cisco IOS Software Release you are using > Command References.

- Complete basic configuration for the universal gateway, which includes, at a minimum, the following tasks:
 - Complete your company's dial plan.
 - Establish a working telephony network based on your company's dial plan.
- Integrate your dial plan and telephony network into your existing IP network topology. Merging your IP and telephony networks depends on your particular IP and telephony network topology. In general, we recommend the following suggestions:
 - Use canonical numbers wherever possible. It is important to avoid situations in which numbering systems are significantly different on different routers or universal gateways in your network.

- Make routing and dialing transparent to the user. For example, avoid secondary dial tones from secondary switches, wherever possible.

Configuration Tasks

Once you have completed the tasks listed in the "Prerequisites" section on page 60, perform the following tasks:

• Configure your IP network for real-time voice traffic.

You need to have a well-engineered end-to-end network when running delay-sensitive applications such as VoIP. Fine-tuning your network to adequately support VoIP involves a series of protocols and features for quality of service (QoS). It is beyond the scope of this quick start guide to explain the details for wide-scale QoS deployment. To configure your IP network for real-time voice traffic, you must consider the entire scope of your network and then select the appropriate QoS tool or tools.

It is important to remember that QoS must be configured throughout your network—not just on the universal gateway devices running VoIP—to improve voice network performance. Not all QoS techniques are appropriate for all network routers. Edge routers and backbone routers do not necessarily perform the same operations in a network; the QoS tasks they perform might also differ. To configure your IP network for real-time voice traffic, you must consider the functions of both edge and backbone routers in your network and then select the appropriate QoS tool or tools.

To configure QoS, see the relevant chapters of the Cisco IOS Quality of Service Solutions Configuration Guide. You can access this document at Technical Support & Documentation > Product Support > Cisco IOS Software > Cisco IOS Software Release you are using > Configuration Guides.

• Configure dial peers.

Configuring dial peers is the key to setting up dial plans and implementing voice over a packet network. Dial peers are used to identify call source and destination endpoints and to define the characteristics applied to each call leg in the call connection.

For more information about VoIP, see the Cisco IOS Voice Configuration Library. You can access these documents at Technical Support & Documentation > Product Support > Cisco IOS Software > Cisco IOS Software Release you are using > Configuration Guides.

Where to Go Next

For additional specialized configuration procedures, see the appropriate Cisco IOS software configuration documentation on the Documentation DVD and on Cisco.com.

For detailed configuration information specific to the Cisco AS5350XM and Cisco AS5400XM Universal Gateway:

Cisco AS5350XM and Cisco AS5400XM Universal Gateways Software Configuration Guide.

You can access this document at Technical Support & Documentation > Product Support > Universal Gateways and Access Servers > Cisco AS5300 or Cisco AS5400 Series Universal Gateways > Configuration Guides.

For detailed configuration information for specific features:

Configuration Guides and Command References for the Cisco IOS software release installed on your Cisco gateway.

You can access these documents at Technical Support & Documentation > Product Support > Cisco IOS Software > Cisco IOS Software Release you are using > Configuration Guides or Command References.

For new features associated with a software release:

New feature documentation for the Cisco IOS software release installed on your Cisco gateway.

You can access these documents at Technical Support & Documentation > Product Support > Cisco IOS Software > Cisco IOS Software Release you are using > Feature Guides.

8 Slot Numbering

Feature card slot numbering starts from the system board and works up from left to right. Slot 0 is reserved for the system board. The feature card slots are numbered sequentially.

Figure 42 Cisco AS5350XM Chassis Slot Numbers

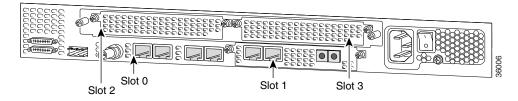
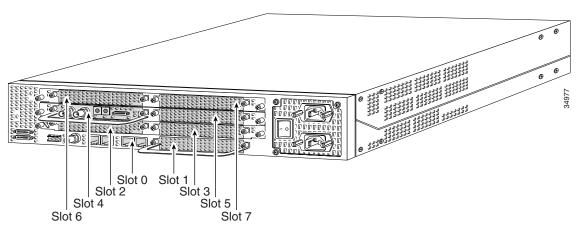


Figure 43 Cisco AS5400XM Chassis Slot Numbers



9 Obtaining Documentation

Cisco documentation and additional literature are available on Cisco.com. Cisco also provides several ways to obtain technical assistance and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

Cisco.com

You can access the most current Cisco documentation at this URL:

http://www.cisco.com/techsupport

You can access the Cisco website at this URL:

http://www.cisco.com

You can access international Cisco websites at this URL:

http://www.cisco.com/public/countries_languages.shtml

Product Documentation DVD

The Product Documentation DVD is a comprehensive library of technical product documentation on a portable medium. The DVD enables you to access multiple versions of installation, configuration, and command guides for Cisco hardware and software products. With the DVD, you have access to the same HTML documentation that is found on the Cisco website without being connected to the Internet. Certain products also have .PDF versions of the documentation available.

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http://www.cisco.com/go/marketplace/

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Cisco Systems Attn: Customer Document Ordering 170 West Tasman Drive San Jose, CA 95134-9883

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11 Cisco Product Security Overview

Cisco provides a free online Security Vulnerability Policy portal at this URL:

http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html

From this site, you will find information about how to:

- Report security vulnerabilities in Cisco products.
- Obtain assistance with security incidents that involve Cisco products.
- Register to receive security information from Cisco.

A current list of security advisories, security notices, and security responses for Cisco products is available at this URL:

http://www.cisco.com/go/psirt

To see security advisories, security notices, and security responses as they are updated in real time, you can subscribe to the Product Security Incident Response Team Really Simple Syndication (PSIRT RSS) feed. Information about how to subscribe to the PSIRT RSS feed is found at this URL:

http://www.cisco.com/en/US/products/products_psirt_rss_feed.html

Reporting Security Problems in Cisco Products

Cisco is committed to delivering secure products. We test our products internally before we release them, and we strive to correct all vulnerabilities quickly. If you think that you have identified a vulnerability in a Cisco product, contact PSIRT:

- For Emergencies only—security-alert@cisco.com
 - An emergency is either a condition in which a system is under active attack or a condition for which a severe and urgent security vulnerability should be reported. All other conditions are considered nonemergencies.
- For Nonemergencies—psirt@cisco.com

In an emergency, you can also reach PSIRT by telephone:

- 1 877 228-7302
- 1 408 525-6532



We encourage you to use Pretty Good Privacy (PGP) or a compatible product (for example, GnuPG) to encrypt any sensitive information that you send to Cisco. PSIRT can work with information that has been encrypted with PGP versions 2.x through 9.x.

Never use a revoked or an expired encryption key. The correct public key to use in your correspondence with PSIRT is the one linked in the Contact Summary section of the Security Vulnerability Policy page at this URL:

http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html

The link on this page has the current PGP key ID in use.

If you do not have or use PGP, contact PSIRT at the aforementioned e-mail addresses or phone numbers before sending any sensitive material to find other means of encrypting the data.

12 Obtaining Technical Assistance

Cisco Technical Support provides 24-hour-a-day award-winning technical assistance. The Cisco Technical Support & Documentation website on Cisco.com features extensive online support resources. In addition, if you have a valid Cisco service contract, Cisco Technical Assistance Center (TAC) engineers provide telephone support. If you do not have a valid Cisco service contract, contact your reseller.

Cisco Technical Support & Documentation Website

The Cisco Technical Support & Documentation website provides online documents and tools for troubleshooting and resolving technical issues with Cisco products and technologies. The website is available 24 hours a day, at this URL:

http://www.cisco.com/techsupport

Access to all tools on the Cisco Technical Support & Documentation website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a user ID or password, you can register at this URL:

http://tools.cisco.com/RPF/register/register.do



Use the Cisco Product Identification (CPI) tool to locate your product serial number before submitting a web or phone request for service. You can access the CPI tool from the Cisco Technical Support & Documentation website by clicking the Tools & Resources link under Documentation & Tools. Choose Cisco Product Identification Tool from the Alphabetical Index drop-down list, or click the Cisco Product Identification Tool link under Alerts & RMAs. The CPI tool offers three search options: by product ID or model name; by tree view; or for certain products, by copying and pasting show command output. Search results show an illustration of your product with the serial number label location highlighted. Locate the serial number label on your product and record the information before placing a service call.

Submitting a Service Request

Using the online TAC Service Request Tool is the fastest way to open S3 and S4 service requests. (S3 and S4 service requests are those in which your network is minimally impaired or for which you require product information.) After you describe your situation, the TAC Service Request Tool provides recommended solutions. If your issue is not resolved using the recommended resources, your service request is assigned to a Cisco engineer. The TAC Service Request Tool is located at this URL:

http://www.cisco.com/techsupport/servicerequest

For S1 or S2 service requests, or if you do not have Internet access, contact the Cisco TAC by telephone. (S1 or S2 service requests are those in which your production network is down or severely degraded.) Cisco engineers are assigned immediately to S1 and S2 service requests to help keep your business operations running smoothly.

To open a service request by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)

EMEA: +32 2 704 55 55 USA: 1 800 553-2447

For a complete list of Cisco TAC contacts, go to this URL:

http://www.cisco.com/techsupport/contacts

Definitions of Service Request Severity

To ensure that all service requests are reported in a standard format, Cisco has established severity definitions.

Severity 1 (S1)—An existing network is down, or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

Severity 2 (S2)—Operation of an existing network is severely degraded, or significant aspects of your business operations are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

Severity 3 (S3)—Operational performance of the network is impaired, while most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

Severity 4 (S4)—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

13 Obtaining Additional Publications and Information

Information about Cisco products, technologies, and network solutions is available from various online and printed sources.

- The Cisco Product Quick Reference Guide is a handy, compact reference tool that includes brief product overviews, key features, sample part numbers, and abbreviated technical specifications for many Cisco products that are sold through channel partners. It is updated twice a year and includes the latest Cisco offerings. To order and find out more about the Cisco Product Quick Reference Guide, go to this URL:
 - http://www.cisco.com/go/guide
- Cisco Marketplace provides a variety of Cisco books, reference guides, documentation, and logo merchandise. Visit Cisco Marketplace, the company store, at this URL:
 - http://www.cisco.com/go/marketplace/
- Cisco Press publishes a wide range of general networking, training and certification titles. Both new and experienced users will benefit from these publications. For current Cisco Press titles and other information, go to Cisco Press at this URL: http://www.ciscopress.com
- Packet magazine is the Cisco Systems technical user magazine for maximizing Internet and networking investments. Each quarter, Packet delivers coverage of the latest industry trends, technology breakthroughs, and Cisco products and solutions, as well as network deployment and troubleshooting tips, configuration examples, customer case studies, certification and training information, and links to scores of in-depth online resources. You can access Packet magazine at this URL:
 - http://www.cisco.com/packet

• Internet Protocol Journal is a quarterly journal published by Cisco Systems for engineering professionals involved in designing, developing, and operating public and private internets and intranets. You can access the Internet Protocol Journal at this URL:

http://www.cisco.com/ipj

- Networking products offered by Cisco Systems, as well as customer support services, can be obtained at this URL: http://www.cisco.com/en/US/products/index.html
- Networking Professionals Connection is an interactive website for networking professionals to share questions, suggestions, and information about networking products and technologies with Cisco experts and other networking professionals. Join a discussion at this URL:

http://www.cisco.com/discuss/networking

• World-class networking training is available from Cisco. You can view current offerings at this URL: http://www.cisco.com/en/US/learning/index.html



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