Cisco AS5350 Universal Gateway Chassis Installation Guide

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Modifying the equipment without Cisco's written authorization may result in the equipment no longer complying with FCC requirements for Class A or Class B digital devices. In that event, your right to use the equipment may be limited by FCC regulations, and you may be required to correct any interference to radio or television communications at your own expense.

You can determine whether your equipment is causing interference by turning it off. If the interference stops, it was probably caused by the Cisco equipment or one of its peripheral devices. If the equipment causes interference to radio or television reception, try to correct the interference by using one or more of the following measures:

• Turn the television or radio antenna until the interference stops.

• Move the equipment to one side or the other of the television or radio.

• Move the equipment farther away from the television or radio.

• Plug the equipment into an outlet that is on a different circuit from the television or radio. (That is, make certain the equipment and the television or radio are on circuits controlled by different circuit breakers or fuses.)

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Cisco AS5350 Universal Gateway Chassis Installation Guide

CONTENTS

Preface

This preface describes the objectives and organization of this document and explains how to find additional information on related products and services. This preface contains the following sections:

Document Organization

This publication is designed for people who have some experience installing networking equipment such as routers, hubs, servers, and switches. The person installing the universal gateway should be familiar with electronic circuitry and wiring practices and have experience as an electronic or electromechanical technician.

This table describes the contents of each chapter in this document.

Table 1 Organization

Chapter	Title	Description
Chapter 1	Overview	Overview of the Cisco AS5350 universal gateway.
Chapter 2	Preparing to Install the Cisco AS5350 Chassis	Describes the tasks you must perform before you begin to install the chassis.
Chapter 3	Installing the Cisco AS5350	Describes the tasks you must perform to install the Cisco AS5350 chassis.
Chapter 4	Troubleshooting	Describes how to troubleshoot the chassis by referring to the chassis LEDs.
Appendix A	Replacing Memory Components	Describes how to replace memory chips in the chassis field-replaceable units.
Appendix B	Replacing the Power Supply	Describes how to replace the power supply.
Appendix C	Cabling Specifications	Describes cabling and pinout information for the chassis.

Document Conventions

This publication uses the following conventions to convey instructions and information.

Convention	Description
boldface font	Commands and keywords.
italic font	Variables for which you supply values.
[ ]	Keywords or arguments that appear within square brackets are optional.
{x | y | z}	A choice of required keywords appears in braces separated by vertical bars. You must select one.
`screen font`	Examples of information displayed on the screen.
`boldface screen font`	Examples of information you must enter.
< >	Nonprinting characters, for example passwords, appear in angle brackets in contexts where italic font is not available.
[ ]	Default responses to system prompts appear in square brackets.

Note This symbol means *reader take note*. Notes contain helpful suggestions or references to additional information and material.

Timesaver This symbol means *the described action saves time*. You can save time by performing the action described in the paragraph.

Caution This symbol means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

Tip This symbol means *the following information will help you solve a problem*. The tips information might not be troubleshooting or even an action, but could be useful information, similar to a Timesaver.

Warning Definition

Warning **IMPORTANT SAFETY INSTRUCTIONS**

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. To see translations of the warnings that appear in this publication, refer to the translated safety warnings that accompanied this device.

Note: SAVE THESE INSTRUCTIONS

Note: This documentation is to be used in conjunction with the specific product installation guide that shipped with the product. Please refer to the Installation Guide, Configuration Guide, or other enclosed additional documentation for further details.

Waarschuwing **BELANGRIJKE VEILIGHEIDSINSTRUCTIES**

Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van de standaard praktijken om ongelukken te voorkomen. Voor een vertaling van de waarschuwingen die in deze publicatie verschijnen, dient u de vertaalde veiligheidswaarschuwingen te raadplegen die bij dit apparaat worden geleverd.

Opmerking BEWAAR DEZE INSTRUCTIES.

Opmerking Deze documentatie dient gebruikt te worden in combinatie met de installatiehandleiding voor het specifieke product die bij het product wordt geleverd. Raadpleeg de installatiehandleiding, configuratiehandleiding of andere verdere ingesloten documentatie voor meer informatie.

Varoitus **TÄRKEITÄ TURVALLISUUTEEN LIITTYVIÄ OHJEITA**

Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista. Tässä asiakirjassa esitettyjen varoitusten käännökset löydät laitteen mukana toimitetuista ohjeista.

Huomautus SÄILYTÄ NÄMÄ OHJEET

Huomautus Tämä asiakirja on tarkoitettu käytettäväksi yhdessä tuotteen mukana tulleen asennusoppaan kanssa. Katso lisätietoja asennusoppaasta, kokoonpano-oppaasta ja muista mukana toimitetuista asiakirjoista.

Attention **IMPORTANTES INFORMATIONS DE SÉCURITÉ**

Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant causer des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents. Pour prendre connaissance des traductions d'avertissements figurant dans cette publication, consultez les consignes de sécurité traduites qui accompagnent cet appareil.

Remarque CONSERVEZ CES INFORMATIONS

Remarque Cette documentation doit être utilisée avec le guide spécifique d'installation du produit qui accompagne ce dernier. Veuillez vous reporter au Guide d'installation, au Guide de configuration, ou à toute autre documentation jointe pour de plus amples renseignements.

Warnung **WICHTIGE SICHERHEITSANWEISUNGEN**

Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewusst. Übersetzungen der in dieser Veröffentlichung enthaltenen Warnhinweise sind im Lieferumfang des Geräts enthalten.

Hinweis BEWAHREN SIE DIESE SICHERHEITSANWEISUNGEN AUF

Hinweis Dieses Handbuch ist zum Gebrauch in Verbindung mit dem Installationshandbuch für Ihr Gerät bestimmt, das dem Gerät beiliegt. Entnehmen Sie bitte alle weiteren Informationen dem Handbuch (Installations- oder Konfigurationshandbuch o. Ä.) für Ihr spezifisches Gerät.

Figyelem! **FONTOS BIZTONSÁGI ELÕÍRÁSOK**

Ez a figyelmezetõ jel veszélyre utal. Sérülésveszélyt rejtõ helyzetben van. Mielõtt bármely berendezésen munkát végezte, legyen figyelemmel az elektromos áramkörök okozta kockázatokra, és ismerkedjen meg a szokásos balesetvédelmi eljárásokkal. A kiadványban szereplõ figyelmeztetések fordítása a készülékhez mellékelt biztonsági figyelmeztetések között található.

Megjegyzés ÕRIZZE MEG EZEKET AZ UTASÍTÁSOKAT!

Megjegyzés Ezt a dokumentációt a készülékhez mellékelt üzembe helyezési útmutatóval együtt kell használni. További tudnivalók a mellékelt Üzembe helyezési útmutatóban (Installation Guide), Konfigurációs útmutatóban (Configuration Guide) vagy más dokumentumban találhatók.

Avvertenza **IMPORTANTI ISTRUZIONI SULLA SICUREZZA**

Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di intervenire su qualsiasi apparecchiatura, occorre essere al corrente dei pericoli relativi ai circuiti elettrici e conoscere le procedure standard per la prevenzione di incidenti. Per le traduzioni delle avvertenze riportate in questo documento, vedere le avvertenze di sicurezza che accompagnano questo dispositivo.

Nota CONSERVARE QUESTE ISTRUZIONI

Nota La presente documentazione va usata congiuntamente alla guida di installazione specifica spedita con il prodotto. Per maggiori informazioni, consultare la Guida all'installazione, la Guida alla configurazione o altra documentazione acclusa.

Advarsel VIKTIGE SIKKERHETSINSTRUKSJONER

Dette varselssymbolet betyr fare. Du befinner deg i en situasjon som kan forårsake personskade. Før du utfører arbeid med utstyret, bør du være oppmerksom på farene som er forbundet med elektriske kretssystemer, og du bør være kjent med vanlig praksis for å unngå ulykker. For å se oversettelser av advarslene i denne publikasjonen, se de oversatte sikkerhetsvarslene som følger med denne enheten.

Merk TA VARE PÅ DISSE INSTRUKSJONENE

Merk Denne dokumentasjonen skal brukes i forbindelse med den spesifikke installasjonsveiledningen som fulgte med produktet. Vennligst se installasjonsveiledningen, konfigureringsveiledningen eller annen vedlagt tilleggsdokumentasjon for detaljer.

Aviso INSTRUÇÕES IMPORTANTES DE SEGURANÇA

Este símbolo de aviso significa perigo. O utilizador encontra-se numa situação que poderá ser causadora de lesões corporais. Antes de iniciar a utilização de qualquer equipamento, tenha em atenção os perigos envolvidos no manuseamento de circuitos eléctricos e familiarize-se com as práticas habituais de prevenção de acidentes. Para ver traduções dos avisos incluídos nesta publicação, consulte os avisos de segurança traduzidos que acompanham este dispositivo.

Nota GUARDE ESTAS INSTRUÇÕES

Nota Esta documentação destina-se a ser utilizada em conjunto com o manual de instalação incluído com o produto específico. Consulte o manual de instalação, o manual de configuração ou outra documentação adicional inclusa, para obter mais informações.

¡Advertencia! INSTRUCCIONES IMPORTANTES DE SEGURIDAD

Este símbolo de aviso indica peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considere los riesgos de la corriente eléctrica y familiarícese con los procedimientos estándar de prevención de accidentes. Vea las traducciones de las advertencias que acompañan a este dispositivo.

Nota GUARDE ESTAS INSTRUCCIONES

Nota Esta documentación está pensada para ser utilizada con la guía de instalación del producto que lo acompaña. Si necesita más detalles, consulte la Guía de instalación, la Guía de configuración o cualquier documentación adicional adjunta.

Varning! VIKTIGA SÄKERHETSANVISNINGAR

Denna varningssignal signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanliga förfaranden för att förebygga olyckor. Se översättningarna av de varningsmeddelanden som finns i denna publikation, och se de översatta säkerhetsvarningarna som medföljer denna anordning.

OBS! SPARA DESSA ANVISNINGAR

OBS! Denna dokumentation ska användas i samband med den specifika produktinstallationshandbok som medföljde produkten. Se installationshandboken, konfigurationshandboken eller annan bifogad ytterligare dokumentation för närmare detaljer.

Предупреждение ВАЖНЫЕ СВЕДЕНИЯ ПО БЕЗОПАСНОСТИ

Этот символ предупреждает о наличии опасности. При неправильных действиях возможно получение травм. Перед началом работы с любым оборудованием необходимо ознакомиться с ситуациями, в которых возможно поражение электротоком, и со стандартными действиями для предотвращения несчастных случаев. Переведенный текст предупреждений содержится в соответствующем документе, поставляемом вместе с устройством.

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这个警告符号指有危险。您所处的环境可能使身体受伤。操作设备前必须意识到电流的危险性，务必熟悉操作标准，以防发生事故。如果需要了解本说明中出现的警告符号的译文，请参阅本装置所附之安全警告译文。

注意 保存这些说明
注意 本文件应与本产品附带的具体安装说明一并阅读。如欲了解详情，请参阅《安装说明》、《配置说明》或所附的其他文件。

警告 安全上の重要な注意事項

「危険」の意味です。人身事故を予防するための注意事項が記述されています。装置の取り扱い作業を行うときは、電気回路の危険性に注意し、一般的な事故防止対策に留意してください。このマニュアルに記載されている警告の各国語版は、装置に付属の「Translated Safety Warnings」を参照してください。

注 これらの注意事項を保管しておいてください。
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Related Documentation

This guide describes how to install and maintain the Cisco AS5350 universal gateway chassis. You will also need the following publications to configure the universal gateway:

- Refer to the *Cisco AS5350 Universal Gateway Regulatory Compliance and Safety Information* document to see translations of the warnings that appear in this publication.
- Use the *Cisco AS5350 Universal Gateway Card Installation Guide* to install, replace, and troubleshoot dial feature cards.
- Refer to the *Cisco AS5350 and Cisco AS5400 Universal Gateway Software Configuration Guide* for basic software configuration instructions.

- For information about isolating problems with the network connections to your Cisco AS5350, refer to the publication *Internetwork Troubleshooting Guide* available on the Cisco Documentation CD-ROM.
- Refer to the appropriate Cisco IOS software configuration guides, command reference publications, *Cisco IOS Dial Technologies Configuration Guide,* Release 12.2T, and the *Cisco IOS Dial Technologies Command Reference,* Release 12.2T for more advanced configuration topics. These publications are available on the Documentation CD-ROM that came with your universal gateway, on the World Wide Web from the Cisco home page, or you can order printed copies.

New Hardware Features

A description of new hardware features available after the release of this document can be found at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/access/acs_serv/5350/index.htm

Obtaining Documentation

Cisco provides several ways to obtain documentation, 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 on the World Wide Web at this URL:

http://www.cisco.com/univercd/home/home.htm

You can access the Cisco website at this URL:

http://www.cisco.com

International Cisco web sites can be accessed from this URL:

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

Documentation CD-ROM

Cisco documentation and additional literature are available in a Cisco Documentation CD-ROM package, which may have shipped with your product. The Documentation CD-ROM is updated monthly and may be more current than printed documentation. The CD-ROM package is available as a single unit or through an annual subscription.

Registered Cisco.com users can order the Documentation CD-ROM (product number DOC-CONDOCCD=) through the online Subscription Store:

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

Ordering Documentation

You can find instructions for ordering documentation at this URL:

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

You can order Cisco documentation in these ways:

- Registered Cisco.com users (Cisco direct customers) can order Cisco product documentation from the Networking Products MarketPlace:

  http://www.cisco.com/en/US/partner/ordering/index.shtml

- Registered Cisco.com users can order the Documentation CD-ROM (Customer Order Number DOC-CONDOCCD=) through the online Subscription Store:

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

- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco Systems Corporate Headquarters (California, U.S.A.) at 408 526-7208 or, elsewhere in North America, by calling 800 553-NETS (6387).

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You can submit comments electronically on Cisco.com. On the Cisco Documentation home page, click **Feedback** at the top of the page.

You can e-mail your comments to bug-doc@cisco.com.

You can submit your comments by mail by using the response card behind the front cover of your document or by writing to the following address:

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

We appreciate your comments.

Obtaining Technical Assistance

Cisco provides Cisco.com, which includes the Cisco Technical Assistance Center (TAC) Website, as a starting point for all technical assistance. Customers and partners can obtain online documentation, troubleshooting tips, and sample configurations from the Cisco TAC website. Cisco.com registered users have complete access to the technical support resources on the Cisco TAC website, including TAC tools and utilities.

Cisco.com

Cisco.com offers a suite of interactive, networked services that let you access Cisco information, networking solutions, services, programs, and resources at any time, from anywhere in the world.

Cisco.com provides a broad range of features and services to help you with these tasks:

- Streamline business processes and improve productivity
- Resolve technical issues with online support

- Download and test software packages
- Order Cisco learning materials and merchandise
- Register for online skill assessment, training, and certification programs

To obtain customized information and service, you can self-register on Cisco.com at this URL:

http://www.cisco.com

Technical Assistance Center

The Cisco TAC is available to all customers who need technical assistance with a Cisco product, technology, or solution. Two levels of support are available: the Cisco TAC website and the Cisco TAC Escalation Center. The avenue of support that you choose depends on the priority of the problem and the conditions stated in service contracts, when applicable.

We categorize Cisco TAC inquiries according to urgency:

- Priority level 4 (P4)—You need information or assistance concerning Cisco product capabilities, product installation, or basic product configuration.
- Priority level 3 (P3)—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- Priority level 2 (P2)—Your production network is severely degraded, affecting significant aspects of business operations. No workaround is available.
- Priority level 1 (P1)—Your production network is down, and a critical impact to business operations will occur if service is not restored quickly. No workaround is available.

Cisco TAC Website

You can use the Cisco TAC website to resolve P3 and P4 issues yourself, saving both cost and time. The site provides around-the-clock access to online tools, knowledge bases, and software. To access the Cisco TAC website, go to this URL:

http://www.cisco.com/tac

All customers, partners, and resellers who have a valid Cisco service contract have complete access to the technical support resources on the Cisco TAC website. Some services on the Cisco TAC website require a Cisco.com login ID and password. If you have a valid service contract but do not have a login ID or password, go to this URL to register:

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

If you are a Cisco.com registered user, and you cannot resolve your technical issues by using the Cisco TAC website, you can open a case online at this URL:

http://www.cisco.com/en/US/support/index.html

If you have Internet access, we recommend that you open P3 and P4 cases through the Cisco TAC website so that you can describe the situation in your own words and attach any necessary files.

Cisco TAC Escalation Center

The Cisco TAC Escalation Center addresses priority level 1 or priority level 2 issues. These classifications are assigned when severe network degradation significantly impacts business operations. When you contact the TAC Escalation Center with a P1 or P2 problem, a Cisco TAC engineer automatically opens a case.

To obtain a directory of toll-free Cisco TAC telephone numbers for your country, go to this URL:

http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml

Before calling, please check with your network operations center to determine the level of Cisco support services to which your company is entitled: for example, SMARTnet, SMARTnet Onsite, or Network Supported Accounts (NSA). When you call the center, please have available your service agreement number and your product serial number.

Obtaining Additional Publications and Information

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

- The *Cisco Product Catalog* describes the networking products offered by Cisco Systems as well as ordering and customer support services. Access the *Cisco Product Catalog* at this URL:

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

- Cisco Press publishes a wide range of networking publications. Cisco suggests these titles for new and experienced users: *Internetworking Terms and Acronyms Dictionary, Internetworking Technology Handbook, Internetworking Troubleshooting Guide,* and the *Internetworking Design Guide.* For current Cisco Press titles and other information, go to Cisco Press online at this URL:

  http://www.ciscopress.com

- *Packet* magazine is the Cisco monthly periodical that provides industry professionals with the latest information about the field of networking. You can access *Packet* magazine at this URL:

  http://www.cisco.com/en/US/about/ac123/ac114/about_cisco_packet_magazine.html

- *iQ Magazine* is the Cisco monthly periodical that provides business leaders and decision makers with the latest information about the networking industry. You can access *iQ Magazine* at this URL:

  http://business.cisco.com/prod/tree.taf%3fasset_id=44699&public_view=true&kbns=1.html

- *Internet Protocol Journal* is a quarterly journal published by Cisco Systems for engineering professionals involved in the design, development, and operation of public and private internets and intranets. You can access the *Internet Protocol Journal* at this URL:

  http://www.cisco.com/en/US/about/ac123/ac147/about_cisco_the_internet_protocol_journal.html

- Training—Cisco offers world-class networking training, with current offerings in network training listed at this URL:

  http://www.cisco.com/en/US/learning/le31/learning_recommended_training_list.html

Overview

This chapter provides an overview of the Cisco AS5350 universal gateway, a versatile data and voice communications platform that provides high performance, high density, and hot-swap capability in only one rack unit.

The Cisco AS5350 is intended for small- to medium-size companies who require dense and scalable solutions to create new multiservice access networks, replace existing gateway hardware, or expand and enhance their current access offering. The Cisco AS5350 provides you with a cost-effective platform for deploying the widest range of IP-based services.

This chapter includes the following sections:

Chassis Components

The chassis consists of the following components:

- One modular chassis with motherboard, high-speed backplane and three DFC slots (see Figure 1-1 and Figure 1-2)
- Building Integrated Timing System (BITS) interface port
- Two Fast Ethernet (2FE) LAN ports
- Two T serial ports for backhaul WAN support
- Fast console auxiliary ports for local administrative access
- An integral AC or DC power supply
- Replaceable fan tray

Figure 1-1 Cisco AS5350 Front Panel

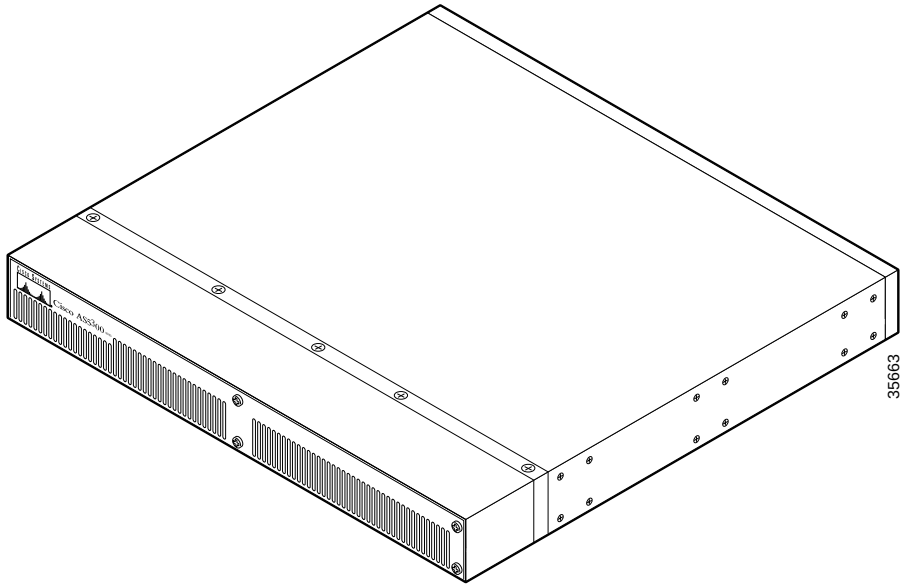
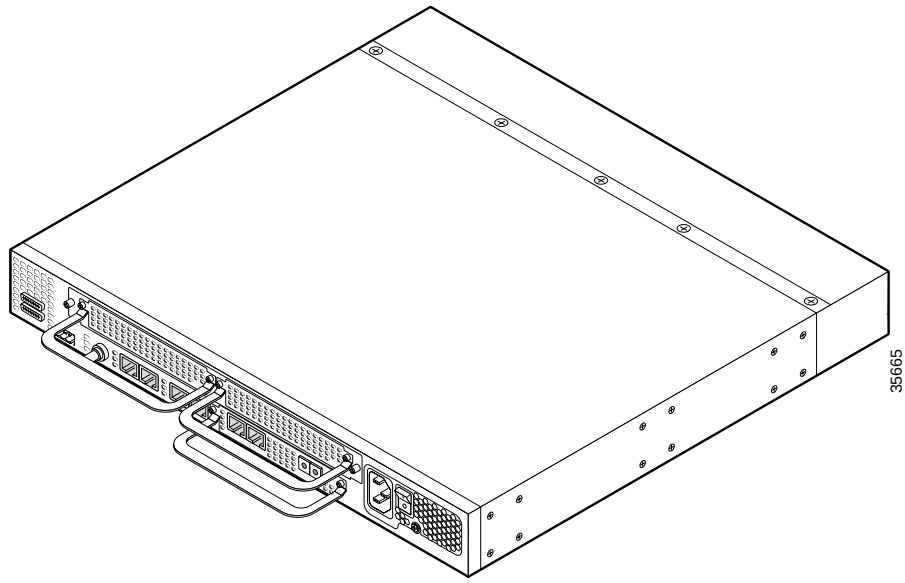


Figure 1-2 Cisco AS5350 Rear Panel



Dial Feature Cards (DFCs)

The Dial Feature Card (DFC) is a 5.1 by 13 inch PCI-based interface board that allows online insertion and removal (OIR) of trunk ingress, and modem cards without rebooting or powering off the system.

The chassis includes one backplane slot which accepts a DFC carrier card. The DFC carrier card accepts two DFCs, which allow OIR. The motherboard accepts one DFC in its own dedicated slot.

Note For details on cards, installation, and troubleshooting, see the *Cisco AS5350 Universal Gateway Card Installation Guide*. This document is available on the World Wide Web and the documentation CD-ROM that comes with your universal gateway. (See the "Related Documentation" section on page xii.)

Power Supply

The power system is comprised of a single AC or DC power supply or a redundant AC or DC power supply. Cooling is provided by two self-contained fans.

Note The Cisco AS5350 redundant power supply is supported in Cisco IOS Release 12.2(2)XB5 or later.

Each power module is capable of supplying a maximum DC load of 150 watts, and is composed of four independent output voltages: 3.3V, 5V, 12V, and -12V. AC input units have power factor correction, and low Total Harmonic Distortion. Power failures are reported through environmental monitoring software.

Check the power at your site to ensure that you are receiving "clean" power (free of spikes and noise). Install a power conditioner if necessary.

Chassis Specifications

Table 1-1 Chassis Specifications

Description	Specification
Dimensions (H x W x D)	1.73 x 17.5 x 20.5 in. (4.39 x 44.45 x 52.07 cm)
Weight	22 lb maximum (10 kg)
Processor	250 MHz
Operating temperature	32 to 104° F (0 to 40° C)
Operating humidity	5 to 95%, noncondensing
Noise level	55 dB[1] @ 3 ft (0.914 m)
Input voltage, AC power supply Current Frequency Power factor Input AC power	100 to 240 VAC[2]; -10%, +6% tolerance 2.0 to 1.0 A; dependent on load 50/60 Hz 0.80 to 0.90 140 to 170W; dependent on load
Input voltage, DC power supply Maximum input current Input DCpower	-48/-60 Vdc, -10%, +10% tolerance 3 A (1.5-2.0 A typical) 150 W (maximum)
WAN interface options	T1 and E1 dial feature cards
Serial interfaces (for backhaul WAN support)	2 serial line interfaces
LAN interface options	2 Fast Ethernet 10/100BASE-T (RJ-45) ports

Table 1-1 Chassis Specifications (continued)

Description	Specification
Console and auxiliary ports	Asynchronous serial (RJ-45)
Regulatory compliance	See the *Regulatory Compliance and Safety Information* document that shipped with your universal gateway. This document is available on the World Wide Web and the documentation CD-ROM that comes with your universal gateway. (See the "Related Documentation" section on page xii.)

1. dB = decibels.
2. VAC = volts alternating current.

Preparing to Install the Cisco AS5350 Chassis

This chapter describes the tasks you must perform before you begin to install the Cisco AS5350 and includes the following sections:

Safety Recommendations

Any device that uses electricity must be handled carefully; follow these guidelines to ensure general safety:

- Keep the chassis area clear and dust-free during and after installation.
- Put the removed chassis cover in a safe place.
- Keep tools away from walk areas where you and others could fall over them.
- Do not wear loose clothing that could get caught in the chassis. Fasten your tie or scarf and roll up your sleeves.
- Wear safety glasses if you are working under any conditions that might be hazardous to your eyes.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe.

Warning **Ultimate disposal of this product should be handled according to all national laws and regulations. To see translations of the warnings that appear in the publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Maintaining Safety with Electricity

Warning **Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or can weld the metal object to the terminals. To see translations of the warnings that appear in the publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Follow these guidelines when you work on equipment powered by electricity.

- Locate the emergency power-OFF switch for the room in which you are working. Then, if an electrical accident occurs, you can act quickly to turn OFF the power.
- Before working on the system, unplug the power cord.
- Disconnect all power before doing the following:
  - Installing or removing a chassis
  - Working near power supplies

Warning **When installing the unit, the ground connection must always be made first and disconnected last. Do not work alone if potentially hazardous conditions exist. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

- Never assume that power is disconnected from a circuit. Always check.

Warning **Read the installation instructions before you connect the system to its power source. To see translations of the warnings that appear in the publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

- Look carefully for possible hazards in your work area, such as moist floors, ungrounded power extension cables, frayed power cords, and missing safety grounds.
- If an electrical accident occurs, proceed as follows:
  - Use caution; do not become a victim yourself.
  - Turn OFF power to the system.
  - If possible, send another person to get medical aid. Otherwise, assess the condition of the victim and then call for help.
  - Determine if the person needs rescue breathing or external cardiac compressions; then take appropriate action.

Warning **This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that a fuse or circuit breaker no larger than 120 VAC, 15A U.S. (240 VAC, 10A international) is used on the phase conductors (all current-carrying conductors). To see translations of the warnings that appear in the publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Preventing Electrostatic Discharge Damage

Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry. ESD damage occurs when electronic components are improperly handled and can result in complete or intermittent failures.

Always follow ESD-prevention procedures when you remove and replace components. Ensure that the chassis is electrically connected to earth ground. Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. Connect the grounding clip to an unpainted surface of the chassis frame to

safely ground unwanted ESD voltages. To guard against ESD damage and shocks, the wrist strap and cord must operate properly. If no wrist strap is available, ground yourself by touching the metal part of the chassis.

Caution For safety, periodically check the resistance value of the antistatic strap, which should be between 1 and 10 megohm (Mohm).

Required Tools and Equipment

The following items are included with the universal gateway:

- 19- and 24-inch 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 tie
- Cable tie holder
- Grounding lug

You might need the following equipment, which is not included:

- Straight-through RJ-45-to-RJ-45 cable for an Ethernet connection
- Up to two straight-through RJ-45-to-RJ-45 cables for T1 connections
- Up to two E1 cables for E1 connections
- Ethernet hub 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

Preparing to Connect to a Network

When you set up your universal gateway, consider distance limitations and potential electromagnetic interference (EMI) as defined by the Electronic Industries Association (EIA).

Warning **Hazardous network voltages are present in WAN ports regardless of whether power to the router is OFF or ON. To avoid electric shock, use caution when working near WAN ports. When detaching cables, detach the end away from the router first. To see translations of the warnings that appear in the publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Warning **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. To see translations of the warnings that appear in the publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Ethernet Connections

Two Fast Ethernet (FE) ports, RJ-45 ports, are located on the rear panel of the universal gateway: FE0 and FE1 (selectable). To configure the Ethernet ports, refer to the *Cisco AS5350 and Cisco AS5400 Universal Gateway Software Configuration Guide*. Both ports use unshielded twisted-pair (UTP) cable and require Category 5 cable. The maximum segment distance is 328 feet (100 meters).

Note UTP cables look like the cables used for ordinary telephones; however, UTP cables meet certain electrical standards that telephone cables do not. Cables are not included.

Console and Auxiliary Ports

The Cisco AS5350 includes an asynchronous serial console port and an auxiliary port. The console and auxiliary ports provide access to the universal gateway either locally (with a console terminal) or remotely (with a modem). This section discusses important cabling information to consider before connecting a console terminal (an ASCII terminal or PC running terminal emulation software) to the console port, or modem to the auxiliary port.

Console Port

The Cisco AS5350 includes an EIA/TIA-232 asynchronous serial console port (RJ-45). Depending on the cable and the adapter used, this port will appear as a data terminal equipment (DTE) or data communications equipment (DCE) device at the end of the cable. Your universal gateway arrives with cables and adapters to connect a console terminal (an ASCII terminal or PC running terminal emulation software) to the console port. To connect an ASCII terminal to the console port, use the RJ-45 rollover cable with the female RJ-45-to-DB-25 adapter (labeled TERMINAL).

To connect a PC running terminal emulation software to the console port, use the RJ-45 rollover cable with the female RJ-45-to-DB-9 adapter (labeled TERMINAL). The default parameters for the console port are 9600 baud, 8 data bits, no parity, and 2 stop bits. The console port does not support hardware flow control.

For detailed information about installing a console terminal, see Chapter 3, “Installing the Cisco AS5350.” See Appendix C, “Cabling Specifications,” for cable and port pinouts.

Auxiliary Port

The Cisco AS5350 includes an EIA/TIA-232 asynchronous serial auxiliary port (RJ-45) that supports flow control. Depending on the cable and the adapter used, this port will appear as a DTE or DCE device at the end of the cable. Your universal gateway arrives with a cable and an adapter to connect a modem to the auxiliary port. To connect a modem to the auxiliary port, use the RJ-45 rollover cable with the male RJ-45-to-DB-25 adapter (labeled MODEM).

For detailed information about connecting devices to the auxiliary port, see Chapter 3, “Installing the Cisco AS5350.” See Appendix C, “Cabling Specifications,” for cable and port pinouts.

2T Serial Ports

Two high speed 12-in-1 serial ports on the rear panel of the Cisco AS5350 provide backhaul WAN and IP support.

The following types of serial interface standards (in DTE/DCE) are supported:

- EIA/TIA-232
- EIA/TIA-449
- EIA/TIA-530
- EIA/TIA-530A
- EIA/TIA-X.21
- ITU-T V.35

Each interface supports up to 8 Mbps.

Alarm Port

The three pins on the alarm port are connected to the output of a relay. This relay is controlled by system software. To configure the Alarm port, refer to the *Cisco AS5350 and Cisco AS5400 Universal Gateway Software Configuration Guide*. This document is available on CCO and the documentation CD-ROM that comes with your universal gateway. (See the “Related Documentation” section on page xii.) With the alarm ports connected and configured, Cisco IOS software polls every one second to detect the failure events that are configured and turns ON the alarm when it detects any failure event. See Appendix C, “Cabling Specifications,” for pinouts and cable specifications.

BITS Port

The BITS port is a coaxial interface that provides external synchronized clocking through a Timing Signal Generator (TSG). To configure the BITS port, refer to the *Cisco AS5350 and Cisco AS5400 Universal Gateway Software Configuration Guide*. This document is available on CCO and the documentation CD-ROM that comes with your universal gateway. (See the “Related Documentation” section on page xii.) See Appendix C, “Cabling Specifications,” for pinouts and cable specifications.

Power Supply Considerations

Check the power at your site to ensure that you are receiving "clean" power (free of spikes and noise). Install a power conditioner if necessary.

Warning **The device is designed to work with TN power systems. To see translations of the warnings that appear in the publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Warning **This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that a fuse or circuit breaker no larger than 120 VAC, 15A U.S. (240 VAC, 10A international) is used on the phase conductors (all current-carrying conductors). To see translations of the warnings that appear in the publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

The universal gateway AC power supply includes the following features:

- Full range operation—100 to 240 VAC.
- All units include a 6-foot (1.8-m) electrical power cord. (A label near the power inlet indicates the correct voltage, frequency, and current draw for the unit.)

Note The redundant AC power supply has a power cord with a special connector.

The universal gateway DC power supply includes the following features:

- 150 W output
- Dual input connections for power source redundancy
- Removable DC connector (A label near the power inlets indicates the correct voltage, current draw, and power dissipation for the unit.)
- Double-hole grounding lug for reliable grounding to the chassis

Installing the Cisco AS5350

This chapter guides you through the installation of the Cisco AS5350 universal gateway and includes the following sections:

Warning **Only trained and qualified personnel should be allowed to install or replace this equipment. To see translations of the warnings that appear in the publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Warning **This equipment is intended to be grounded. Ensure that the host is connected to earth ground during normal use. To see translations of the warnings that appear in the publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Warning **Incorrect connection of this or connected equipment to the general purpose outlet could result in a hazardous situation. To see translations of the warnings that appear in the publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Setting Up the Chassis

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

- Setting the Chassis on a Desktop
- Rack-Mounting the Chassis

Warning **When installing the unit, the ground connection must always be made first and disconnected last. To see translations of the warnings that appear in the publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Warning **This unit is intended for installation in restricted access areas. A restricted access area is where access can only be gained by service personnel through the use of a special tool, lock and key, or other means of security, and is controlled by the authority responsible for the location. To see translations of the warnings that appear in the publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Setting the Chassis on a Desktop

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 plan the location of the chassis:

- Plan for access to both front and rear 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.

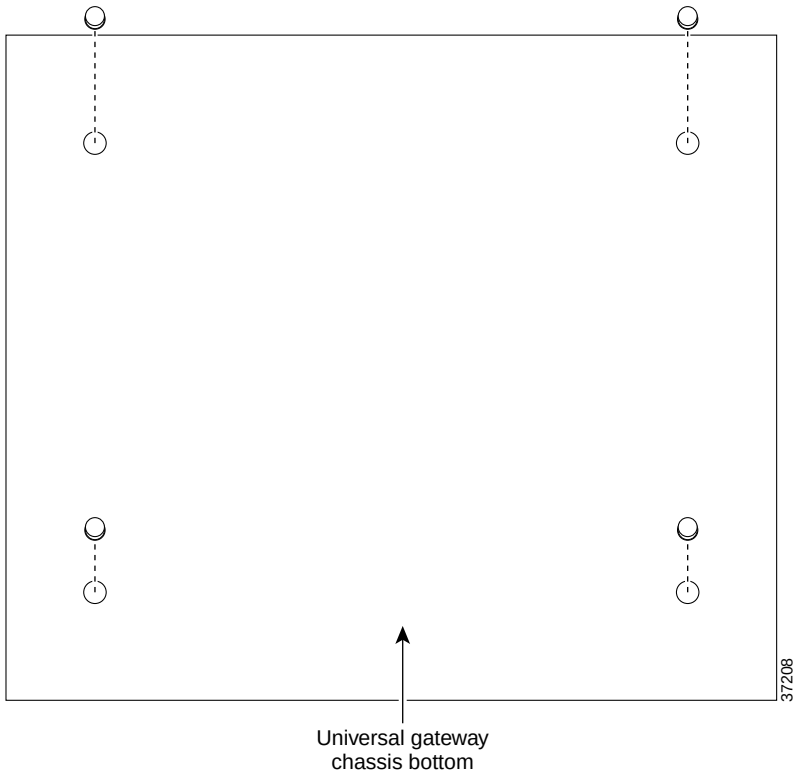
Attaching the Rubber Feet

To attach the rubber feet to the chassis, follow this procedure:

Step 1 Carefully turn the chassis over so you can see the four small depressions made for attaching the rubber feet. (See Figure 3-1.) The rubber feet are included in the accessory kit that shipped with your universal gateway.

Step 2 Remove the wax paper from the bottom of each rubber foot and press the foot into the small depression on the bottom of the chassis. (See Figure 3-1.)

Figure 3-1 Attaching the Rubber Feet



Rack-Mounting the Chassis

This section describes how to rack-mount the chassis. The universal gateway arrives with 19-inch rack-mount brackets and larger brackets for use with a 23- or 24-inch rack (See Figure 3-2).

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.

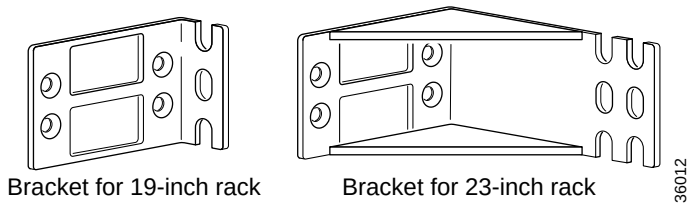
Warning **Before working on a chassis or working near power supplies, unplug the power cord on AC units; disconnect the power at the circuit breaker on DC units. To see translations of the warnings that appear in the publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

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)

Figure 3-2 Standard Rack-Mount Brackets



Attaching the Brackets

To attach the mounting brackets to the chassis, follow this procedure:

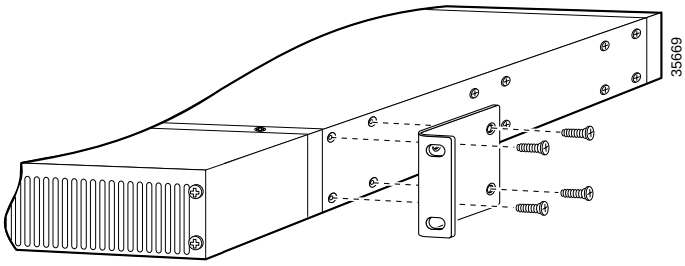
Step 1 Set the chassis on a flat surface. (See Figure 3-3.)

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

Step 2 Attach the standard 19 or 23-inch rack brackets to the sides of the chassis. Use the screws provided with the mounting brackets. (See Figure 3-3.)

Note There are three sets of mounting holes on the sides of the chassis. Attach the brackets for front, rear, or middle mounting.

Figure 3-3 Standard Bracket Installation—Front Panel Forward



Note: The second bracket attaches to the other side of the chassis.
The chassis can also be installed with the rear panel forward.

Installing in a Rack

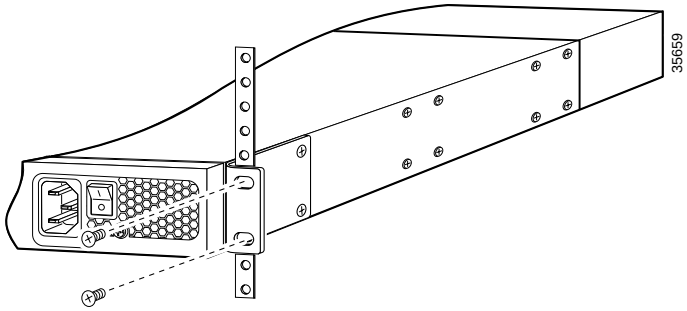
Caution Do not use the handles on the dial feature cards to assist in lifting the chassis.

To install the chassis into the equipment rack, follow this procedure:

Step 1 With the mounting brackets attached to the chassis, support the chassis and align the holes in the brackets with the screw holes in the rack. (See Figure 3-4.)

Step 2 Attach the chassis to the rack with the screws you have provided. (See Figure 3-4.)

Figure 3-4 Attaching the Chassis to a 19-Inch Rack—Rear Panel Forward



Note: The second bracket attaches to the rack at the other side of the chassis. The chassis can also be installed with the front panel forward.

Connecting the Chassis Ground

You must connect the chassis to a reliable earth ground using the ground lug (provided) and size AWG 6 (13 mm2) wire.

To attach the chassis ground, take the following 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. (See Figure 3-5 or Figure 3-6.) 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).

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

Figure 3-5 Cisco AS5350 Ground Lug Attachment

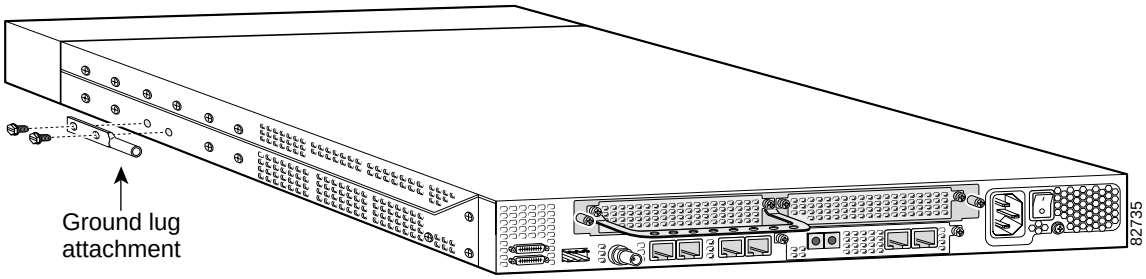
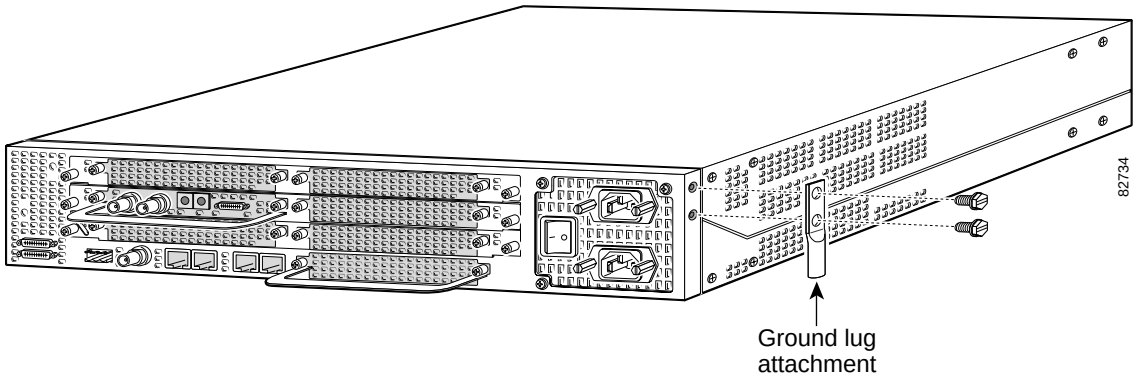


Figure 3-6 Cisco AS5400 Ground Lug Attachment



Connecting to the Network

This section describes how to connect the Cisco AS5350 to your network. The cables required to connect the universal gateway to a network are not provided. For ordering information, contact customer service. See the "Obtaining Technical Assistance" section on page xiv, or see Appendix C, "Cabling Specifications," for cable and port pinouts.

Warning **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 use both RJ-45 connectors. Use caution when connecting cables. To see translations of the warnings that appear in the publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Note Connect the alarm port only to a safety extra-low voltage (SELV) source using 22 AWG, or thicker, copper wire. SELV ratings are maximum 30 Volts AC (RMS), maximum 60 Volts DC, and maximum 50 VA power. The alarm port is rated for 2.0 Amp maximum current.

Warning **Do not work on the system or connect or disconnect cables during periods of lightning activity. To see translations of the warnings that appear in the publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

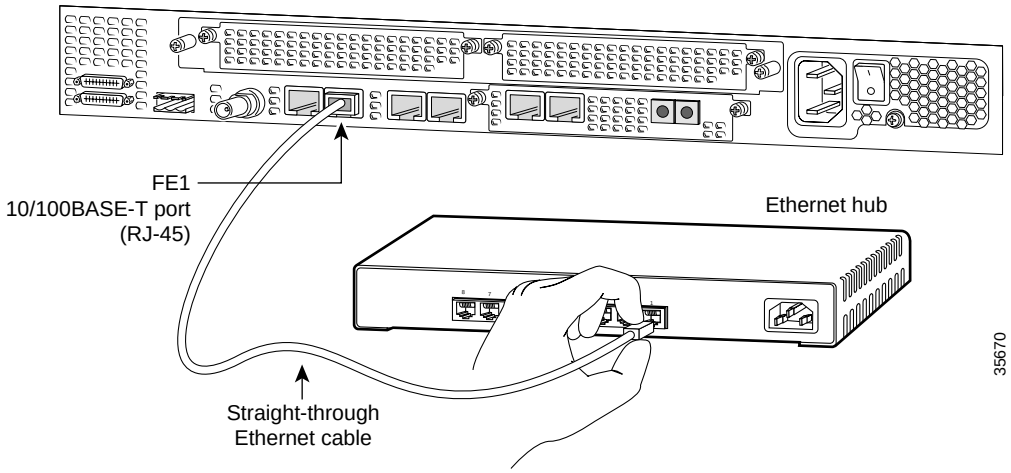
Caution If the universal gateway is configured with fewer than three DFCs, make sure that a blank slot cover is installed over each open slot to ensure proper airflow.

Note The Cisco AS5350 arrives with all carrier cards and DFCs already installed, unless you order a card separately as a spare. Refer to the *Cisco AS5350 Universal Gateway Card Installation Guide* for card installation instructions. This document is available on Cisco.com and the documentation CD-ROM that comes with your universal gateway. (See the "Obtaining Documentation" section on page xiii.)

Connecting to an Ethernet Network

Connect an Cisco AS5350 Fast Ethernet port to an Ethernet hub using a straight-through, RJ-45-to-RJ-45, Ethernet cable. (See Figure 3-7.)

Figure 3-7 Connecting to an Ethernet Hub (10/100BASE-T Shown)



Connecting to a WAN

Warning **To reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cord. To see translations of the warnings that appear in the publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Warning **This equipment is to be installed and maintained by service personnel only as defined by AS/NZS 3260 Clause 1.2.14.3 Service Personnel. To see translations of the warnings that appear in the publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Warning **Hazardous network voltages are present in WAN ports regardless of whether power to the router is OFF or ON. To avoid electric shock, use caution when working near WAN ports. When detaching cables, detach the end away from the router first. To see translations of the warnings that appear in the publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Warning **The telecommunications lines must be disconnected 1) before unplugging the main power connector and/or 2) while the housing is open. To see translations of the warnings that appear in the publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

You can connect the Cisco AS5350 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 3-8 and Figure 3-9.)

Figure 3-8 Connecting a 2-Port or 4-Port DFC to an RJ-45 (T1) Jack

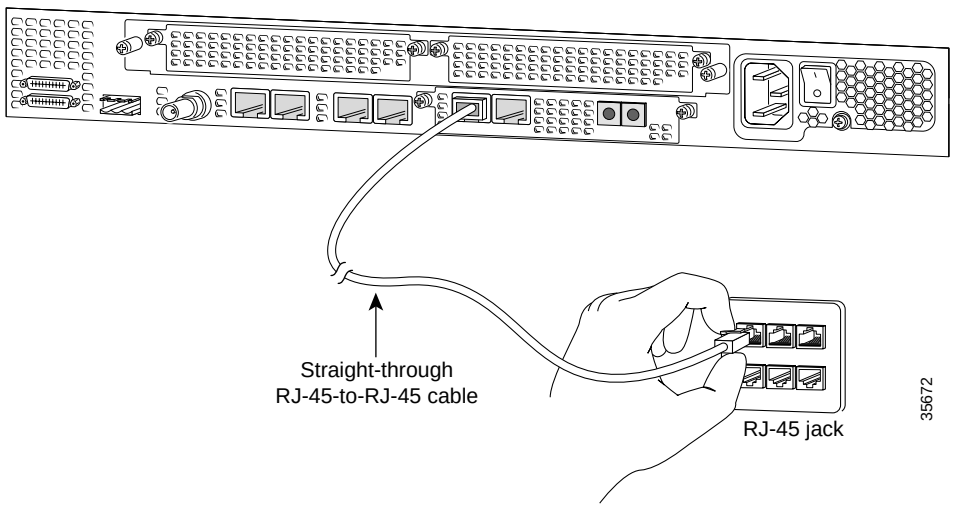
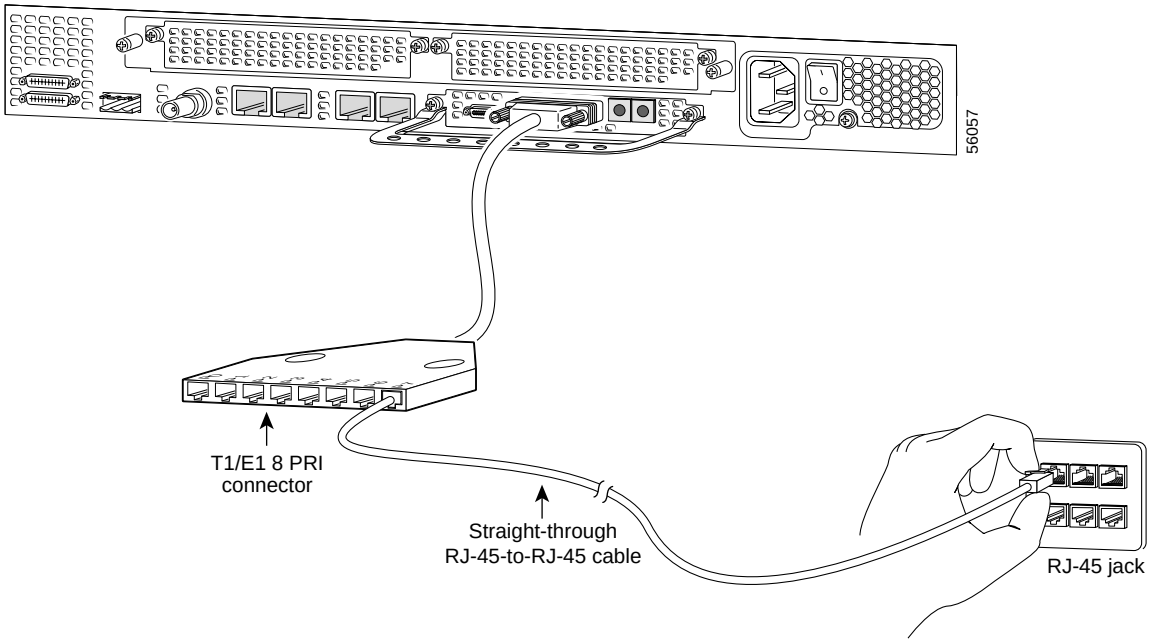


Figure 3-9 Connecting an 8-Port DFC to a RJ-45 (T1) Jack



Note Use software commands to choose a specific port and the line termination on that port. For information on software commands, see the *Cisco AS5350 and Cisco AS5400 Universal Gateway Software Configuration Guide*. This document is available on the Cisco.com and the documentation CD-ROM that comes with your universal gateway. (See the "Obtaining Documentation" section on page xiii.) 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.

- Connect each E1/PRI port to an RJ-45 jack with a straight-through RJ-45 to RJ-45 cable. (See Figure 3-10 and Figure 3-11.)

Warning **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. To see translations of the warnings that appear in the publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Figure 3-10 Connecting a 2-Port or 4-Port DFC to an RJ-45 Jack

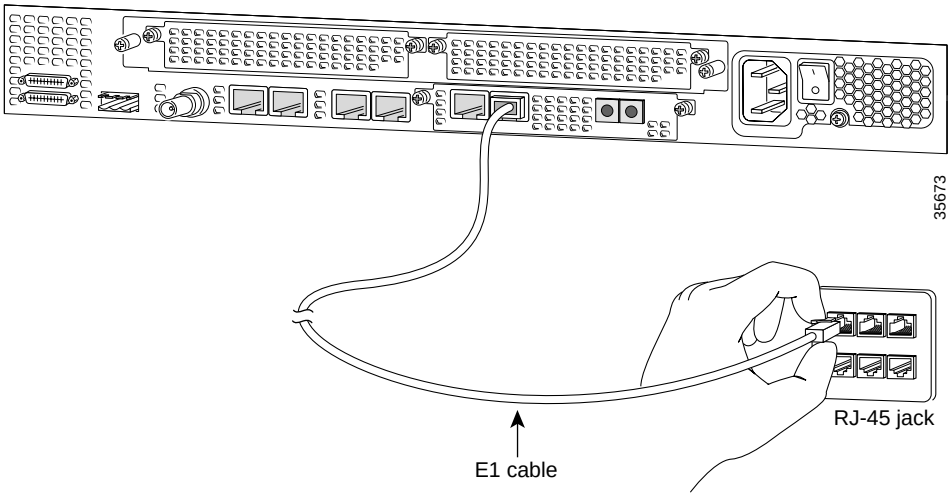
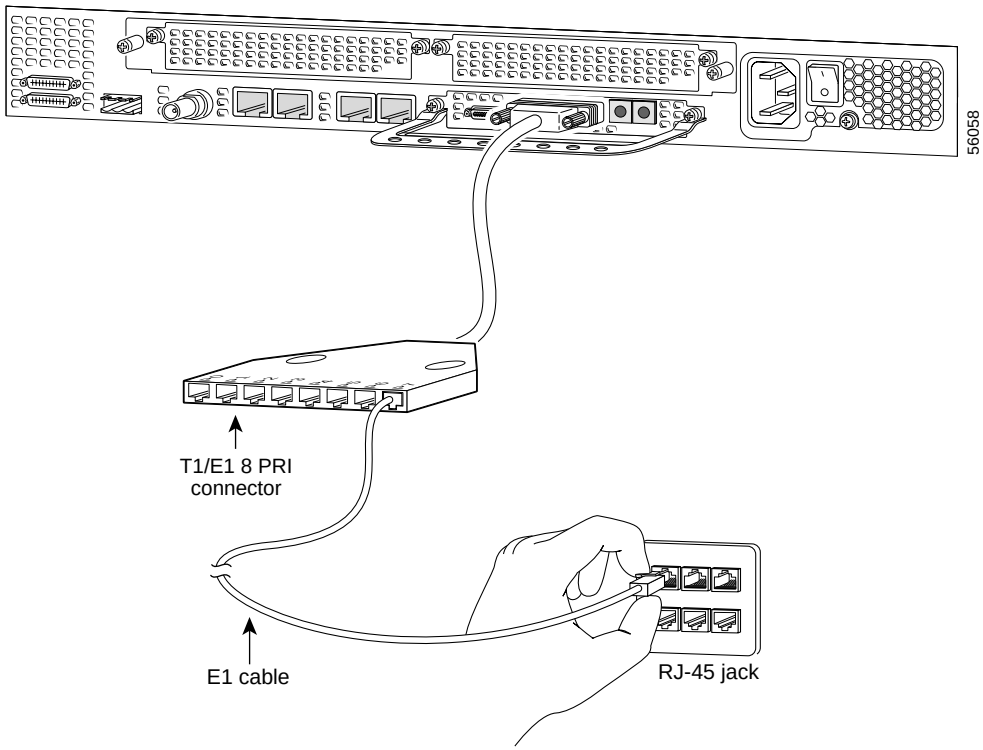
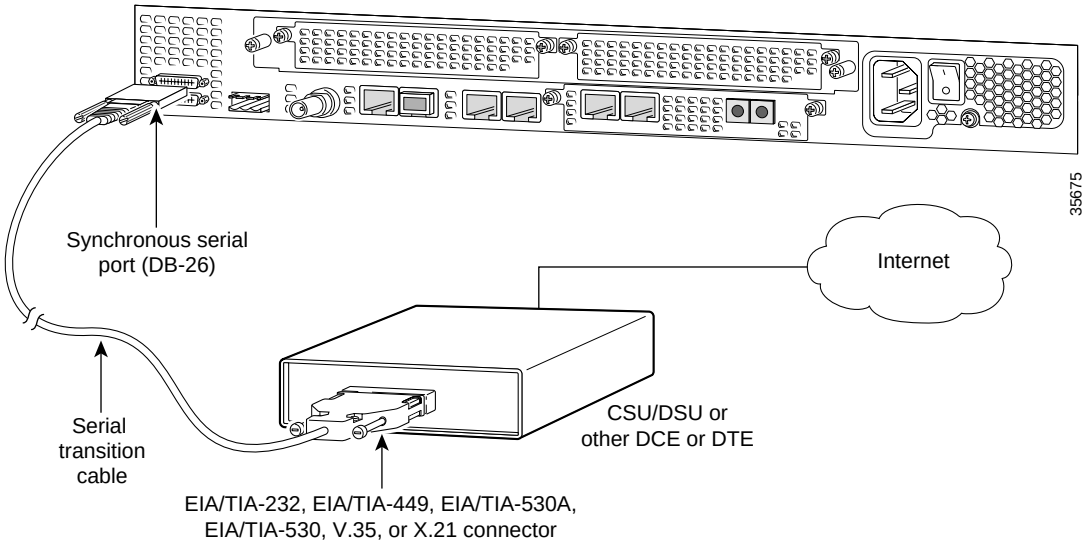


Figure 3-11 Connecting an 8-Port DFC to an RJ-45 Jack



- Connect a synchronous serial port to a modem or a CSU/DSU with a serial transition cable. (See Figure 3-12.)

Figure 3-12 Connecting to a CSU/DSU



Connecting to the Console and Auxiliary Ports

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

Connecting to the Console Port

To connect a terminal (an ASCII terminal or a PC running terminal emulation software) to the console port on the Cisco AS5350, follow this procedure:

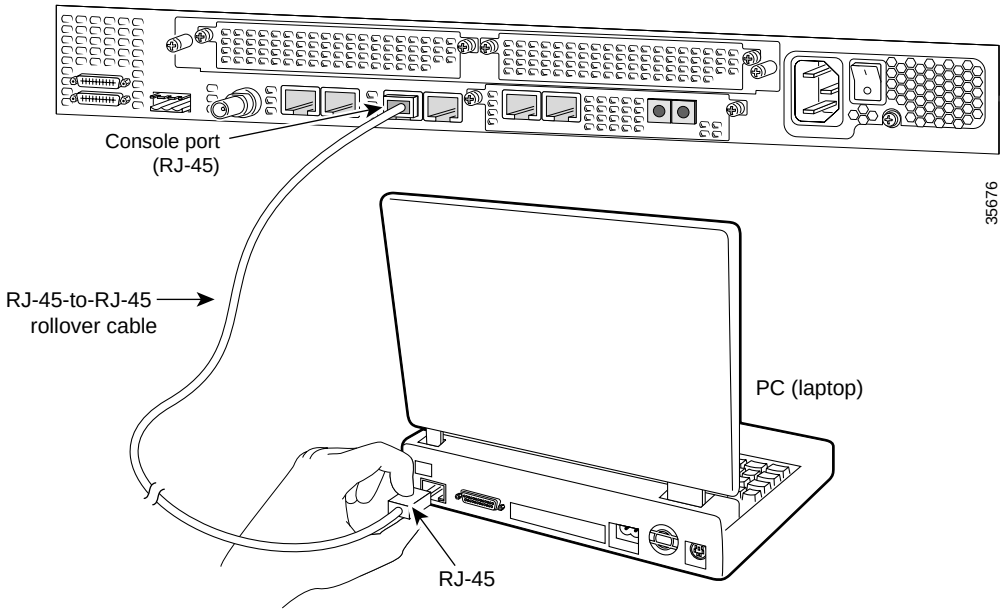
Step 1 Connect the terminal to the console port using an RJ-45 rollover cable and an RJ-45-to-DB-25 or RJ-45-to-DB-9 adapter. The adapters provided are labeled TERMINAL. The adapters and the rollover cable are included in the accessory kit that comes with the universal gateway. (See Figure 3-13.)

Note For additional information on rollover cable pinouts, see Appendix C, “Cabling Specifications.”

Step 2 Configure your terminal or PC terminal emulation software for 9600 baud, 8 data bits, no parity, and 2 stop bits.

Step 3 Configure the console port. See the *Cisco AS5350 and Cisco AS5400 Universal Gateway Software Configuration Guide*. This document is available on the World Wide Web and the documentation CD-ROM that comes with your universal gateway. (See the “Obtaining Documentation” section on page xiii.)

Figure 3-13 Connecting the Console Terminal



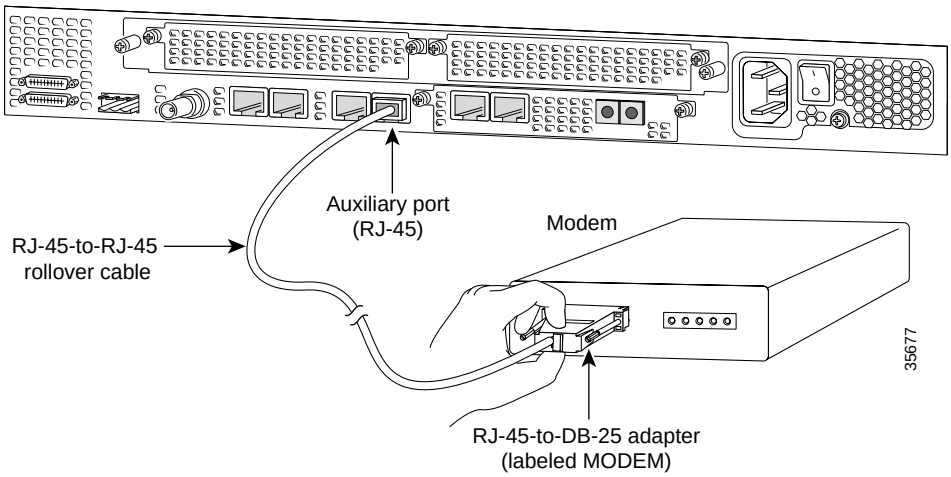
Connecting a Modem to the Auxiliary Port

To connect a modem to the auxiliary port, follow this procedure:

Step 1 Connect a modem to the auxiliary port on the Cisco AS5350 using an RJ-45 rollover cable with an RJ-45-to-DB-25 adapter. The adapter provided is labeled MODEM. The adapter and the rollover cable are included in the accessory kit that comes with the universal gateway.(See Figure 3-14.)

Note Make sure that your modem and the auxiliary port on the Cisco AS5350 are configured for the same transmission speed (38400 baud is typical) and hardware flow control with Data Carrier Detect (DCD) and Data Terminal Ready (DTR) operations.

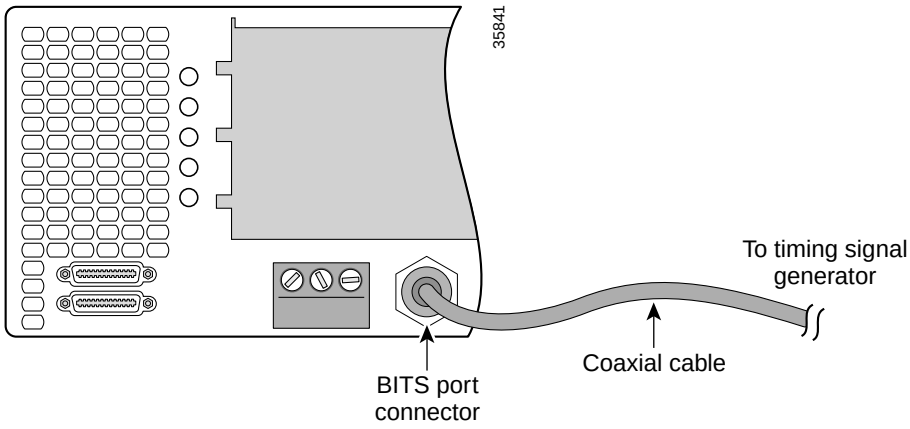
Figure 3-14 Connecting a Modem to the Auxiliary Port



Connecting a Signal Generator to the BITS Port

Use a coaxial cable to connect a Timing Signal Generator (TSG) to the BITS port. The BITS port is used for external clocking. (See Figure 3-15.)

Figure 3-15 Connecting to the BITS Port



Connecting an Alarm to the Alarm Port

To connect an alarm device to the alarm port, follow this procedure:

Note Connect the alarm port only to a safety extra-low voltage (SELV) source using 22 AWG, or thicker, copper wire. SELV ratings are maximum 30 Volts AC (RMS), maximum 60 Volts DC, and maximum 50 VA power. The alarm port is rated for 2.0 Amp maximum current.

Note The alarm connector is a 3-wire connector that plugs into a receptacle in the rear of the chassis. The connector is provided in the accessory kit that ships with the Cisco AS5350.

Step 1 Insert the three pin alarm port connector (included in the accessory kit) into the alarm port terminal block.

Step 2 Strip a minimum 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).

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

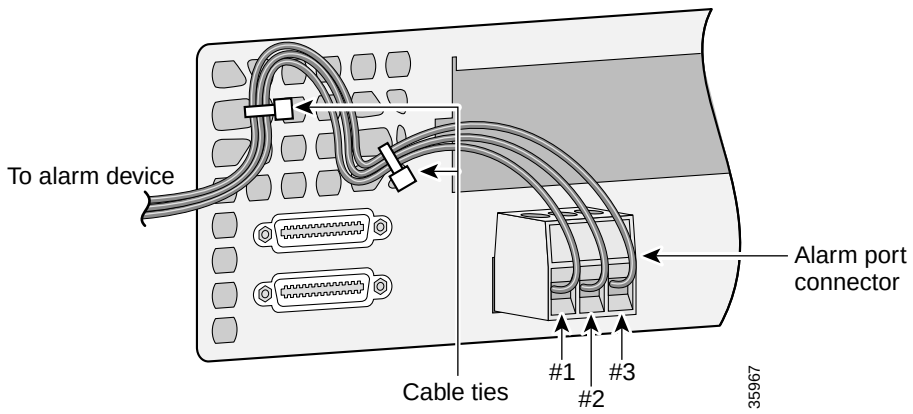
Step 3 Secure the wires to the alarm connector with the screws on the connector. See Appendix C, “Cabling Specifications,” for alarm port pinouts.

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

Step 4 Attach two cable ties to the chassis and connect the wires to the cable ties. (See Figure 3-16.)

Step 5 Attach the alarm wires to the alarm device.

Figure 3-16 Connecting to the Alarm Port



Supplying Power

The power system comprises an AC or DC power supply or a redundant AC or DC power supply, with internal cooling provided by two self-contained fans.

Note The redundant power supply is supported in Cisco IOS Release 12.2(2)XB5 or later releases.

Each power module is capable of supplying a maximum DC load of 150 watts, and is composed of four independent output voltages: 3.3V, 5V, 12V, and -12V. AC input units have power factor correction, and low Total Harmonic Distortion. Power failures are reported through environmental monitoring software.

Check the power at your site to ensure that you are receiving “clean” power (free of spikes and noise). Install a power conditioner if necessary.

The universal gateway AC power supply includes the following features:

- Full range operation—100 to 240 VAC.
- All AC units include a 6-foot (1.8-meter) electrical power cord (A label near the power inlets indicates the correct voltage, frequency, current draw, and power dissipation for the unit.)

Note The redundant AC power supply has a non-standard connector. Use the electrical power cord that came with your universal gateway.

The universal gateway DC power supply includes the following features:

- 150 W output
- Dual input connections for power source redundancy
- Removable DC connector (A label near the power inlets indicates the correct voltage, current draw, and power dissipation for the unit.)
- Double-hole grounding lug for reliable grounding to the chassis

Follow this procedure to connect power to the universal gateway:

Step 1 Connect one end of the AC power cord to the power connector on the rear panel of the Cisco AS5350 (See Figure 3-17 or Figure 3-18.) Or, if you are using a DC-powered unit, refer to Figure 3-19 or Figure 3-20, and complete Step a through Step e.

Step 2 Connect the other end of the AC power cord to the power outlet.

Warning **This product relies on the building’s installation for short-circuit (overcurrent) protection. Ensure that a fuse or circuit breaker no larger than 120 VAC, 15A U.S. (240 VAC, 10A international) is used on the phase conductors (all current-carrying conductors). To see translations of the warnings that appear in the publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Warning **The device is designed to work with TN power systems. To see translations of the warnings that appear in the publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Warning **The plug-socket combination must be accessible at all times because it serves as the main disconnecting device.To see translations of the warnings that appear in the publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Figure 3-17 Connecting the AC Power Cord

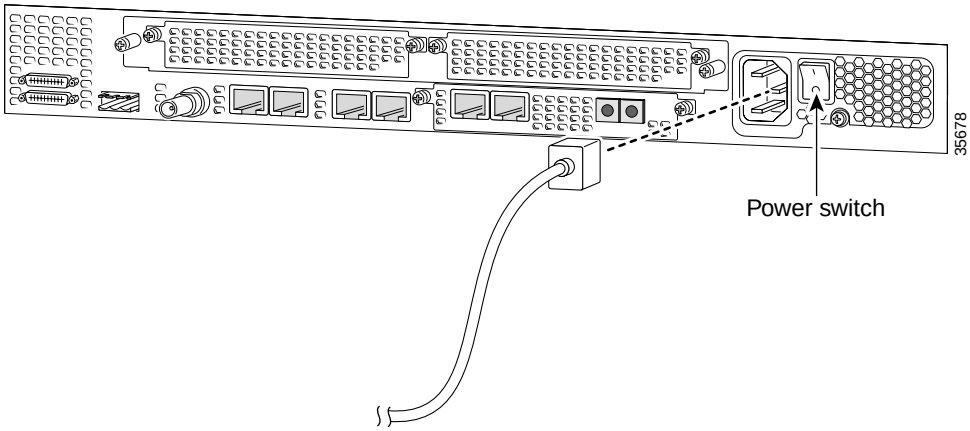
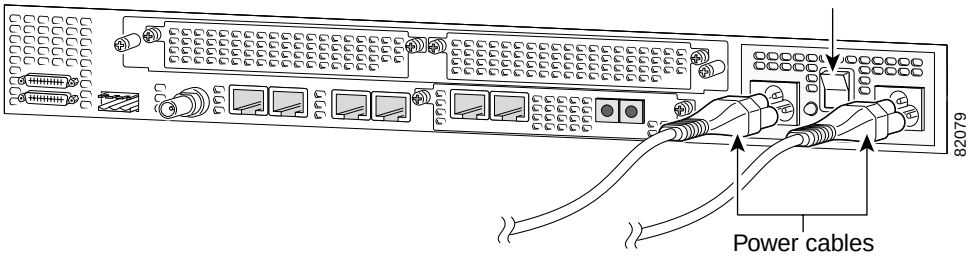


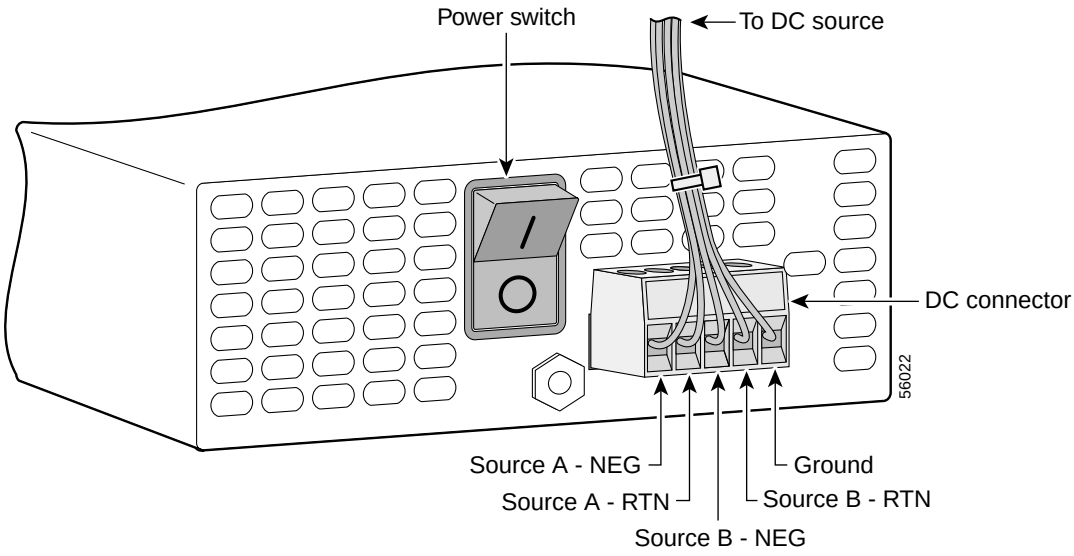
Figure 3-18 Connecting the AC Power Cord to the Redundant Power Supply



Warning **Before performing any of the following procedures, 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. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

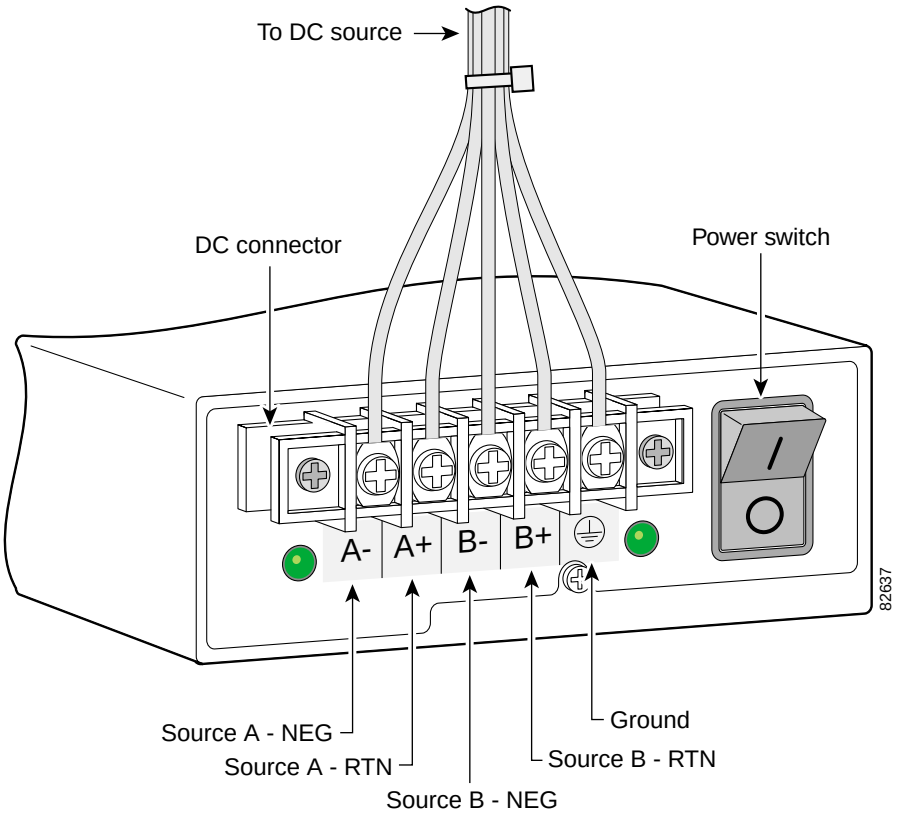
Warning **The illustration shows the DC power supply terminal block. Wire the DC power supply using the appropriate wire terminations at the wiring end, as illustrated. The proper wiring sequence is ground to ground, return to return, and negative to negative. Note that the ground wire should always be connected first and disconnected last. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Figure 3-19 DC Power Supply Connections—Single Power Supply



Caution Do not overtorque the terminal block contact screws. The recommended torque is 4.5 lb-in (0.50 N-m).

Figure 3-20 DC Power Supply Connections—Redundant Power Supply



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

Note If you are installing a redundant power supply, you should attach appropriate sized spade terminals to the stripped ends of the ground and input wires.

a. Strip off a quarter of an inch (1/4 in. [0.625 cm]) of insulation on the safety ground, +48 VDC, and -48 VDC input wires.

b. Insert the safety ground (green wire) into the DC connector ground connector and tighten the locking screws. Ensure that no bare wire is exposed.

c. Insert the 48 VDC Return wires into the DC connector positive connectors (+) and tighten the locking screws. Ensure that no bare wire is exposed.

d. Insert the -48 VDC wires into the DC connector negative connectors (-) and tighten the locking screws. Ensure that no bare wire is exposed.

e. Make sure that the power supply wires are secured to cable strain-relief clamps with cable ties.

Warning **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. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Step 3 Power on the universal gateway.

The internal power supply fan should power on.

Where to Go Next

When you power ON the Cisco AS5350 for the first time, messages will begin to appear on your console screen. Refer to the *Cisco AS5350 and Cisco AS5400 Universal Gateway Software Configuration Guide* for configuration instructions. This document is available on the World Wide Web and the documentation CD-ROM that comes with your Cisco AS5350. (See the “Obtaining Documentation” section on page xiii.)

The remaining chapters of this guide include reference material for replacing spare parts, troubleshooting, and creating your own cables:

- Chapter 4, “Troubleshooting”
- Appendix A, “Replacing Memory Components”
- Appendix B, “Replacing the Power Supply”
- Appendix C, “Cabling Specifications”

Troubleshooting

This chapter describes troubleshooting techniques for the Cisco AS5350. The chapter contains the following sections:

LEDs

The LEDs indicate the current operating condition of the Cisco AS5350. You can observe the LEDs, note any fault condition that the product is encountering, and then contact your system administrator or a customer service representative (see the “Obtaining Technical Assistance” section on page xiv), if necessary. Refer to Figure 4-1 for a diagram illustrating the rear panel LEDs and Table 4-1 for a description of the LEDs.

For information about LEDs and troubleshooting on Cisco AS5350 dial feature cards, see the *Cisco AS5350 Universal Gateway Card Installation Guide.* This document is available on the World Wide Web and the documentation CD-ROM that comes with your universal gateway. (See the “Obtaining Documentation” section on page xiii.)

Figure 4-1 Rear Panel LEDs

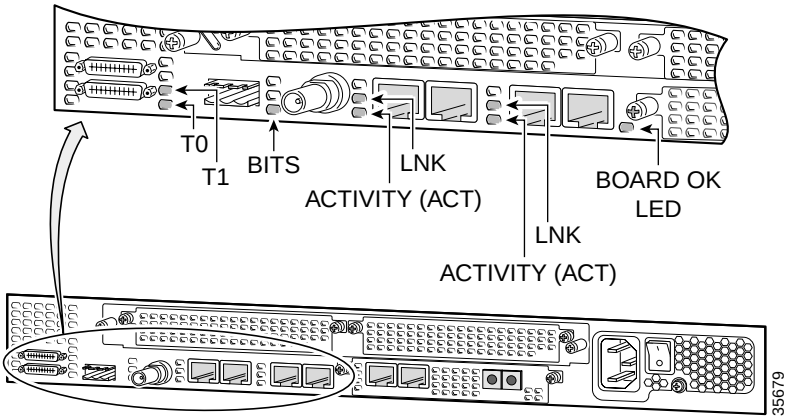


Table 4-1 Chassis LEDs

Function	LED	State	Description
Alarm	Alarm	On	An alarm error is detected.
Fast Ethernet	Activity (ACT)	Flickering	The Fast Ethernet LAN connection is transmitting and receiving data normally.
		Off	The Fast Ethernet LAN connection is not transmitting or receiving data.
	Link (LNK)	On	Fast Ethernet cable is connected properly.
		Off	The Fast Ethernet port is not connected.
Console/Auxiliary	Activity (ACT)	Flickering	The console or auxiliary connection is transmitting and receiving data normally.
		Off	The console or auxiliary connection is not transmitting or receiving data.
	Link (LNK)	On	The console or auxiliary cable is connected properly.
		Off	The console or auxiliary port is not connected.
System Board Status (Located to right of Console/Auxiliary ports)	OK	On	System board is operating normally.
		Off	Power is off or system has not booted.
		Blinking	A memory failure occurred.

Table 4-1 Chassis LEDs (continued)

Function	LED	State	Description
Serial Ports	T0, T1	Flickering	Indicates data activity on the serial ports.
		Off	The serial port connection is not transmitting or receiving data.
BITS Port	BITS	ON	Indicates a valid signal on the BITS port.

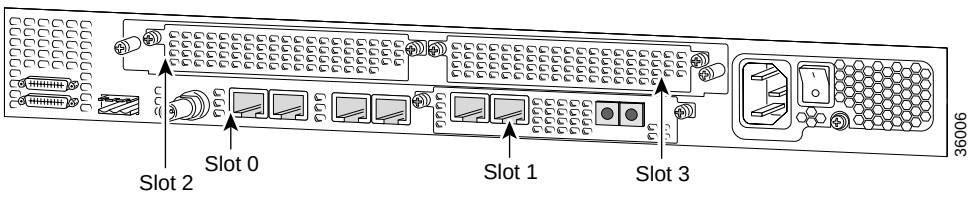
Monitoring Environment

The Cisco AS5350 contains temperature sensors to detect abnormal temperature conditions during system operation. The three levels of sensor detection are as follows:

- If the operating temperature of the system exceeds 45° C, the system reaches a warning state. A warning message appears on the console. When the operating temperature of the system drops below 45° C, another message is displayed on the console indicating a recovery. At this level of sensor detection, there is no disruption in system operation.
- When the operating temperature of the system continues to rise above 45° C and reaches a temperature of 60° C, the system reaches a critical state. Cisco IOS software gracefully shuts down the first DFC. If the operating temperature continues to be critical after 10 minutes, Cisco IOS software shuts down another DFC.

Note DFC slot numbering starts from the motherboard and works up from left to right. Slot 0 is reserved for the motherboard. The DFC slots are numbered sequentially from 1 to 3. (See Figure 4-2.)

Figure 4-2 Cisco AS5350 Slot Numbering



This process is repeated at 10 minute intervals until the final DFC is shut down. The console displays the slot number of the DFC and the type of DFC that was shut down.

If the operating temperature cools down to 45° C, Cisco IOS software powers on the first DFC, repeating the process for each DFC at 10 minute intervals.

- When the operating temperature of the system rises above 65° C, Cisco IOS software shuts down all DFCs immediately.

Displaying Environment Status

You can use the command-line interface (CLI) to check environment monitoring status of the Cisco AS5350.

To check environment monitoring, enter the **show environment** command in privileged EXEC mode, as follows:

```
Router# show environment
```

The display shown below appears on your console during normal operating conditions. The slot number corresponds to the DFC in that slot. The outlet and inlet sensors read the temperature of the air circulating inside the chassis.

```
Router# show environment

Temperature:
        Temperature Reading:
                Temperature at inlet is measured as 22C/71F.
                Temperature at outlet is measured as 27C/80F.
        Temperature State:
                Temperature is in normal state.
Fans:
        Fans temperature delta is measured as 5C.
        All fans are running well.
Power Supply:
Power System is present.
```

The display below appears on your console when the system reaches a warning state:

```
Router# show environment

Temperature:
        Temperature Reading:
                Temperature at inlet is measured as 52C/125F.
                Temperature at outlet is measured as 64C/147F.
        Temperature State:
                Temperature is in warning state.
Fans:
        Fans temperature delta is measured as 6C.
        All fans are running well.
Power Supply:
Power System is not present.
PS Input Voltage status: normal
PS Output Voltage status: normal
PS Fan status: normal
PS Thermal status: normal
PS OverVoltage status: normal
Environmental monitor experienced the following events:
        Temperature:sensor failed.
        Fans:monitor dropped.
        Temperature:warning.
        Temperature:sensor recovered.
        Fans:monitor recovered.
        Fans:normal.
```

The display below appears on your console when the system reaches a critical state:

```
Router# show environment

Temperature:
        Temperature Reading:
                Temperature at inlet is measured as 62C/143F.
                Temperature at outlet is measured as 74C/165F.
        Temperature State:
                Temperature is in critical state.
        DFC Busyout/Power-down:
                A DFC is powered down. Slot:1, Type:NP60 DFC
                A DFC is busyout. Slot:2, Type:T1 2 PRI DFC
                A DFC is busyout. Slot:3, Type:NP60 DFC
Fans:
        Fans temperature delta is measured as 6C.
        All fans are running well.
Power Supply:
Power System is present.
PS Input Voltage status: normal
PS Output Voltage status: normal
PS Fan status: normal
PS Thermal status: normal
PS OverVoltage status: normal
Environmental monitor experienced the following events:
        Temperature:sensor failed.
        Fans:monitor dropped.
        Temperature:warning.
        Temperature:sensor recovered.
        Fans:monitor recovered.
        Fans:normal.
        Temperature:critical.
```

The display below appears on your console when the system reaches a shutdown state:

```
Router# show environment

Temperature:
        Temperature Reading:
                Temperature at inlet is measured as 70C/158F.
                Temperature at outlet is measured as 82C/179F.
        Temperature State:
                Temperature is in shutdown state.
        DFC Busyout/Power-down:
                A DFC is powered down. Slot:1, Type:NP60 DFC
                A DFC is powered down. Slot:2, Type:T1 2 PRI DFC
                A DFC is powered down. Slot:3, Type:NP60 DFC
Fans:
        Fans temperature delta is measured as 6C.
        All fans are running well.
Power Supply:
Power System is present.
PS Input Voltage status: normal
PS Output Voltage status: normal
PS Fan status: normal
PS Thermal status: normal
PS OverVoltage status: normal
```

```
Environmental monitor experienced the following events:
        Temperature:sensor failed.
        Fans:monitor dropped.
        Temperature:warning.
        Temperature:sensor recovered.
        Fans:monitor recovered.
        Fans:normal.
        Temperature:critical.
        Temperature:shutdown.
```

Troubleshooting Network Interfaces

For information about isolating problems with the network connections to your Cisco AS5350, refer to the publication *Internetwork Troubleshooting Guide* available on the Cisco Documentation CD-ROM. For more information, see the section "Related Documentation" section on page xii.

Replacing the Fan Tray

Warning **Before working on a system that has an on/off switch, turn OFF the power and unplug the power cord.To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Caution Before you remove the fan tray, read the "Safety Recommendations" section on page 21.

Removing the Fan Tray

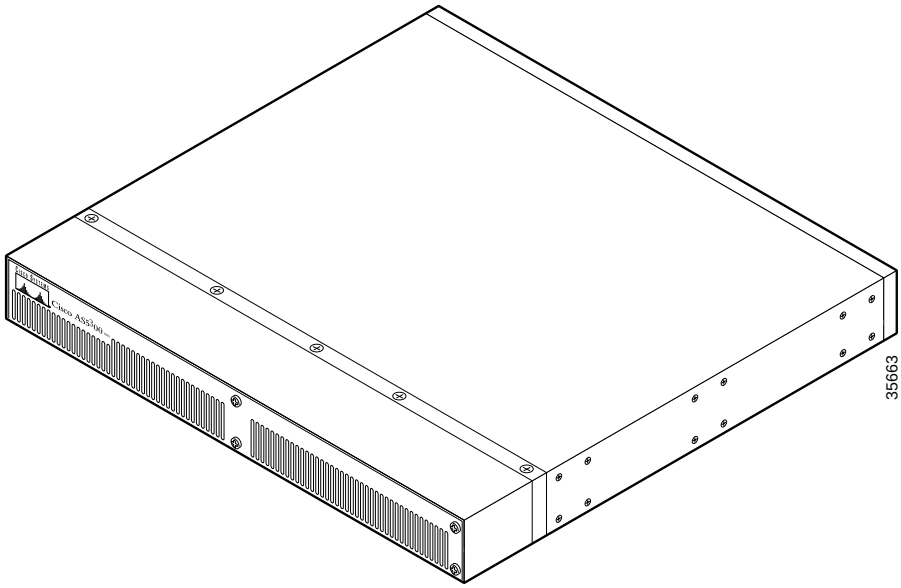
To remove the fan tray, follow this procedure:

Step 1 Use the power switch on the chassis to power down the chassis.

Caution The fan tray is not hot swappable. You must power down the system before removing the fan tray.

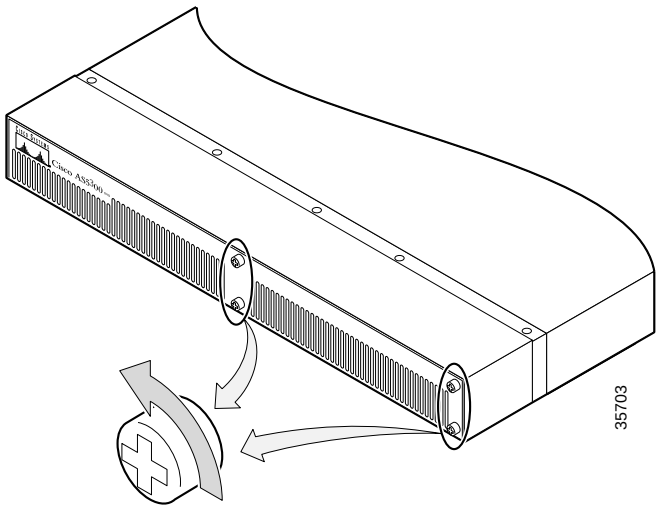
Step 2 Position the chassis with the front panel facing you. (See Figure 4-3.) The front panel contains the fan tray.

Figure 4-3 Cisco AS5350 Front Panel



Step 3 Loosen the four screws securing the fan tray to the chassis. (See Figure 4-4.)

Figure 4-4 Loosen Fan Tray Screws



Step 4 Grasp the edge of the fan tray near the two end-screws and carefully pull it towards you. (See Figure 4-5.) The fan tray power connector disconnects from its receptacle. (See Figure 4-6.)

Figure 4-5 Pulling the Edge of the Fan Tray

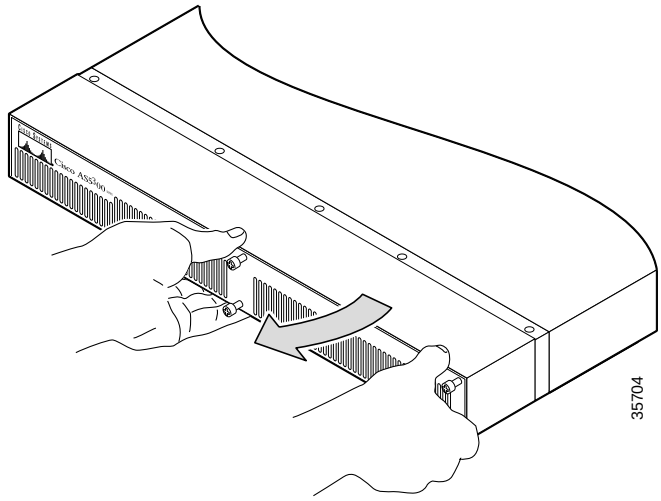
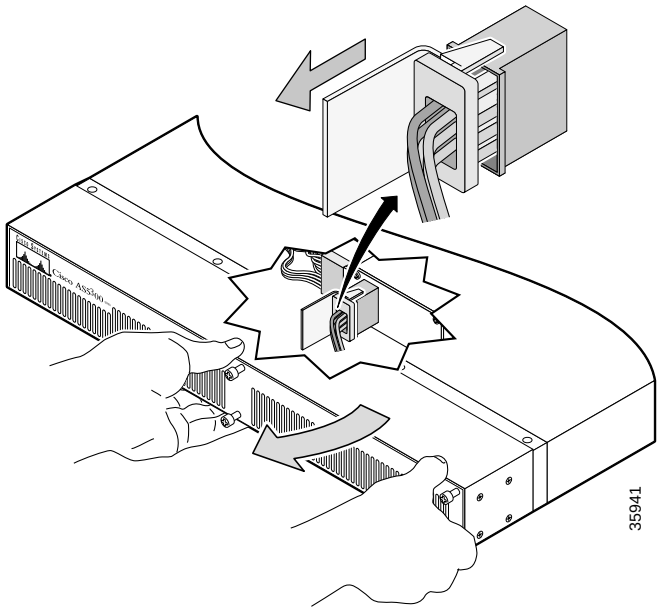
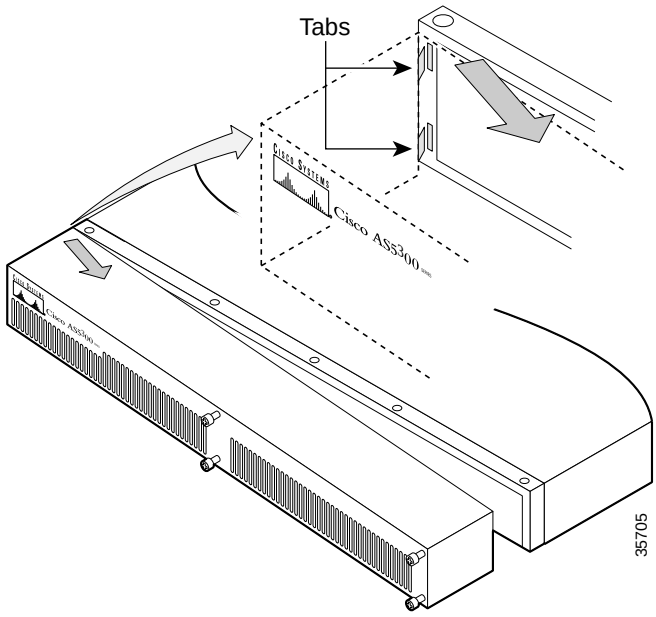


Figure 4-6 Fan Tray Power Connector Disconnecting From Receptacle



Step 5 Slide the metal tabs located at the other end of the fan tray out of their slots. (See Figure 4-7.)

Figure 4-7 Slide Metal Tabs out of Slots

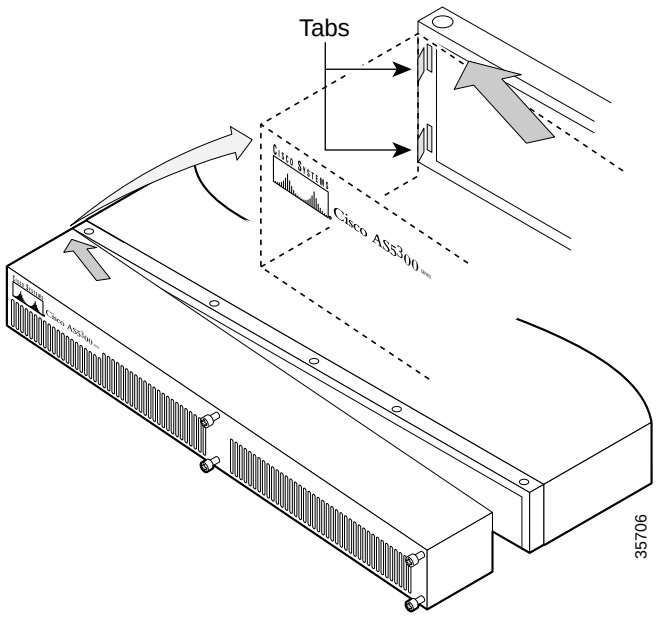


Installing the Fan Tray

To install the fan tray, follow this procedure:

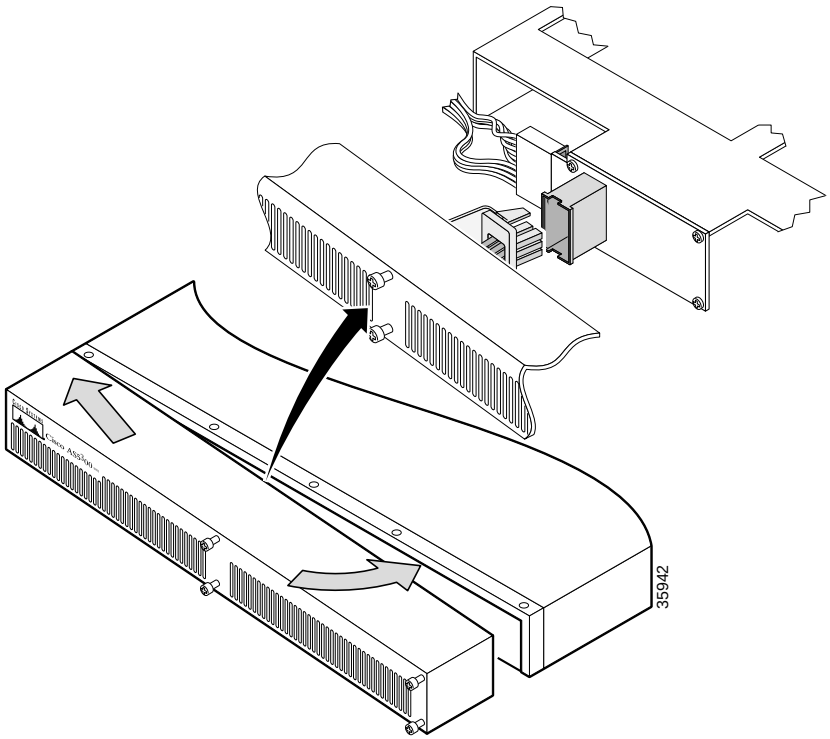
Step 1 Insert the metal tabs located at the end of the fan tray into their slots. (See Figure 4-8.) Use your left hand to hold that end of the fan tray against the chassis to ensure that the metal tabs do not slip out of their slots.

Figure 4-8 Inserting the Metal Tabs into Slots



Step 2 Use your right hand to rotate the other end of the fan tray towards the front panel of the chassis. Make sure the fan tray power connector slides into the receptacle. (See Figure 4-9.)

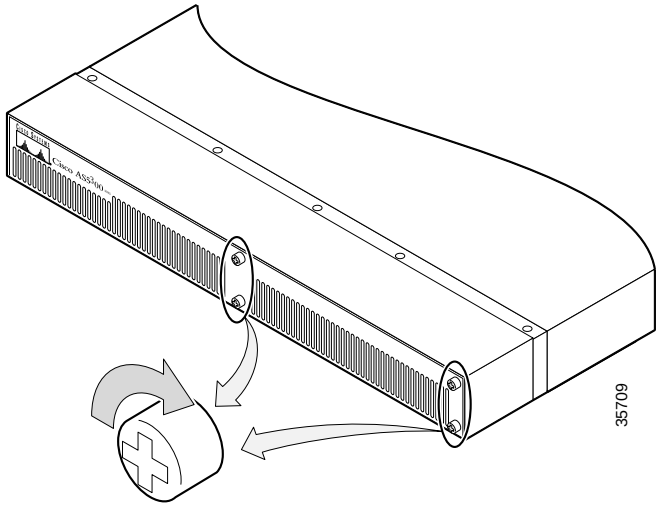
Figure 4-9 Sliding the Fan Tray Power Connector into Receptacle



Step 3 Carefully slide the fan tray connector into its receptacle until the fan tray touches the front panel. (See Figure 4-9.)

Step 4 Tighten the four screws to secure the fan tray to the chassis. (See Figure 4-10.)

Figure 4-10 Tightening Fan Tray Screws



Getting Help

For information about technical support, onsite service, and exchange and repair services, refer to the "Obtaining Technical Assistance" section on page xiv.

Replacing Memory Components

This appendix contains procedures on how to replace memory chips in the Cisco AS5350 field-replaceable units. The appendix contains the following sections:

Removing the Chassis Cover

This section describes how to open the chassis by removing the chassis cover.

Required Tools

You need the following tools:

- Medium Phillips screwdriver
- Small or medium flat-blade screwdriver

Safety Recommendations

Note the following safety recommendations:

Warning **Before opening the chassis, disconnect the telephone-network cables to avoid contact with telephone-network voltages. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Warning **Do not work on the system or connect or disconnect cables during periods of lightning activity. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

NVRAM in the universal gateway uses an internal lithium battery to maintain data. Although this is not a field-serviceable component, we are required to provide the following safety warnings:

Warning **Before working on a system that has an on/off switch, turn OFF the power and unplug the power cord. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Warning **There is the danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Warning **Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Chassis Cover Removal

You must open the universal gateway chassis to gain access to its interior components: boot read-only memory (ROM) software, synchronous dynamic random-access memory, dual in-line memory (SDRAM DIMMs) modules, and Flash memory SIMMs. (When you replace the boot ROM, you must also remove all feature cards in the chassis.)

To remove the chassis cover, follow this procedure:

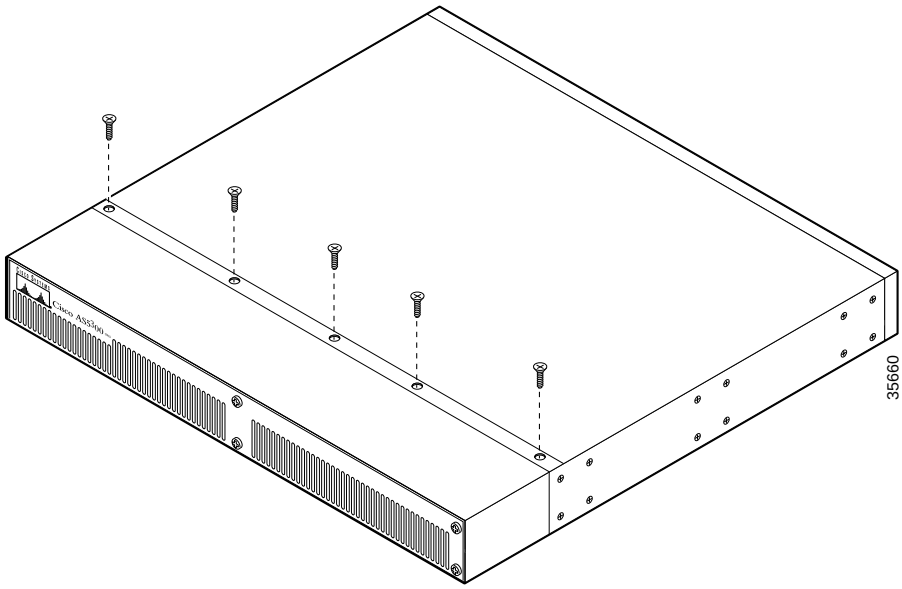
Step 1 Turn the power switch on the universal gateway off and disconnect site power.

Step 2 Remove all interface cables from the rear panel of the universal gateway.

Step 3 Place the gateway so that the front panel is facing you.

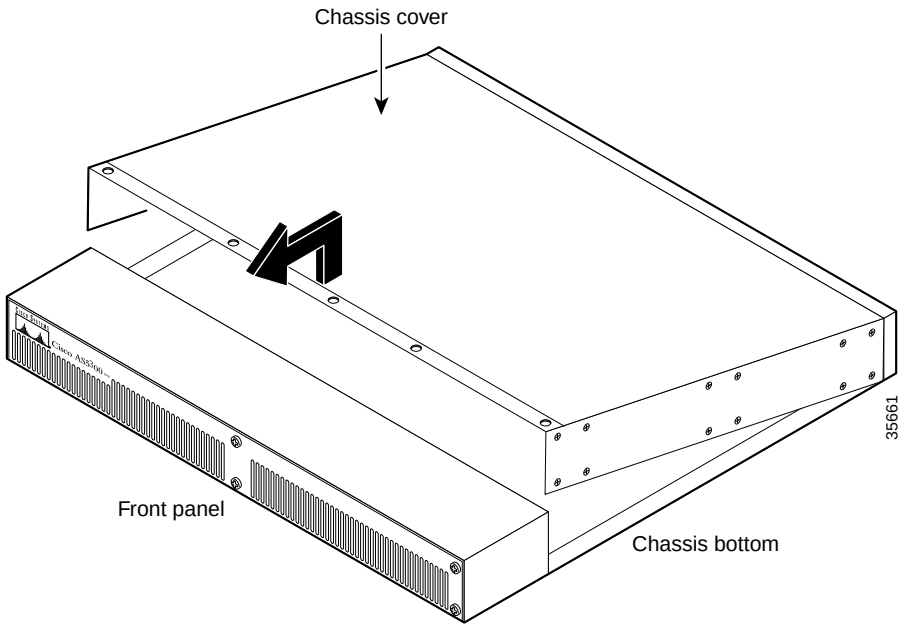
Step 4 Remove the five screws on the chassis cover, as shown in Figure A-1.

Figure A-1 Removing the Chassis Cover Screws



Step 5 Gently pry the cover off with a flat-blade screwdriver. Lift the chassis cover upward, as shown in Figure A-2, and pull it away from the tabs on the rear of the chassis.

Figure A-2 Removing the Chassis Cover



Replacing the Boot ROM

To upgrade the boot ROM software to a new software image, you must replace the existing boot ROM.

Required Tools and Equipment

You will need the following tools and equipment:

- ROM extraction tool
- One boot ROM
- ESD-preventive wrist strap

Boot ROM Replacement

Caution A PLCC-type boot ROM does not have pins that plug into the socket; instead, the contacts are on the sides of the boot ROM and along the inner sides of the socket. Therefore, you cannot use a small flat-blade screwdriver to remove a PLCC-type boot ROM. Forcing a small screwdriver or other tool between the boot ROM and the sides of the socket to pry out the boot ROM will damage the component, the socket, or both.

To replace the boot ROM, follow these steps:

Step 1 Turn the power switch on the universal gateway off and disconnect site power.

Warning **Before opening the chassis, disconnect the telephone-network cables to avoid contact with telephone-network voltages. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Step 2 Remove all interface cables from the rear panel of the universal gateway.

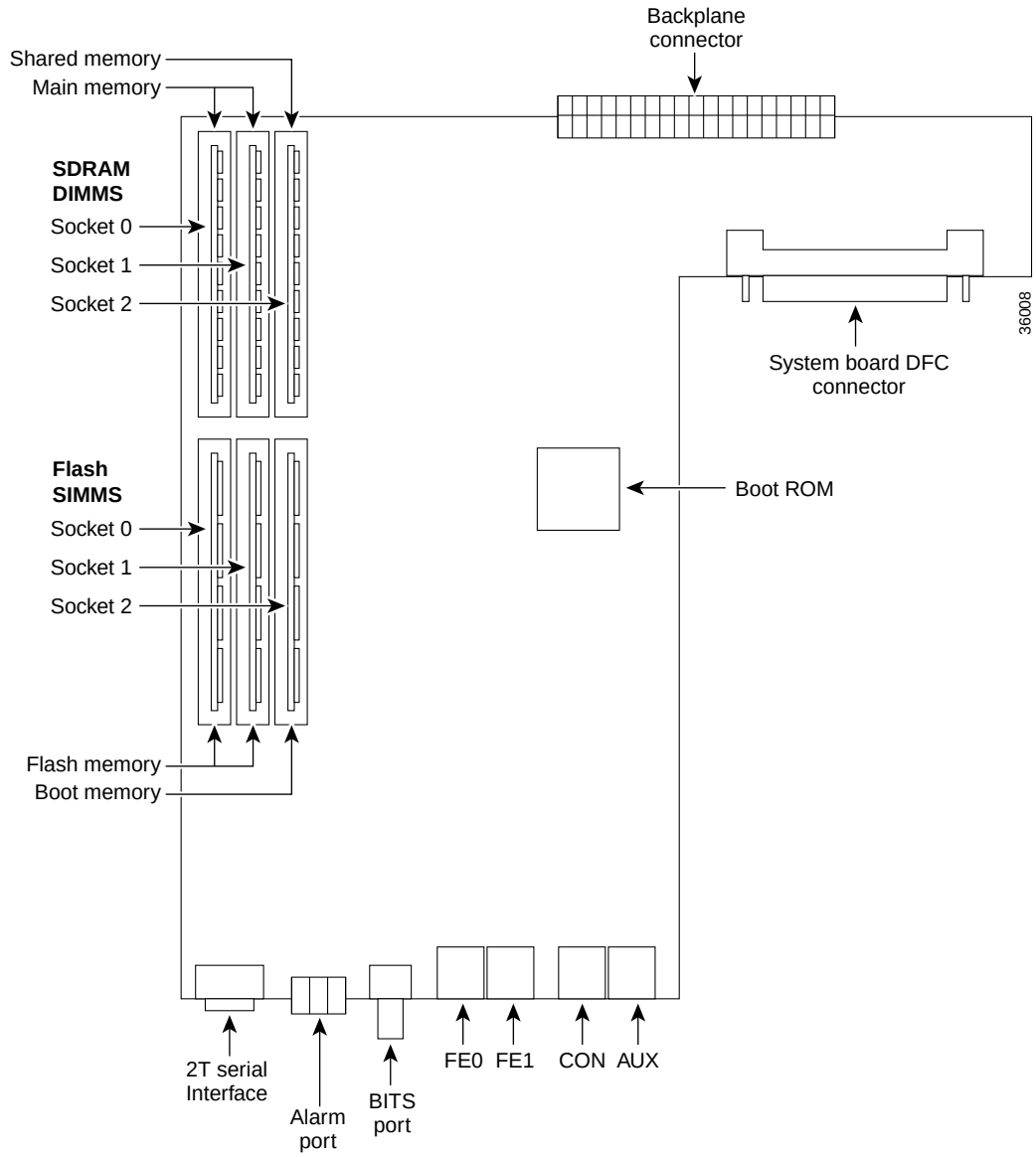
Step 3 Attach an ESD-preventive wrist strap.

Step 4 Remove the chassis cover. (See the instructions in the section “Removing the Chassis Cover” section on page A1.)

Step 5 Remove the carrier card to access the system board. (See the *Cisco AS5350 Universal Gateway Card Installation Guide* for instructions on removing the carrier card. This document is available on Cisco.com and the documentation CD-ROM that comes with your universal gateway. See the “Obtaining Documentation” section on page xiii.)

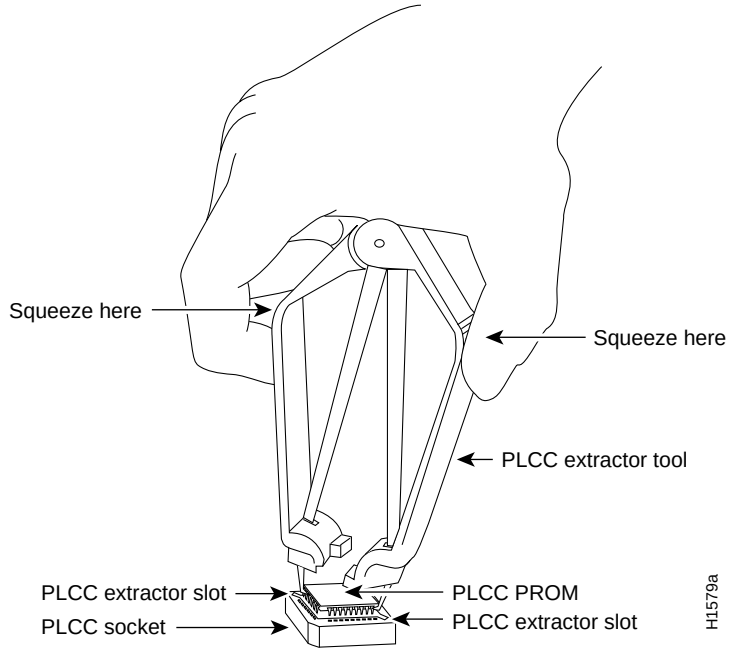
Step 6 Locate the boot ROM on the system board. (See Figure A-3.)

Figure A-3 System Board Layout



Step 7 Gently extract the old ROM with a PLCC-type ROM extraction tool and set the old boot ROM on a nonconducting surface. Do not use excessive force because the socket might break. (See Figure A-4.)

Figure A-4 Extracting Boot ROM



Step 8 Insert the new boot ROM into the socket.

Caution The notch in the ROM must align with the notch in the socket on the system board. If the ROM is installed backwards, damage will occur when the gateway is powered on.

Step 9 Replace the carrier card. (See the *AS5350 Universal Gateway Card Installation Guide* for instructions on installing the carrier card. This document is available on the World Wide Web and the documentation CD-ROM that comes with your gateway. See the "Obtaining Documentation" section on page xiii.)

Step 10 Replace the gateway chassis cover. (See the instructions in the "Replacing the Chassis Cover" section on page A12.)

Step 11 Power on the universal gateway. If error messages relating to memory are displayed, remove the new boot ROM and reinstall it, taking care to seat the ROM firmly in its socket.

Replacing SDRAM DIMMs

This section describes how to replace SDRAM DIMMs on the system board. You might need to upgrade the SDRAM DIMMs for the following reasons:

- You have upgraded to a new Cisco IOS feature set or release that requires more memory.
- You are using very large routing tables or many protocols (for example, when the universal gateway is set up as a connection device between large external networks and your internal network).

The system board contains three sockets for SDRAM DIMMs (see Figure A-3):

- Two sockets hold main memory SDRAM DIMMs. Main memory is used by the CPU to store the operating configuration, routing tables, and queues. The DIMMs can be 128 or 256 MB, and the capacity of the DIMMs in both sockets must match.
  - For main memory, the total capacity is 512 MB (two, 256 MB DIMMs).
- One socket holds a shared memory SDRAM DIMM. Shared memory is used to store incoming and outgoing packets. This DIMM can be 64 or 128 MB.
  - For shared memory, the total capacity is 128 MB (one, 128 MB DIMM).

Required Tools and Equipment

You need the following tools and equipment:

- ESD-preventive wrist strap
- The appropriate SDRAM DIMM(s) for your universal gateway

SDRAM DIMM Replacement

To replace the SDRAMM, follow this procedure:

Step 1 Turn the power switch on the universal gateway off and disconnect site power.

Step 2 Remove all interface cables from the rear panel of the universal gateway.

Warning **Before opening the chassis, disconnect the telephone-network cables to avoid contact with telephone-network voltages. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Step 3 Attach an ESD-preventive wrist strap.

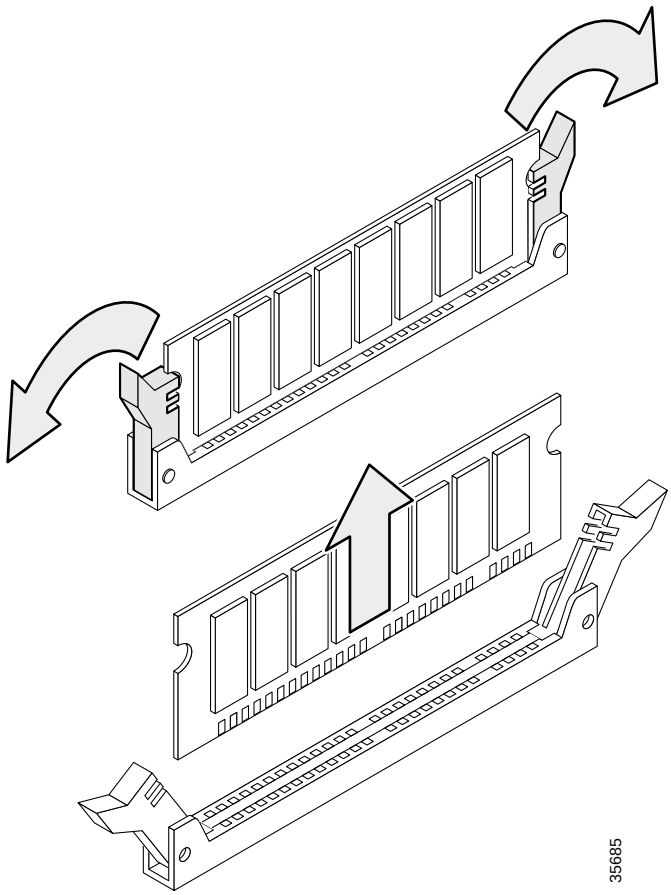
Step 4 Remove the chassis cover. (See the instructions in the “Removing the Chassis Cover” section on page A1.)

Step 5 Use Figure A-3 to locate the DIMM you are replacing.

Step 6 Pull the socket latches away from the DIMM, and then pull the DIMM out of the socket. (See Figure A-5.) The latches hold the DIMM tightly, so be careful not to break the socket.

Caution To prevent damage, do not press on the center of the DIMM. Handle the DIMM carefully.

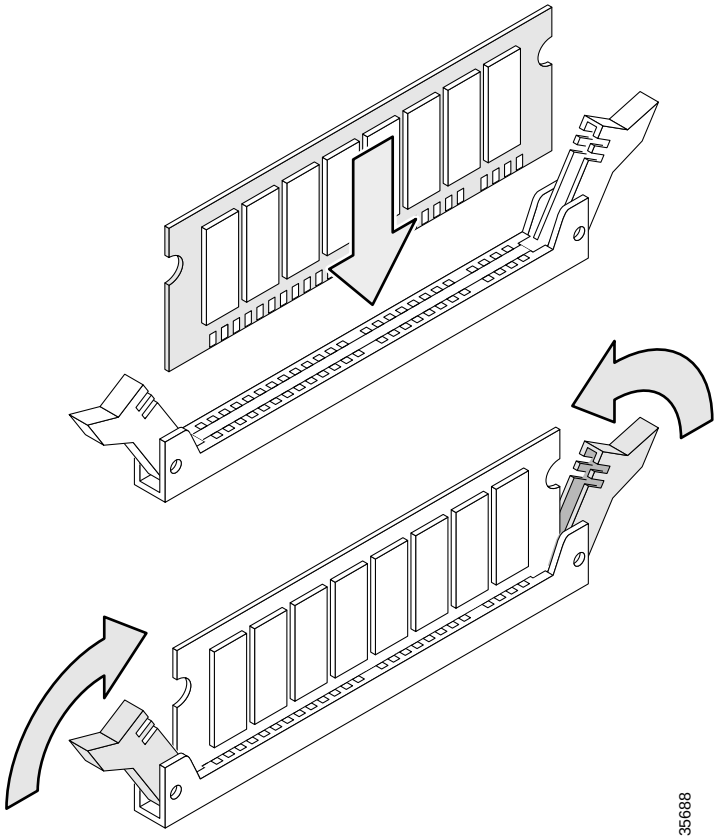
Figure A-5 Removing and Replacing the SDRAM DIMM



Step 7 Position the new DIMM so that the polarization notch is located at the right end of the DIMM socket.

Step 8 Insert the new SDRAM DIMM by sliding the end with the metal fingers into the DIMM socket, as shown in Figure A-6.

Figure A-6 Inserting the New SDRAM DIMM into the Socket



Step 9 Snap the latches into place. Do not use excessive force because the socket might break.

Step 10 Replace the gateway chassis cover. (See the “Replacing the Chassis Cover” section on page A12.)

Step 11 Power on the universal gateway. If error messages relating to memory are displayed, remove the SDRAM DIMM and reinstall it, taking care to seat the DIMM firmly in its socket.

Replacing Flash Memory SIMMs

The system board contains three sockets for 5V Flash memory SIMMs (see Figure A-3):

- The first two Flash memory sockets hold SIMMs containing the Cisco IOS software image. Cisco recommends that you install the first SIMM into the first Flash memory socket. (Socket 0 in Figure A-3.) For future expansion, install the second SIMM in the second Flash memory socket. The SIMMs are 32 MB, and the capacity of both SIMMs must match.
  - For system memory, the total capacity is 64 MB (two, 32 MB SIMMs).

- The third Flash memory socket holds a SIMM for the boot helper image (rxboot) software. The SIMM can be 8 or 16 MB.
  - For boot memory, the total capacity is 16 MB (one, 16 MB SIMM).

The Flash memory SIMMs must be purchased from Cisco. For ordering information, refer to the "Obtaining Technical Assistance" section on page xiv.

Required Tools and Equipment

You need the following tools and equipment:

- ESD-preventive wrist strap
- The appropriate Flash memory SIMM(s) for your universal gateway

Flash Memory SIMM Replacement

To replace the 5V Flash memory SIMMs, follow this procedure:

Step 1 Turn the power switch on the universal gateway off and disconnect site power.

Step 2 Remove all interface cables from the rear panel of the universal gateway.

Step 3 Attach an ESD-preventive wrist strap.

Step 4 Remove the chassis cover. (See the previous procedure in the "Removing the Chassis Cover" section on page A1.)

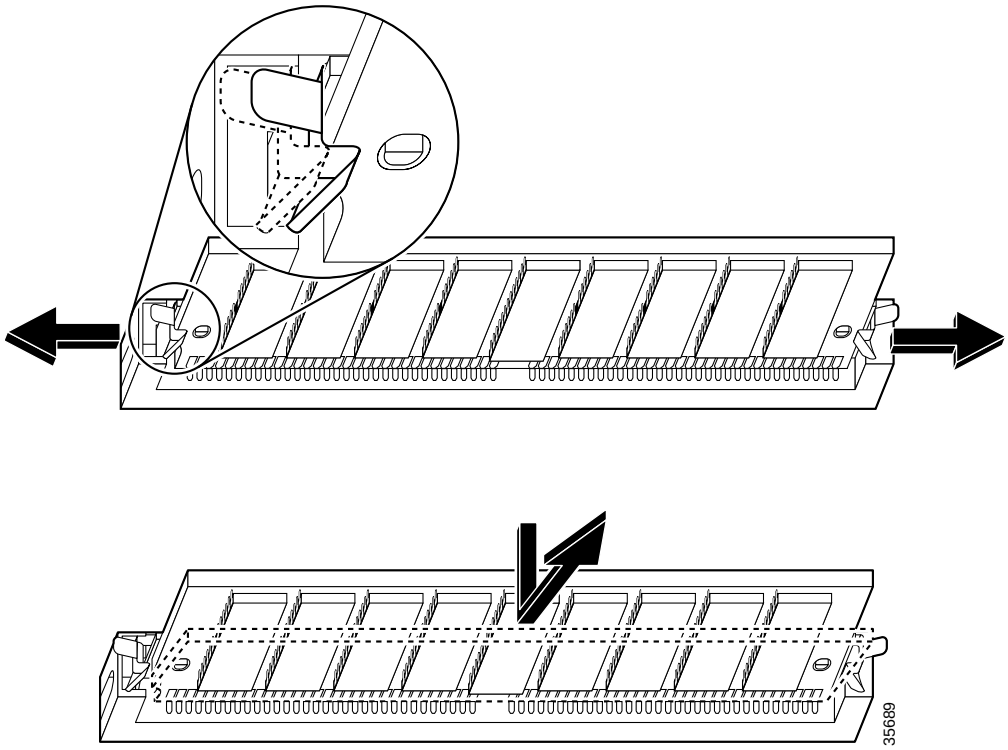
Step 5 Place the chassis so that the system board is oriented as shown in Figure A-3, with the Flash memory SIMMs toward you.

Step 6 Remove the existing Flash memory SIMM by pulling outward on the socket latches and then lifting the SIMM out of the socket (see Figure A-7).

Caution To prevent damage, do not press on the center of the SIMMs. Handle each SIMM carefully.

Step 7 Repeat these steps for all the Flash memory SIMMs that you need to replace.

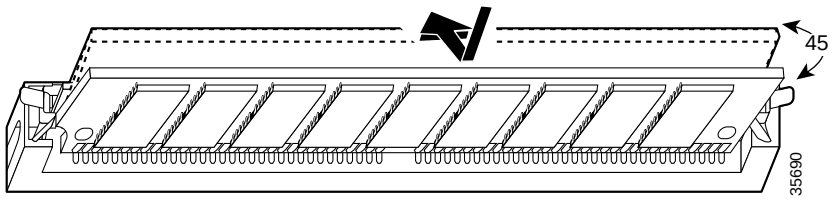
Figure A-7 Removing the Flash Memory SIMM



Caution Some Flash memory SIMMs have the components mounted on the rear side. To prevent damage when you insert the SIMM, always use the polarization notch as a reference, *not* the position of the components on the SIMM.

Step 8 Insert the new SIMM by sliding the end with the metal fingers into the appropriate SIMM socket at approximately a 45-degree angle to the system board as shown in Figure A-8.

Figure A-8 Inserting the Flash Memory SIMM



Step 9 Gently rotate the SIMM until the latch on either side snaps into place. Do not use excessive force because the connector might break. When inserting the new SIMM, make sure that the polarization notch is located at the right end of the SIMM socket.

Step 10 Replace the gateway chassis cover. (See the instructions in the following section “Replacing the Chassis Cover.”)

Step 11 Connect the gateway to a console terminal.

Step 12 Power on the universal gateway. If any memory-related error messages appear, remove the Flash memory SIMM and reinstall it, taking care to seat the SIMM firmly in the socket.

Replacing the Chassis Cover

This section describes the procedure for replacing the chassis cover.

Required Tools and Equipment

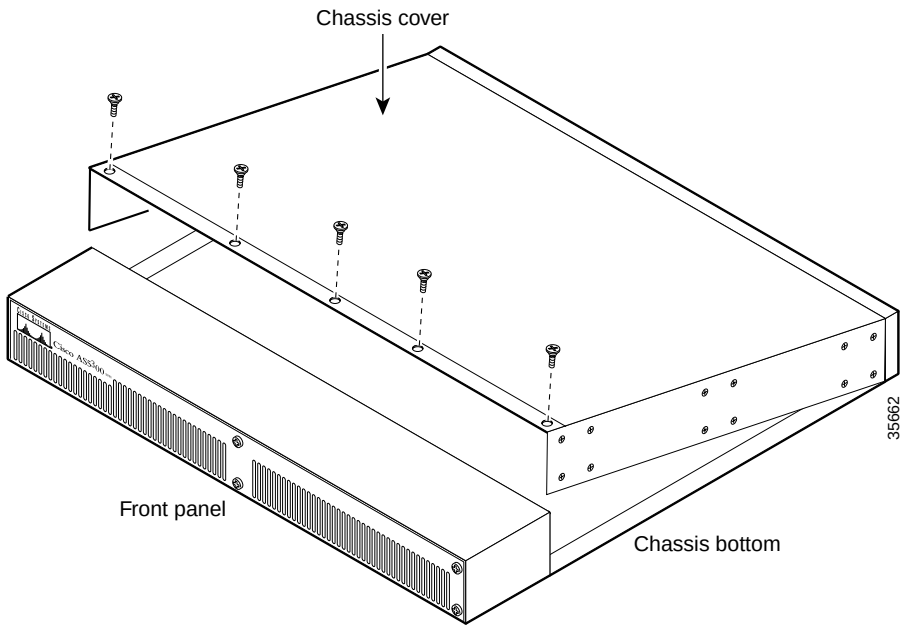
- Medium Phillips screwdriver
- Five screws

Chassis Cover Replacement

To replace the chassis cover, follow this procedure:

Step 1 Place the chassis bottom so that the front panel is facing you. (See Figure A-9.)

Figure A-9 Replacing the Chassis Cover



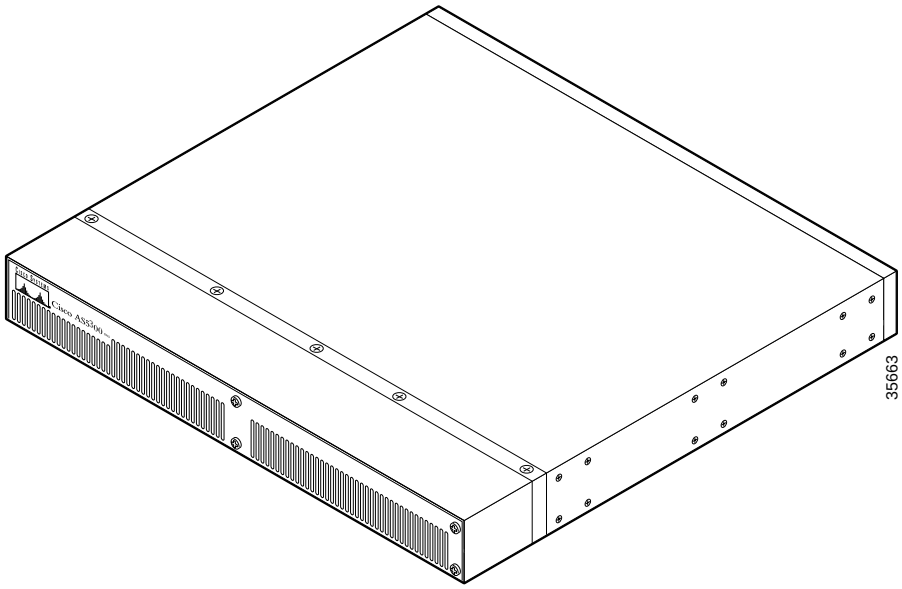
Step 2 Hold the chassis cover over the chassis bottom, and align each of the cover tabs with the chassis tabs at the top rear of the chassis.

Step 3 Lower the front of the top cover to close the chassis, and ensure the following:

- The chassis cover tabs fit under the edge of the chassis rear panel so that they are not exposed.
- The chassis tabs fit under the chassis cover so that they are not exposed.
- The chassis cover side tabs on both sides fit inside the chassis side panels so that they are not exposed.

When the chassis cover is properly assembled, no tabs are visible. (See Figure A-10.)

Figure A-10 Cisco AS5350 Chassis



Step 4 Secure the chassis cover with five screws.

Step 5 Reinstall the chassis on a rack, desktop, or table.

Step 6 Reinstall all interface cables.

Step 7 Reconnect the AC power cord to the power supply. Power on the universal gateway.

The internal power supply fan should power on.

Replacing the Power Supply

This appendix includes information on how to replace the power supply for the Cisco AS5350 and contains the following sections:

Overview

The Cisco AS5350 universal gateway can have a single AC or DC power supply or a redundant AC or DC power supply.

Note The redundant power supply is supported in Cisco IOS Release 12.2(2)XB5 or later releases.

Safety Recommendations

Note the following safety recommendations:

Warning **Before opening the chassis, disconnect the telephone-network cables to avoid contact with telephone-network voltages. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Warning **Do not work on the system or connect or disconnect cables during periods of lightning activity. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Warning **Before working on a system that has an on/off switch, turn OFF the power and unplug the power cord. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Warning **Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Warning **Only trained and qualified service personnel should be allowed to install or replace this equipment. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Warning **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. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Caution Before opening the chassis, ensure that you have discharged all static electricity from your body and be sure that the power is off.

Required Tools and Equipment

You need the following tools and equipment:

- Medium-size Phillips screwdriver
- Small or medium flat-blade screwdriver
- ESD-preventive wrist strap
- Tie-wraps (optional)
- Antistatic bag (optional)

Removing the Chassis Cover

You must open the universal gateway chassis to gain access to its interior components.

To open the chassis cover, follow this procedure:

Step 1 Turn the power switch on the universal gateway off and disconnect site power.

Note Note that the power switch is part of the power supply.

Note If you are using a DC-powered unit, refer to Figure B-1 or Figure B-2 and complete the Step a through Step d.

Warning **Before performing any of the following procedures, 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. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Figure B-1 DC Power Supply Connections—Single Power Supply

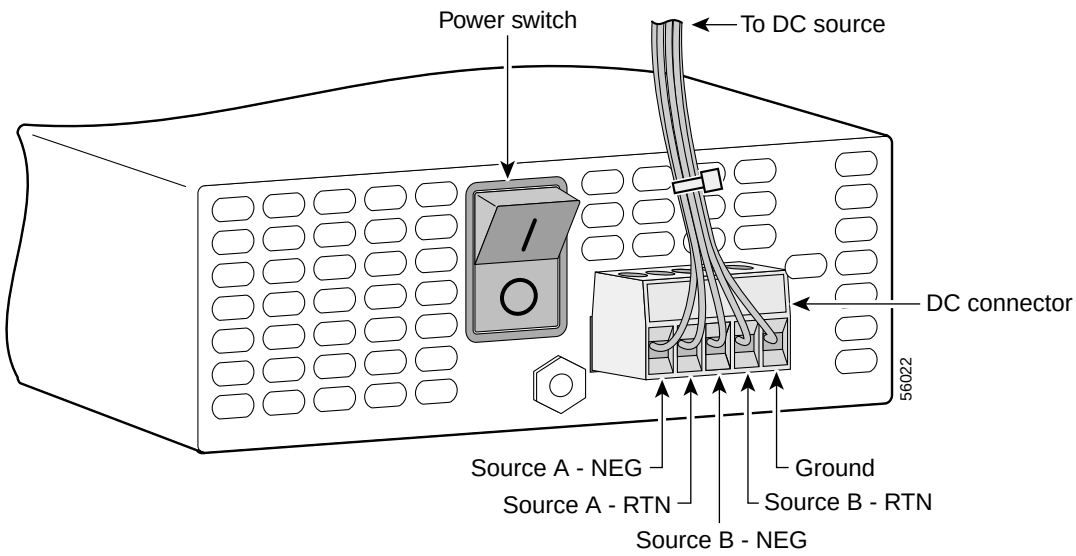
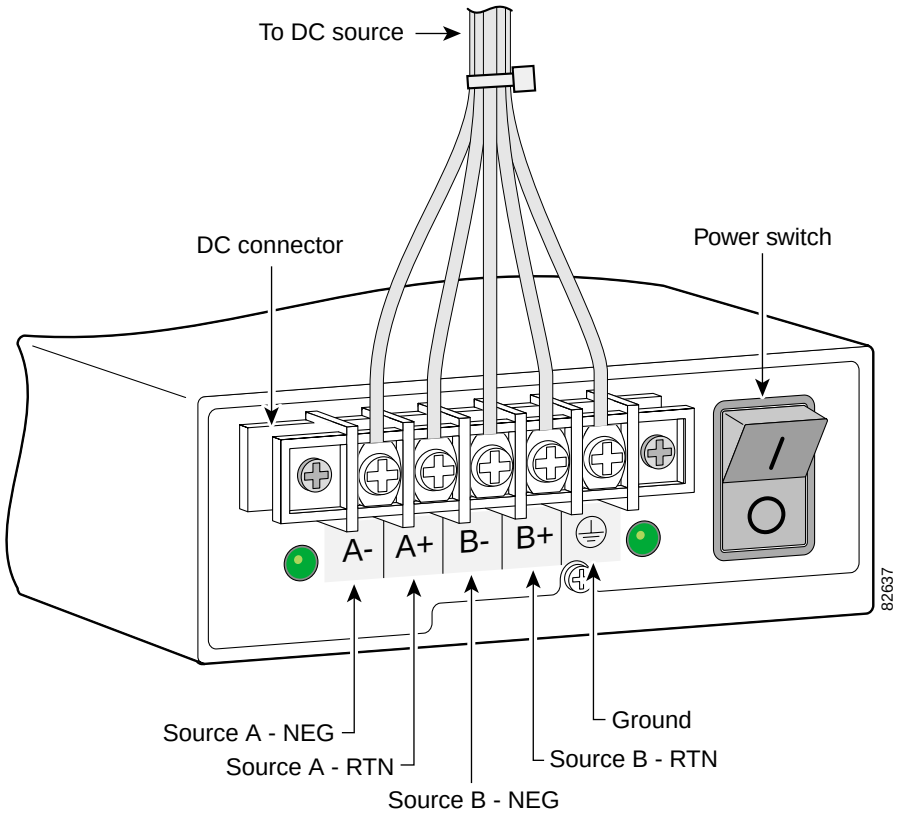


Figure B-2 DC Power Supply Connections—Redundant Power Supply



a. Loosen the five locking screws for the negative, return, and ground connectors on the DC connector.

b. Remove the +48 VDC return wires from the DC connectors.

c. Remove the -48 VDC wires into the DC negative connectors.

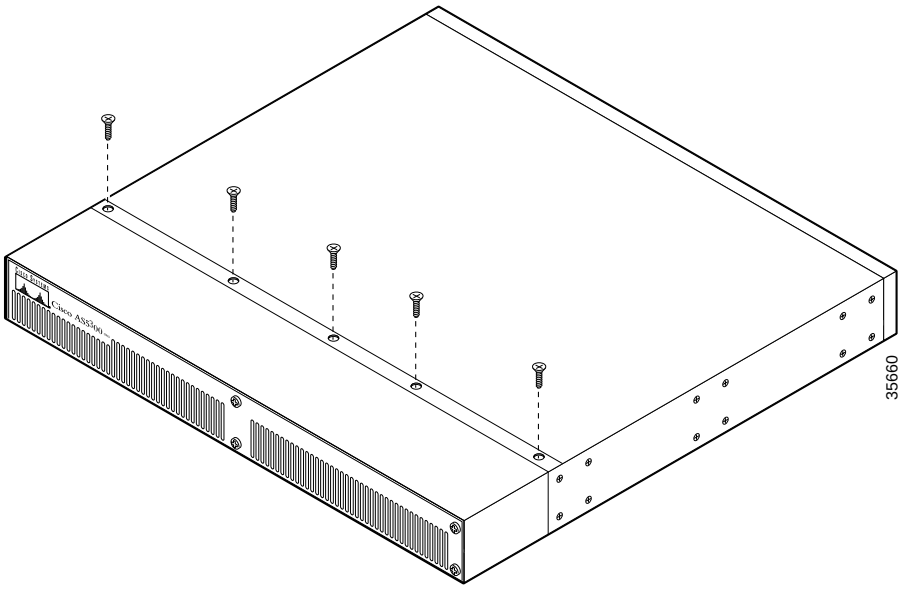
d. Remove the safety ground wire from the DC connector.

Step 2 Remove all interface cables from the rear panel of the universal gateway.

Step 3 Place the universal gateway so that the front panel is facing you.

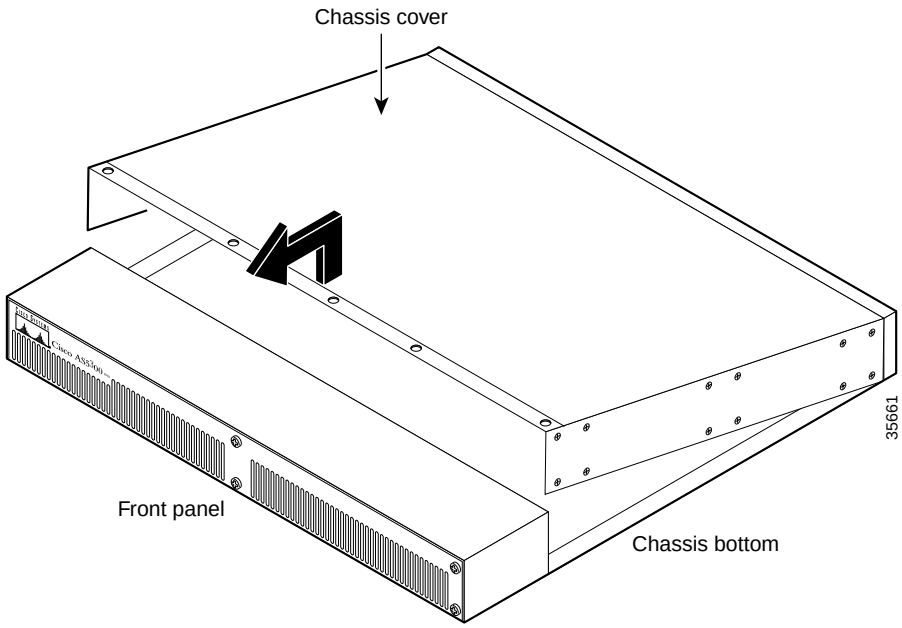
Step 4 Remove the five screws on the chassis cover. (See Figure B-3.)

Figure B-3 Removing the Chassis Cover Screws



Step 5 Gently pry the cover off with a flat-blade screwdriver. Lift the chassis cover upward, as shown in Figure B-4, and pull it away from the tabs on the rear of the chassis.

Figure B-4 Removing the Chassis Cover



Step 6 Continue with the "Removing the Old Power Supply" section on page B-6.

Removing the Old Power Supply

This section describes how to remove the power supply. Note the following safety warnings before you remove the power supply:

Warning **Ultimate disposal of this product should be handled according to all national laws and regulations. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Warning **Only trained and qualified personnel should be allowed to install or replace this equipment. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Warning **Read the installation instructions before you connect the system to its power source. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Warning **Before working on a system that has an on/off switch, turn OFF the power and unplug the power cord. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Warning **Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

To remove the power supply, follow this procedure:

Step 1 Place the universal gateway so that the rear panel is facing you.

Step 2 Remove the mounting screw that secures the power supply to the chassis and set it aside. (See Figure B-5 or Figure B-6.)

Note Although the following illustrations show only the AC power supply, the procedures are the same for the DC power supply.

Figure B-5 Removing the Mounting Screw on the Single AC Power Supply

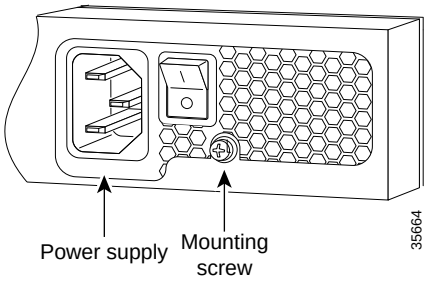
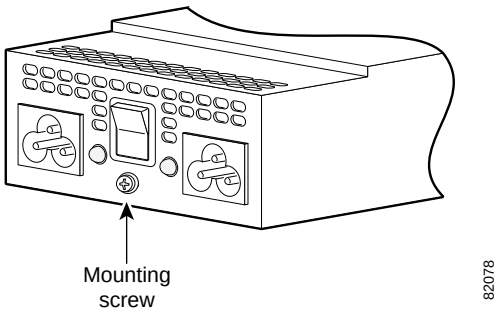


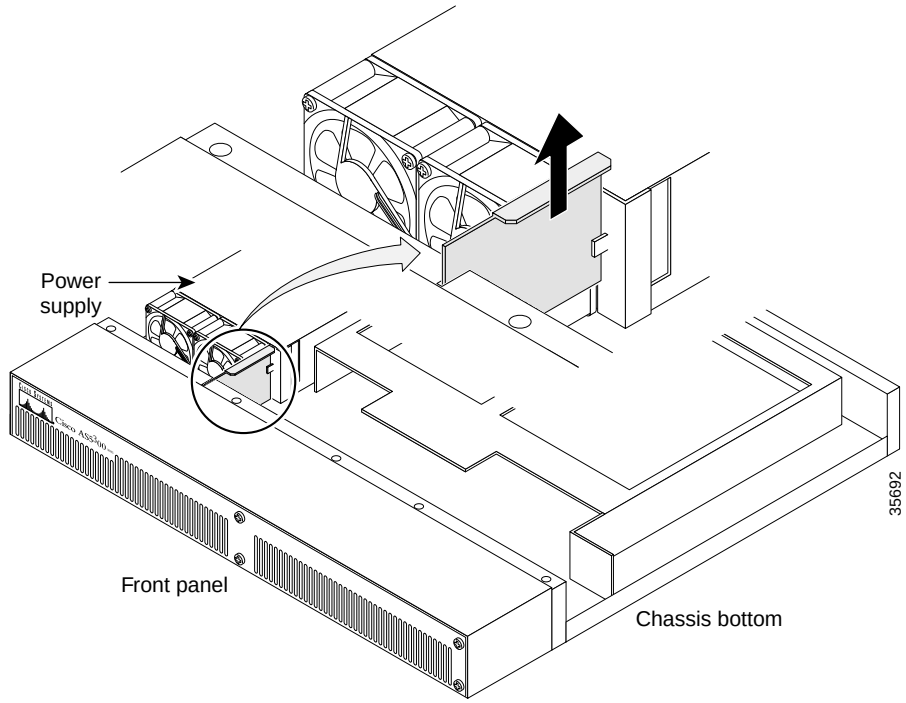
Figure B-6 Removing the Mounting Screw on the Redundant AC Power Supply



Step 3 Turn the universal gateway so that the front panel is facing you.

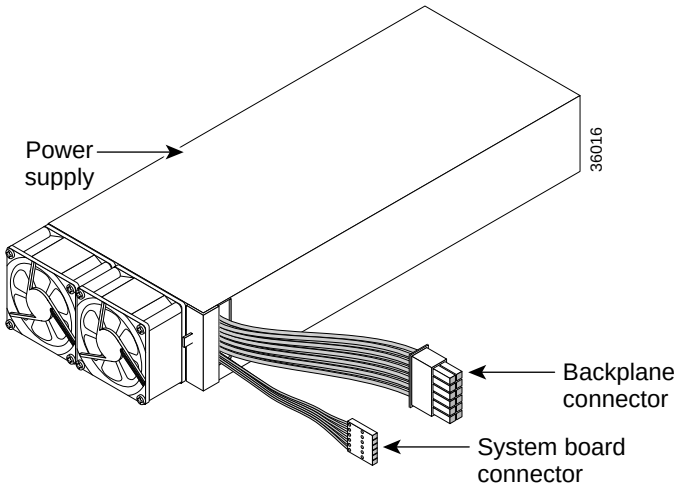
Step 4 Lift the air separator out of the chassis. (See Figure B-7.)

Figure B-7 Removing the Air Separator



Note There are two power connectors on the power supply. One connects to the backplane and the other to the system board. (See Figure B-8.)

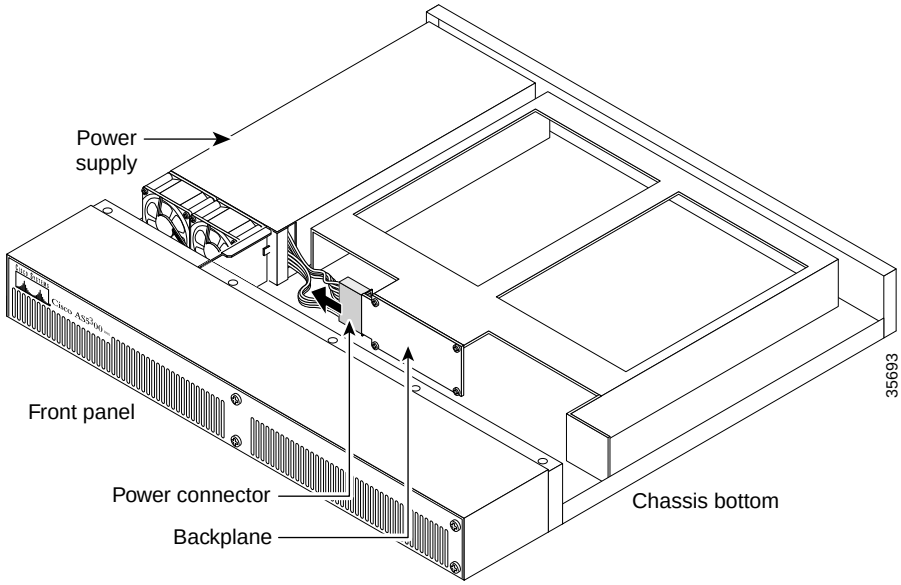
Figure B-8 Power Supply Connectors



Step 5 Disconnect both power supply connectors. Disconnect the backplane connector first, followed by the system board connector. (See Figure B-9.)

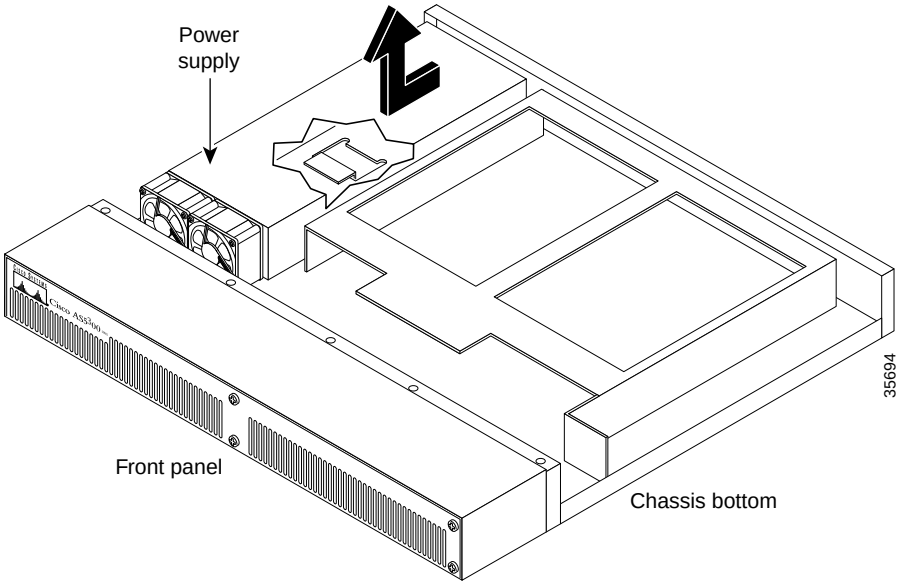
Note The system board connector is located on the system board, below and left of the backplane connector.

Figure B-9 Disconnecting the Power Connectors from the Backplane



Step 6 Slide the power supply toward the front panel to disengage the power supply from the chassis hooks. (See Figure B-10.) Remove the power supply from the chassis.

Figure B-10 Lifting the Power Supply Out of the Chassis

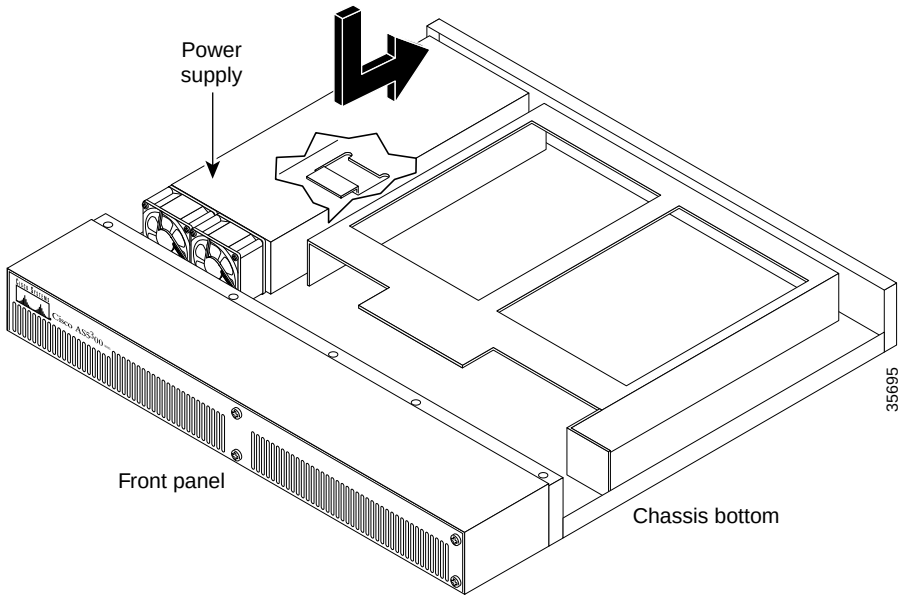


Installing the Power Supply

To install the power supply, follow this procedure:

Step 1 Place the power supply as shown in Figure B-11, then slide it toward the rear panel. You will be able to feel the chassis hooks engage with the slots on the bottom of the power supply. The same procedure applies to both the AC and DC power supplies.

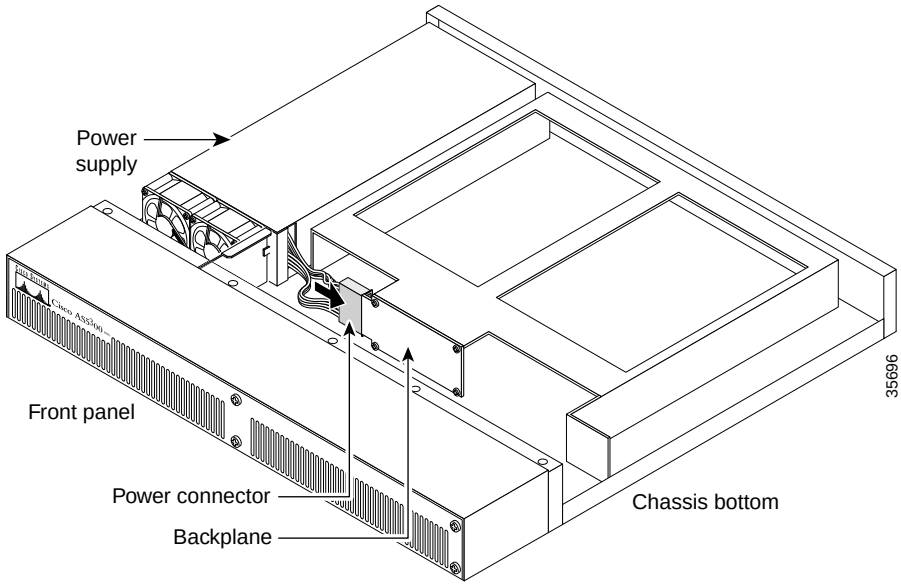
Figure B-11 Inserting the Power Supply in the Chassis



Step 2 Connect the two power connectors to the system board and backplane. (See Figure B-8.) Connect the system board connector first, followed by the backplane connector. (See Figure B-12.)

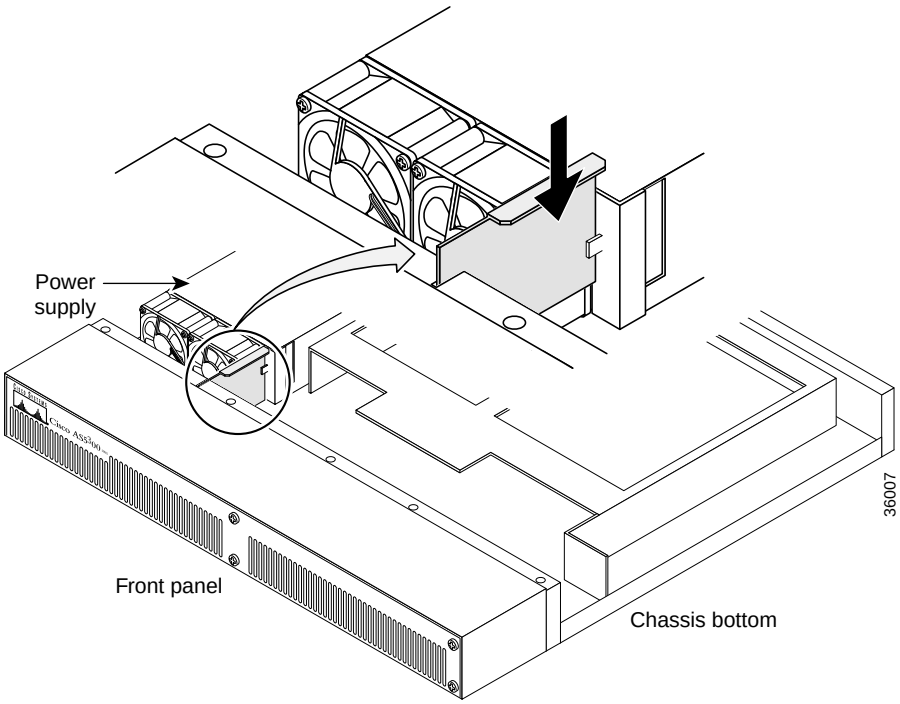
Note The system board connector is located on the system board, below and left of the backplane connector.

Figure B-12 Reconnecting the Power Cables to the Backplane



Step 3 Replace the air separator, holding all cables to the right of the separator as you slip it into the chassis. (See Figure B-13.)

Figure B-13 Replacing the Air Separator



Step 4 Reinstall the power supply mounting screw.

Step 5 Replace the chassis cover using the procedures in the “Replacing the Chassis Cover” section on page B-12.

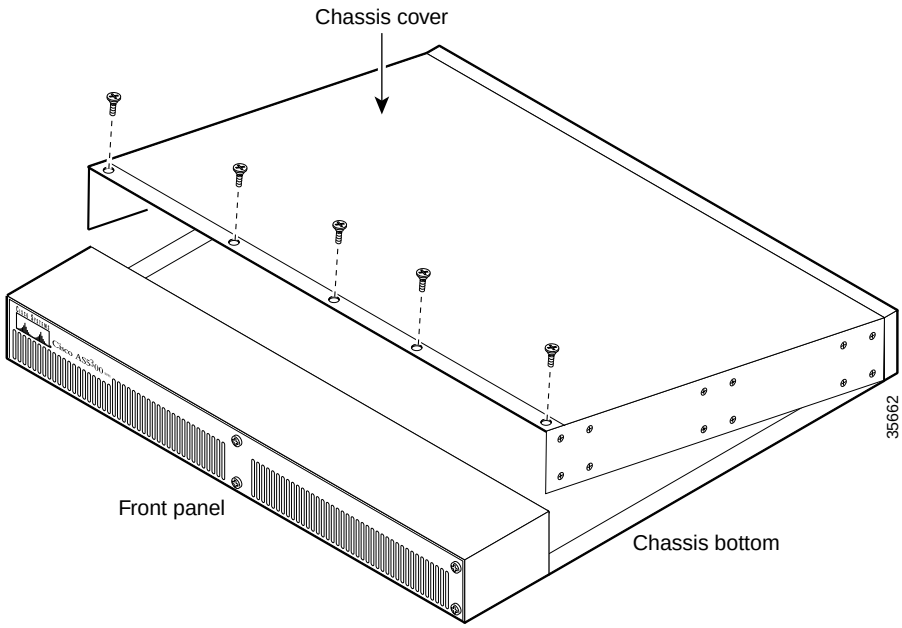
Replacing the Chassis Cover

To replace the chassis cover, follow this procedure:

Step 1 Place the chassis bottom so that the front panel is facing you.

Step 2 Hold the chassis cover over the chassis bottom, and align each of the cover tabs with the chassis tabs at the top rear of the chassis, as shown in Figure B-14.

Figure B-14 Replacing the Chassis Cover



Step 3 Lower the front of the top cover to close the chassis, and ensure the following:

- The chassis cover tabs fit under the edge of the chassis rear panel so that they are not exposed.
- The chassis tabs fit under the chassis cover so that they are not exposed.
- The chassis cover side tabs on both sides fit inside the chassis side panels so that they are not exposed.

When the chassis cover is properly assembled, no tabs are visible.

Step 4 Secure the chassis cover with five screws.

Step 5 If you installed a different type of power supply (AC or DC) than was originally installed in the universal gateway, place one of the power ratings labels that came in the plastic bag with the documentation directly over the power ratings information on the rear panel. For example, if the original chassis came with an AC power supply and you replaced it with a DC power supply, place the DC power ratings label over the ratings stamped on the rear panel of the chassis. This will ensure that the correct power ratings information appears on the rear panel. (See Figure B-15 and Figure B-16.)

Figure B-15 Power Ratings Label for DC Power Supply

INPUT -48/-60V == 3A 150VA

Figure B-16 Power Ratings Label for AC Power Supply

INPUT 100 – 240V~ 50/60Hz 2 – 1A

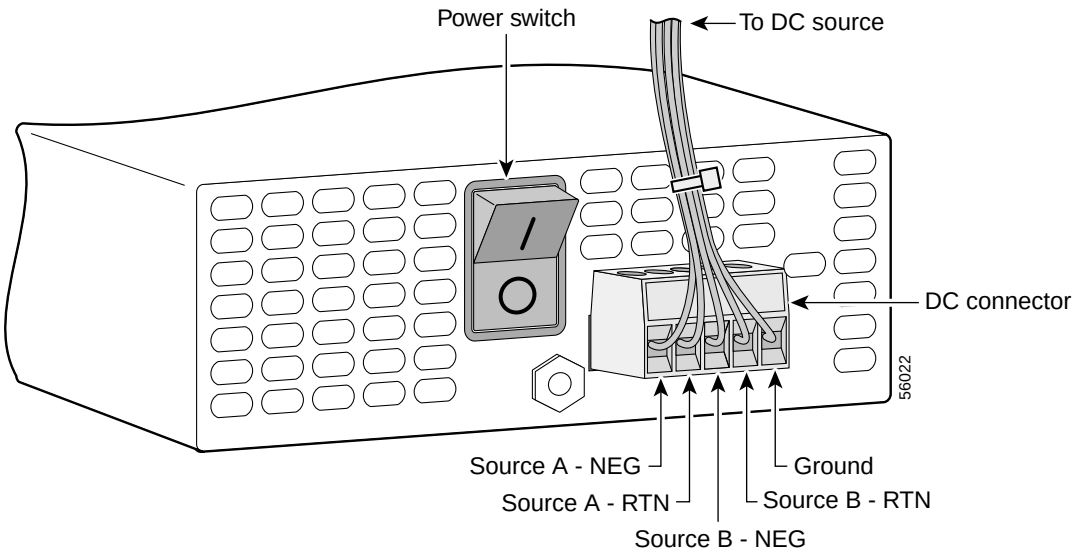
Step 6 Reinstall the chassis on a rack, desktop, or table.

Step 7 Reinstall all interface cables.

Step 8 Reconnect the AC power cord. Or, if you are using a DC-powered unit, refer to Figure B-17 or Figure B-18, and complete the steps appropriate for each power supply.

Warning **The illustration shows the DC power supply terminal block. Wire the DC power supply using the appropriate wire terminations at the wiring end, as illustrated. The proper wiring sequence is ground to ground, return to return, and negative to negative. Note that the ground wire should always be connected first and disconnected last. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

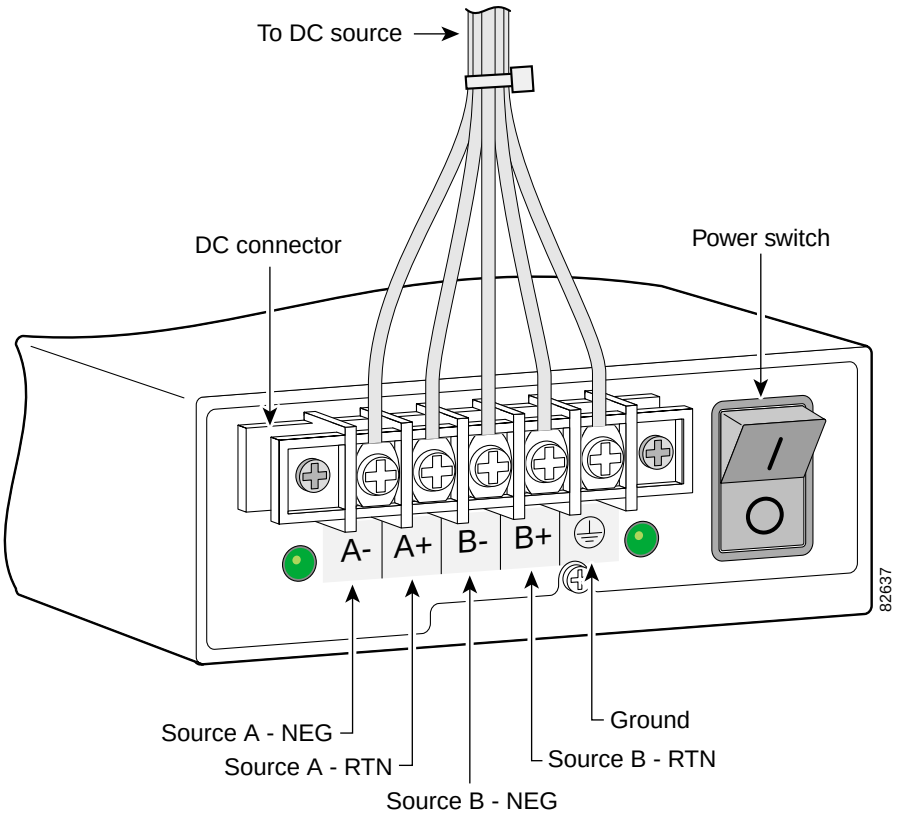
Figure B-17 Connecting DC Power Supply—Single Power Supply



a. Connect the DC connector to the rear of the power supply.

Caution Do not overtorque the terminal block contact screws. The recommended torque is 4.5 lb-in (0.50 N-m).

Figure B-18 Connecting DC Power Supply—Redundant Power Supply



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

Note For central office installations, it is recommended to use a 6 AWG green ground wire with one end connected to reliable earth. 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 the side of the chassis with the two screws included in the accessory pack.

Note If you are installing a redundant power supply, you should attach appropriate sized spade terminals to the stripped ends of the ground and input wires.

a. Insert the safety ground (green wires) into the DC connector ground connector and tighten the locking screw. Ensure that no bare wire is exposed.

b. Insert the +48 VDC return wires into the DC connectors (+) and tighten the locking screws. Ensure that no bare wire is exposed.

c. Insert the -48 VDC wires into the DC negative connectors (-) and tighten the locking screws. Ensure that no bare wire is exposed.

d. Make sure that the power supply wires are secured to cable strain-relief clamps with cable ties.

Warning **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. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Step 9 Power on the universal gateway.

The internal power supply fan should power on.

Cabling Specifications

This appendix provides the following cabling and pinout information for the Cisco AS5350 universal gateway:

Note This appendix provides cabling information for chassis connections only. For cabling information for the Cisco AS5350 dial feature cards, see the *Cisco AS5350 Universal Gateway Card Installation Guide*.

Note This appendix specifies pinouts only for the pins used. Pins not listed in the tables in this appendix are not connected.

Console and Auxiliary Port Cables and Pinouts

The universal gateway arrives with a console and auxiliary cable kit, which contains the cable and adapters you need to connect a console (an ASCII terminal or PC running terminal emulation software) or modem to your universal gateway. The console and auxiliary cable kit includes:

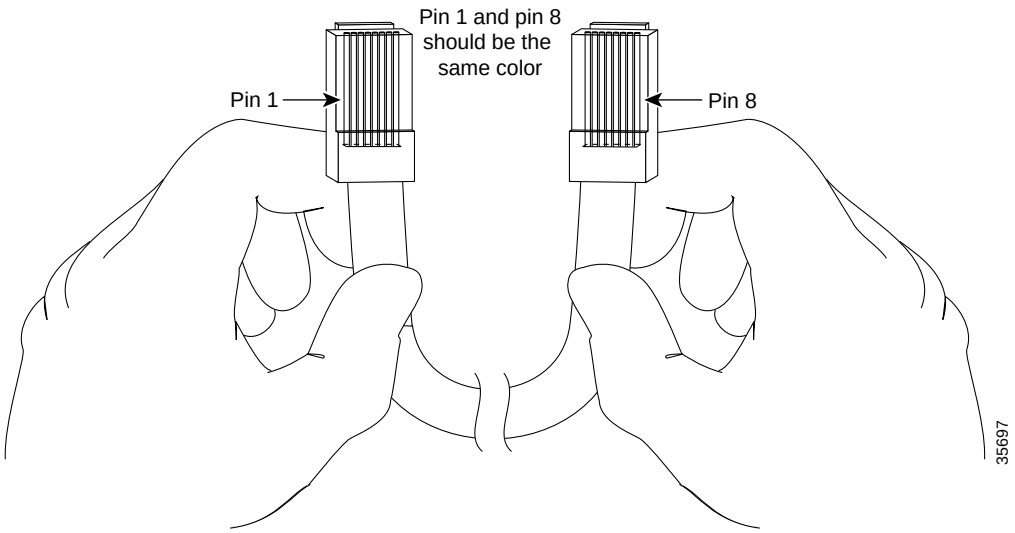
- RJ-45-to-RJ-45 rollover cable (See the next section, “Identifying a Rollover Cable,” for more information).
- RJ-45-to-DB-9 female DTE adapter (labeled TERMINAL).
- RJ-45-to-DB-25 female DTE adapter (labeled TERMINAL).
- RJ-45-to-DB-25 male DCE adapter (labeled MODEM).

For console connections, proceed to the “Console Port Cables and Pinouts” section on page C-2. For modem connections, proceed to the “Auxiliary Port Cables and Pinouts” section on page C-4.

Identifying a Rollover Cable

You can identify a rollover cable by comparing the two modular ends of the cable. Holding the cables side-by-side, with the tab at the back, the wire connected to the pin on the outside of the left plug should be the same color as the wire connected to the pin on the outside of the right plug. (See Figure C-1.) If your cable was purchased from Cisco Systems, pin 1 will be white on one connector, and pin 8 will be white on the other connector (a rollover cable reverses pins 1 and 8, 2 and 7, 3 and 6, and 4 and 5).

Figure C-1 Identifying a Rollover Cable



Console Port Cables and Pinouts

Use the RJ-45-to-RJ-45 rollover cable and RJ-45-to-DB-9 female DTE adapter (labeled TERMINAL) to connect the console port to a PC running terminal emulation software. Figure C-2 shows how to connect the console port to a PC. Table C-1 lists the pinouts for the asynchronous serial console port, the RJ-45-to-RJ-45 rollover cable, and the RJ-45-to-DB-9 female DTE adapter (labeled TERMINAL).

Figure C-2 Connecting the Console Port to a PC

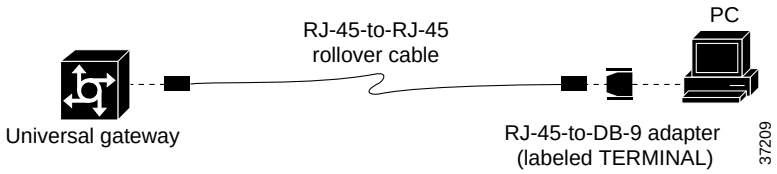


Table C-1 Console Port Signaling and Cabling Using a DB-9 Adapter

Console Port (DTE)	RJ-45-to-RJ-45 Rollover Cable		RJ-45-to-DB-9 Terminal Adapter	Console Device
Signal	**RJ-45 Pin**	**RJ-45 Pin**	**DB-9 Pin**	**Signal**
RTS	1[1]	8	8	CTS
DTR	2	7	6	DSR
TxD	3	6	2	RxD
GND	4	5	5	GND
GND	5	4	5	GND
RxD	6	3	3	TxD
DSR	7	2	4	DTR
CTS	8[1]	1	7	RTS

1. Pin 1 is connected internally to pin 8.

Use the RJ-45-to-RJ-45 rollover cable and RJ-45-to-DB-25 female DTE adapter (labeled TERMINAL) to connect the console port to a terminal. Figure C-3 shows how to connect the console port to a terminal. Table C-2 lists the pinouts for the asynchronous serial console port, the RJ-45-to-RJ-45 rollover cable, and the RJ-45-to-DB-25 female DTE adapter (labeled TERMINAL).

Figure C-3 Connecting the Console Port to a Terminal

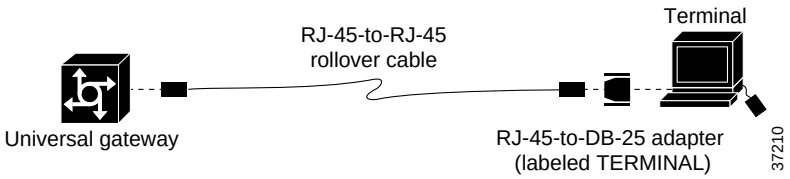


Table C-2 Console Port Signaling and Cabling Using a DB-25 Adapter

Console Port (DTE)[1]	RJ-45-to-RJ-45 Rollover Cable		RJ-45-to-DB-25 Terminal Adapter	Console Device
Signal	**RJ-45 Pin**	**RJ-45 Pin**	**DB-25 Pin**	**Signal**
RTS	1[2]	8	5	CTS
DTR	2	7	6	DSR
TxD	3	6	3	RxD
GND	4	5	7	GND
GND	5	4	7	GND
RxD	6	3	2	TxD
DSR	7	2	20	DTR
CTS	8[1]	1	4	RTS

1. You can use the same cabling to connect a console to the auxiliary port.
2. Pin 1 is connected internally to pin 8.

Auxiliary Port Cables and Pinouts

Use the RJ-45-to-RJ-45 rollover cable and RJ-45-to-DB-25 male DCE adapter (labeled MODEM) to connect the auxiliary port to a modem. Figure C-4 shows how to connect the auxiliary port to a modem. Table C-3 lists the pinouts for the asynchronous serial auxiliary port, the RJ-45-to-RJ-45 rollover cable, and the RJ-45-to-DB-25 male DCE adapter (labeled MODEM).

Figure C-4 Connecting the Auxiliary Port to a Modem

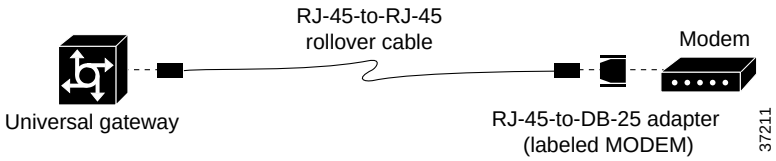


Table C-3 Auxiliary Port Signaling and Cabling Using a DB-25 Adapter

AUX Port (DTE)	RJ-45-to-RJ-45 Rollover Cable		RJ-45-to-DB-25 Modem Adapter	Modem
Signal	**RJ-45 Pin**	**RJ-45 Pin**	**DB-25 Pin**	**Signal**
RTS	1	8	4	RTS
DTR	2	7	20	DTR
TxD	3	6	3	TxD
GND	4	5	7	GND
GND	5	4	7	GND
RxD	6	3	2	RxD
DSR	7	2	8	DCD
CTS	8	1	5	CTS

Ethernet Port Pinouts

Table C-4 lists the pinouts for the Ethernet ports.

Table C-4 10/100BASE-T Port Pinouts

RJ-45 Pin	Description
1	TXD+
2	TXD–
3	RXD+
4	–
5	–
6	RXD–
7	–
8	–

BITS Port Pinouts

Table C-5 BITS Port Pinouts

Pin	Description
1	BITS signal
2	Ground

Alarm Port Pinouts

Table C-6 Alarm Port Pinouts

Pin	Description
1	Normally open
2	Pole
3	Normally closed

Bantam Jack Port Pinouts

Table C-7 Bantam Jack Port Pinouts

Pin	Description
1	Tip
2	Ring

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