CISCO SYSTEMS

Cisco 3600 Series Routers
Hardware Installation Guide

Corporate Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
http://www.cisco.com
Tel: 408 526-4000
       800 553-NETS (6387)
Fax: 408 526-4100

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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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Preface

This preface discusses the objectives, audience, organization, and conventions of this hardware installation guide, and points to related documents that have information beyond the scope of this document. It contains the following sections:

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Objectives

This guide explains how to install, maintain, and troubleshoot your router hardware. It also includes instructions for the router ROM monitor and configuration register.

Although this guide provides minimum software configuration information, it is not comprehensive. For detailed software configuration information, refer to the *Software Configuration Guide for Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Routers* and to the Cisco IOS configuration guide and command reference publications. These publications are available online and on the Cisco Documentation CD-ROM. See the "Obtaining Documentation" section on page xvii for more information.

This guide describes several router models that are similar in functionality, but differ in the number of interfaces supported. Some information provided may not apply to your particular router model.

To access the warranty, service, and support information, see the "Cisco 90-Day Limited Hardware Warranty Terms" section on page xvi.

Audience

This guide is designed for the person installing, configuring, and maintaining the router, who should be familiar with electronic circuitry and wiring practices and has experience as an electronic or electromechanical technician. It identifies certain procedures that should be performed only by trained and qualified personnel.

Organization

Table 1 lists the major sections of this hardware installation guide.

Table 1   Document Organization

Chapter	Title	Description
Chapter 1	Overview of Cisco 3600 Series Routers	Discusses the features and specifications of the routers.
Chapter 2	Preparing to Install the Router	Describes safety recommendations, site requirements, network connection considerations, and required tools and equipment; includes the installation checklist.
Chapter 3	Installing the Router	Includes router installation information and shows how to connect to the router console, auxiliary, and network ports.
Appendix A	Troubleshooting	Describes how to isolate problems, read LEDs, interpret error and status messages, recover an enable password, and recover software images.
Appendix B	Using the ROM Monitor	Describes the ROM monitor (bootstrap program).
Appendix C	Configuration Register	Describes the configuration register settings, factory default settings, and procedures for changing these settings.

Conventions

This guide uses the conventions listed in Table 2 to convey instructions and information.

Table 2   Document Conventions

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, such as passwords, appear in angle brackets in environments where *italic font* is not available.
[ ]	Default responses to system prompts appear in square brackets.

Note Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the manual.

Timesaver Means *the described action saves time*. You can save time by performing the action described in the paragraph.

Tip 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.

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

Safety Warnings

Safety warnings appear throughout this publication in procedures that, if performed incorrectly, may harm you. A warning symbol precedes each warning statement. To see translations of the warnings that appear in this publication, refer to the *Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Regulatory Compliance and Safety Information* document that accompanied your router.

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. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device. Statement 1071

SAVE THESE INSTRUCTIONS

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. Gebruik het nummer van de verklaring onderaan de waarschuwing als u een vertaling van de waarschuwing die bij het apparaat wordt geleverd, wilt raadplegen.

BEWAAR DEZE INSTRUCTIES

Varoitus   **TÄRKEITÄ TURVALLISUUSOHJEITA**

Tämä varoitusmerkki merkitsee vaaraa. Tilanne voi aiheuttaa ruumiillisia vammoja. Ennen kuin käsittelet laitteistoa, huomioi sähköpiirien käsittelemiseen liittyvät riskit ja tutustu onnettomuuksien yleisiin ehkäisytapoihin. Turvallisuusvaroitusten käännökset löytyvät laitteen mukana toimitettujen käännettyjen turvallisuusvaroitusten joukosta varoitusten lopussa näkyvien lausuntonumeroiden avulla.

SÄILYTÄ NÄMÄ OHJEET

Attention   **IMPORTANTES INFORMATIONS DE SÉCURITÉ**

Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant entraîner des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers liés aux circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents. Pour prendre connaissance des traductions des avertissements figurant dans les consignes de sécurité traduites qui accompagnent cet appareil, référez-vous au numéro de l'instruction situé à la fin de chaque avertissement.

CONSERVEZ CES INFORMATIONS

Warnung   **WICHTIGE SICHERHEITSHINWEISE**

Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu Verletzungen führen kann. Machen Sie sich vor der Arbeit mit Geräten mit den Gefahren elektrischer Schaltungen und den üblichen Verfahren zur Vorbeugung vor Unfällen vertraut. Suchen Sie mit der am Ende jeder Warnung angegebenen Anweisungsnummer nach der jeweiligen Übersetzung in den übersetzten Sicherheitshinweisen, die zusammen mit diesem Gerät ausgeliefert wurden.

BEWAHREN SIE DIESE HINWEISE GUT AUF.

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. Utilizzare il numero di istruzione presente alla fine di ciascuna avvertenza per individuare le traduzioni delle avvertenze riportate in questo documento.

CONSERVARE QUESTE ISTRUZIONI

Advarsel   **VIKTIGE SIKKERHETSINSTRUKSJONER**

Dette advarselssymbolet betyr fare. Du er i en situasjon som kan føre til skade på person. Før du begynner å arbeide med noe av utstyret, må du være oppmerksom på farene forbundet med elektriske kretser, og kjenne til standardprosedyrer for å forhindre ulykker. Bruk nummeret i slutten av hver advarsel for å finne oversettelsen i de oversatte sikkerhetsadvarslene som fulgte med denne enheten.

TA VARE PÅ DISSE INSTRUKSJONENE

Aviso   **INSTRUÇÕES IMPORTANTES DE SEGURANÇA**

Este símbolo de aviso significa perigo. Você está em uma situação que poderá ser causadora de lesões corporais. Antes de iniciar a utilização de qualquer equipamento, tenha conhecimento dos perigos envolvidos no manuseio de circuitos elétricos e familiarize-se com as práticas habituais de prevenção de acidentes. Utilize o número da instrução fornecido ao final de cada aviso para localizar sua tradução nos avisos de segurança traduzidos que acompanham este dispositivo.

GUARDE ESTAS INSTRUÇÕES

¡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. Al final de cada advertencia encontrará el número que le ayudará a encontrar el texto traducido en el apartado de traducciones que acompaña a este dispositivo.

GUARDE ESTAS INSTRUCCIONES

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. Använd det nummer som finns i slutet av varje varning för att hitta dess översättning i de översatta säkerhetsvarningar som medföljer denna anordning.

SPARA DESSA ANVISNINGAR

Figyelem   **FONTOS BIZTONSÁGI ELOÍRÁSOK**

Ez a figyelmezeto jel veszélyre utal. Sérülésveszélyt rejto helyzetben van. Mielott bármely berendezésen munkát végezte, legyen figyelemmel az elektromos áramkörök okozta kockázatokra, és ismerkedjen meg a szokásos balesetvédelmi eljárásokkal. A kiadványban szereplo figyelmeztetések fordítása a készülékhez mellékelt biztonsági figyelmeztetések között található; a fordítás az egyes figyelmeztetések végén látható szám alapján keresheto meg.

ORIZZE MEG EZEKET AZ UTASÍTÁSOKAT!

Предупреждение   **ВАЖНЫЕ ИНСТРУКЦИИ ПО СОБЛЮДЕНИЮ ТЕХНИКИ БЕЗОПАСНОСТИ**

Этот символ предупреждения обозначает опасность. То есть имеет место ситуация, в которой следует опасаться телесных повреждений. Перед эксплуатацией оборудования выясните, каким опасностям может подвергаться пользователь при использовании электрических цепей, и ознакомьтесь с правилами техники безопасности для предотвращения возможных несчастных случаев. Воспользуйтесь номером заявления, приведенным в конце каждого предупреждения, чтобы найти его переведенный вариант в переводе предупреждений по безопасности, прилагаемом к данному устройству.

СОХРАНИТЕ ЭТИ ИНСТРУКЦИИ

警告　重要的安全性说明

此警告符号代表危险。您正处于可能受到严重伤害的工作环境中。在您使用设备开始工作之前，必须充分意识到触电的危险，并熟练掌握防止事故发生的标准工作程序。请根据每项警告结尾提供的声明号码来找到此设备的安全性警告说明的翻译文本。

请保存这些安全性说明

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、一般的な事故防止策に留意してください。警告の各国語版は、各注意事項の番号を基に、装置に付属の「Translated Safety Warnings」を参照してください。

これらの注意事項を保管しておいてください。

주의　중요 안전 지침

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이 지시 사항을 보관하십시오.

Aviso　**INSTRUÇÕES IMPORTANTES DE SEGURANÇA**

Este símbolo de aviso significa perigo. Você se encontra em uma situação em que há risco de lesões corporais. Antes de trabalhar com qualquer equipamento, esteja ciente dos riscos que envolvem os circuitos elétricos e familiarize-se com as práticas padrão de prevenção de acidentes. Use o número da declaração fornecido ao final de cada aviso para localizar sua tradução nos avisos de segurança traduzidos que acompanham o dispositivo.

GUARDE ESTAS INSTRUÇÕES

Advarsel　**VIGTIGE SIKKERHEDSANVISNINGER**

Dette advarselssymbol betyder fare. Du befinder dig i en situation med risiko for legemesbeskadigelse. Før du begynder arbejde på udstyr, skal du være opmærksom på de involverede risici, der er ved elektriske kredsløb, og du skal sætte dig ind i standardprocedurer til undgåelse af ulykker. Brug erklæringsnummeret efter hver advarsel for at finde oversættelsen i de oversatte advarsler, der fulgte med denne enhed.

GEM DISSE ANVISNINGER

تحذير　**إرشادات الأمان الهامة**

يوضح رمز التحذير هذا وجود خطر. وهذا يعني أنك متواجد في مكان قد ينتج عنه التعرض لإصابات. قبل بدء العمل، احذر مخاطر التعرض للصدمات الكهربائية وكن على علم بالإجراءات القياسية للحيلولة دون وقوع أي حوادث. استخدم رقم البيان الموجود في أخر كل تحذير لتحديد مكان ترجمته داخل تحذيرات الأمان المترجمة التي تأتي مع الجهاز.

قم بحفظ هذه الإرشادات

Cisco 3600 Series Routers Hardware Installation Guide

Upozorenje   VAŽNE SIGURNOSNE NAPOMENE

Ovaj simbol upozorenja predstavlja opasnost. Nalazite se u situaciji koja može prouzročiti tjelesne ozljede. Prije rada s bilo kojim uređajem, morate razumjeti opasnosti vezane uz električne sklopove, te biti upoznati sa standardnim načinima izbjegavanja nesreća. U prevedenim sigurnosnim upozorenjima, priloženima uz uređaj, možete prema broju koji se nalazi uz pojedino upozorenje pronaći i njegov prijevod.

SAČUVAJTE OVE UPUTE

Upozornění   DŮLEŽITÉ BEZPEČNOSTNÍ POKYNY

Tento upozorňující symbol označuje nebezpečí. Jste v situaci, která by mohla způsobit nebezpečí úrazu. Před prací na jakémkoliv vybavení si uvědomte nebezpečí související s elektrickými obvody a seznamte se se standardními opatřeními pro předcházení úrazům. Podle čísla na konci každého upozornění vyhledejte jeho překlad v přeložených bezpečnostních upozorněních, která jsou přiložena k zařízení.

USCHOVEJTE TYTO POKYNY

επικίνδυνη τάση ή   ΣΗΜΑΝΤΙΚΕΣ ΟΔΗΓΙΕΣ ΑΣΦΑΛΕΙΑΣ

Αυτό το προειδοποιητικό σύμβολο σημαίνει κίνδυνο. Βρίσκεστε σε κατάσταση που μπορεί να προκαλέσει τραυματισμό. Πριν εργαστείτε σε οποιοδήποτε εξοπλισμό, να έχετε υπόψη σας τους κινδύνους που σχετίζονται με τα ηλεκτρικά κυκλώματα και να έχετε εξοικειωθεί με τις συνήθεις πρακτικές για την αποφυγή ατυχημάτων. Χρησιμοποιήστε τον αριθμό δήλωσης που παρέχεται στο τέλος κάθε προειδοποίησης, για να εντοπίσετε τη μετάφρασή της στις μεταφρασμένες προειδοποιήσεις ασφαλείας που συνοδεύουν τη συσκευή.

ΦΥΛΑΞΤΕ ΑΥΤΕΣ ΤΙΣ ΟΔΗΓΙΕΣ

אזהרה   **הוראות בטיחות חשובות**

סימן אזהרה זה מסמל סכנה. אתה נמצא במצב העלול לגרום לפציעה. לפני שתעבוד עם ציוד כלשהו, עליך להיות מודע לסכנות הכרוכות במעגלים חשמליים ולהכיר את הנהלים המקובלים למניעת תאונות. השתמש במספר ההוראה המסופק בסופה של כל אזהרה כד לאתר את התרגום באזהרות הבטיחות המתורגמות שמצורפות להתקן.

שמור הוראות אלה

Opomena | постои кај електричните кола и треба да ги познавате стандардните постапки за спречување на несреќни случаи. Искористете го бројот на изјавата што се наоѓа на крајот на секое предупредување за да го најдете неговиот период во преведените безбедносни предупредувања што се испорачани со уредот.
ЧУВАЈТЕ ГИ ОВИЕ НАПАТСТВИЈА

Ostrzeżenie | **WAŻNE INSTRUKCJE DOTYCZĄCE BEZPIECZEŃSTWA**

Ten symbol ostrzeżenia oznacza niebezpieczeństwo. Zachodzi sytuacja, która może powodować obrażenia ciała. Przed przystąpieniem do prac przy urządzeniach należy zapoznać się z zagrożeniami związanymi z układami elektrycznymi oraz ze standardowymi środkami zapobiegania wypadkom. Na końcu każdego ostrzeżenia podano numer, na podstawie którego można odszukać tłumaczenie tego ostrzeżenia w dołączonym do urządzenia dokumencie z tłumaczeniami ostrzeżeń.

NINIEJSZE INSTRUKCJE NALEŻY ZACHOWAĆ

Related Documentation

The Cisco IOS software running your Cisco 3600 series router includes extensive features and functionality. For information that is beyond the scope of this document, or for additional information, use the following resources:

Timesaver | Make sure that you have access to the documents listed in Table 3. These documents are all available on the Cisco Documentation CD-ROM and on the World Wide Web. Some of these documents are available in print. If you need further assistance, see the "Obtaining Documentation" section on page xvii.

Table 3 **Related and Referenced Documents**

Cisco Product	Document Title
Cisco 3600 series routers	*Cisco 3620 and Cisco 3640 Modular Access Routers Quick Start Guide*
	Cisco 3631 Router Quick Start Guide
	Cisco 3660 Modular Access Router Quick Start Guide
	Cisco Modular Access Router Cable Specifications
	Quick Start Guide: Network Modules for Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Routers
	Cisco Network Modules Hardware Installation Guide
	Quick Start Guide: Interface Cards for Cisco 1600, 1700, 2600, 3600, and 3700 Series
	Cisco Interface Cards Hardware Installation Guide
	Upgrading System Memory in Cisco 3600 Series Routers
	Installing and Configuring Flash Memory Cards in Cisco 3600 Series Routers
	Installing and Formatting Cisco 2691, Cisco 3631, and Cisco 3700 Compact Flash Memory Cards
	AIM Installation Quick Start Guide: Cisco 2600, 3600, and 3700 Series
	Installing Advanced Integration Modules in Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Routers
	Installing Power Supplies in Cisco 3600 Series Routers
	Installing Power Supplies in Cisco 3631 Routers
	Installing Universal DC Power Supplies in Cisco 3631 Routers
	Installing Universal DC Power Supplies in Cisco 3660 Routers
	Replacing the Fan Cage in Cisco 3660 Routers
	Cisco RPS Hardware Installation Guide
	Software Configuration Guide for Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Routers
	Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Regulatory Compliance and Safety Information
Network management	Network management software documentation
	http://www.cisco.com/univercd/cc/td/doc/product/rtrmgmt/index.htm
Cisco IOS software	Cisco IOS software documentation, all releases.
	http://www.cisco.com/univercd/cc/td/doc/product/software/index.htm
	Refer to the documentation for the Cisco IOS software release installed on your router.

Cisco 90-Day Limited Hardware Warranty Terms

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

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

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

   The Warranties and License Agreements page appears.

2. To read the *Cisco Information Packet*, follow these steps:

   a. Click the **Information Packet Number** field, and make sure that the part number 78-5235-02F0 is highlighted.

   b. Select the language in which you would like to read the document.

   c. Click **Go**.

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

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

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

3. To read translated and localized warranty information about your product, follow these steps:

   a. Enter this part number in the Warranty Document Number field: 78-5236-01C0

   b. Select the language in which you would like to read the document.

   c. Click **Go**.

      The Cisco warranty page appears.

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

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

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

Duration of Hardware Warranty

Ninety (90) days.

Replacement, Repair, or Refund Policy for Hardware

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

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

To Receive a Return Materials Authorization (RMA) Number

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

Complete the information below, and keep it for reference:

Company product purchased from	
Company telephone number	
Product model number	
Product serial number	
Maintenance contract number	

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 websites 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 regularly and may be more current than printed documentation. The CD-ROM package is available as a single unit or through an annual or quarterly subscription.

Registered Cisco.com users can order a single Documentation CD-ROM (product number DOC-CONDOCCD=) through the Cisco Ordering tool:

http://www.cisco.com/en/US/partner/ordering/ordering_place_order_ordering_tool_launch.html

All users can order annual or quarterly subscriptions through the online Subscription Store:

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

Click Subscriptions & Promotional Materials in the left navigation bar.

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

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

Documentation Feedback

You can submit e-mail comments about technical documentation to bug-doc@cisco.com.

You can submit comments by using the response card (if present) 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

For all customers, partners, resellers, and distributors who hold valid Cisco service contracts, the Cisco Technical Assistance Center (TAC) provides 24-hour-a-day, award-winning technical support services, online and over the phone. Cisco.com features the Cisco TAC website as an online starting point for technical assistance. If you do not hold a valid Cisco service contract, please contact your reseller.

Cisco TAC Website

The Cisco TAC website (http://www.cisco.com/tac) provides online documents and tools for troubleshooting and resolving technical issues with Cisco products and technologies. The Cisco TAC website is available 24 hours a day, 365 days a year.

Accessing all the tools on the Cisco TAC website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a login ID or password, register at this URL:

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

Opening a TAC Case

Using the online TAC Case Open Tool (http://www.cisco.com/tac/caseopen) is the fastest way to open P3 and P4 cases. (P3 and P4 cases are those in which your network is minimally impaired or for which you require product information.) After you describe your situation, the TAC Case Open Tool automatically recommends resources for an immediate solution. If your issue is not resolved using the recommended resources, your case will be assigned to a Cisco TAC engineer.

For P1 or P2 cases (P1 and P2 cases are those in which your production network is down or severely degraded) or if you do not have Internet access, contact Cisco TAC by telephone. Cisco TAC engineers are assigned immediately to P1 and P2 cases to help keep your business operations running smoothly.

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

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)
EMEA: +32 2 704 55 55
USA: 1 800 553-2447

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

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

TAC Case Priority Definitions

To ensure that all cases are reported in a standard format, Cisco has established case priority definitions.

Priority 1 (P1)—Your network is "down" or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

Priority 2 (P2)—Operation of an existing network is severely degraded, or significant aspects of your business operation are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

Priority 3 (P3)—Operational performance of your network is impaired, but most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

Priority 4 (P4)—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

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 general networking, training and certification titles. Both new and experienced user will benefit from these publications. 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 quarterly publication that provides the latest networking trends, technology breakthroughs, and Cisco products and solutions to help industry professionals get the most from their networking investment. Included are networking deployment and troubleshooting tips, configuration examples, customer case studies, tutorials and training, certification information, and links to numerous in-depth online resources. You can access Packet magazine at this URL:

    http://www.cisco.com/packet

- iQ Magazine is the Cisco bimonthly publication that delivers the latest information about Internet business strategies for executives. You can access iQ Magazine at this URL:

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

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

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

- Training—Cisco offers world-class networking training. Current offerings in network training are listed at this URL:

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

Overview of Cisco 3600 Series Routers

Cisco 3600 series routers are modular access routers with LAN and WAN connections that can be configured by means of interchangeable modules and WAN interface cards. With over 70 modular interface options, Cisco 3600 series routers provide solutions for data, voice, video, hybrid dial access, Virtual Private Networks (VPNs), and multiprotocol data routing.

This chapter includes the following sections:

- Hardware Features, page 1-1
- Modules and Interface Cards, page 1-5
- Memory, page 1-6
- Interface Numbering, page 1-8
- System Specifications, page 1-12
- Regulatory Compliance, page 1-15

Hardware Features

The Cisco 3600 series includes the Cisco 3620, Cisco 3640, Cisco 3631, and Cisco 3660 routers, which have the following features:

- Two slots for Personal Computer Memory Card International Association (PCMCIA) cards (Cisco 3620, Cisco 3640, and Cisco 3660 routers only)
- Flash memory capability
- Sockets for memory modules; either:
  - Four sockets for DRAM single in-line memory modules (SIMMs), user-configurable as shared memory or main (processor) memory (Cisco 3620 and Cisco 3640 routers only)
  - Two sockets for SDRAM dual in-line memory modules (DIMMs), user-configurable as shared memory or main (processor) memory (Cisco 3631 and Cisco 3660 routers only)
- High-speed console and auxiliary ports (up to 115.2 kbps)
- Hardware thermal alarm to warn of excessively high operating temperature

Figure 1-1 through Figure 1-4 show the front panels of the Cisco 3600 series routers.

Cisco 3620

The Cisco 3620 router includes these additional features:

- High-performance 80-MHz Reduced Instruction Set Computer (RISC) processor

- Two slots for network modules

- Can be installed in a 19-, 23-, or 24-inch rack, on a wall, or on a desk

- Can receive DC power from the Cisco Redundant Power System (RPS)

Figure 1-1   Front Panel of the Cisco 3620 Router
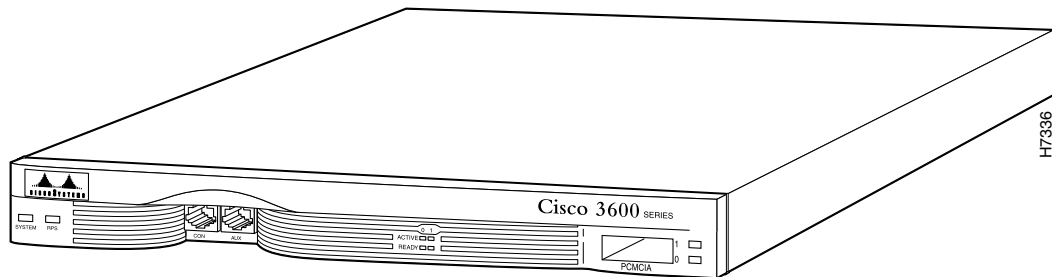
Cisco 3631
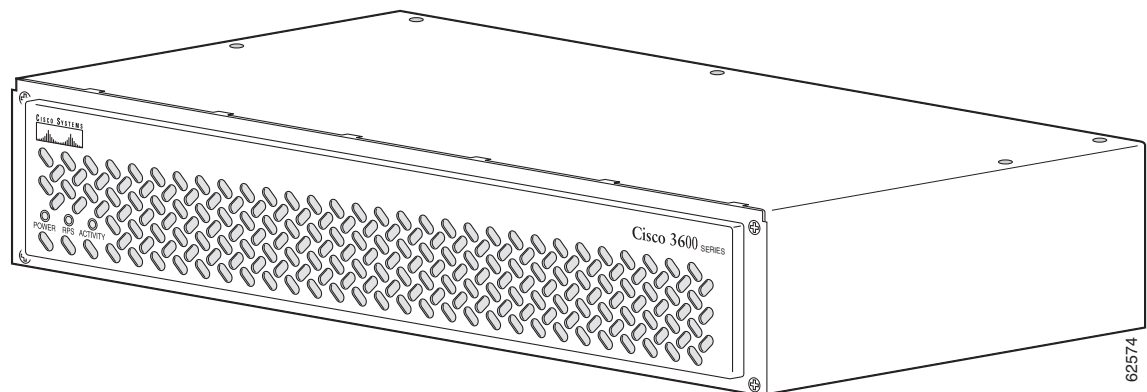
The Cisco 3631 router includes these additional features:

- High-performance 240-MHz PMC-Sierra RM7061A RISC processor

- One 10/100 Ethernet port

- Two slots for network modules

- One compact Flash memory card slot

- One Advanced Integration Module (AIM) slot

- 2 WIC/VIC slots

- Can be installed in a 19- or 23-inch rack or on a desk

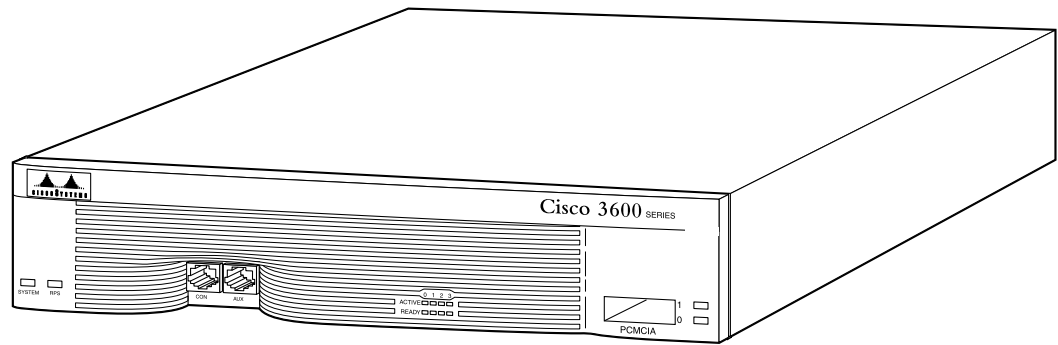*Figure 1-2   Front Panel of the Cisco 3631 Router*

Cisco 3640

The Cisco 3640 router includes these additional features:

- High-performance 100-MHz RISC processor

- Four slots for network modules

- Can be installed in a 19-, 23-, or 24-inch rack, or on a desk

- Can receive DC power from the Cisco Redundant Power System (RPS)

Figure 1-3   Front Panel of the Cisco 3640 Router

Cisco 3660

The Cisco 3660 router includes these additional features:

- High-performance 225-MHz RISC processor installed on a removable mainboard tray

- Six slots for hot swapping similar network modules

- Can be installed in a 19- or 23-inch rack, or on a desk

- Dual redundant, hot-swappable power supplies (second power supply is optional)

- Hot-swappable fan cage used to cool the chassis

- One or two onboard, autosensing, 10/100 Fast Ethernet interfaces

- Supports two Advanced Integration Modules (AIMs)

Figure 1-4   Front Panel of the Cisco 3660 Router
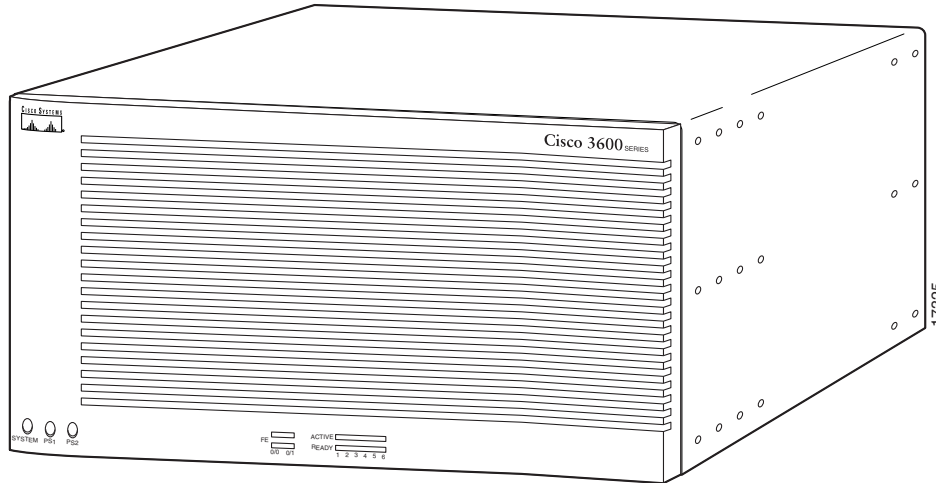
Note   The Cisco 3660 router platform consists of two router models: Cisco 3661 and Cisco 3662. The Cisco 3661 router with one Fast Ethernet interface (part number CISCO3661-xC) is shown in Figure 1-5, and the Cisco 3662 router with two Fast Ethernet interfaces (part number CISCO3662-xC or CISCO3662-xC-CO) is shown in Figure 1-6.

Figure 1-5 and Figure 1-6 show Cisco 3660 AC power supplies installed. The DC power supplies differ in appearance but occupy the same bays in the router.

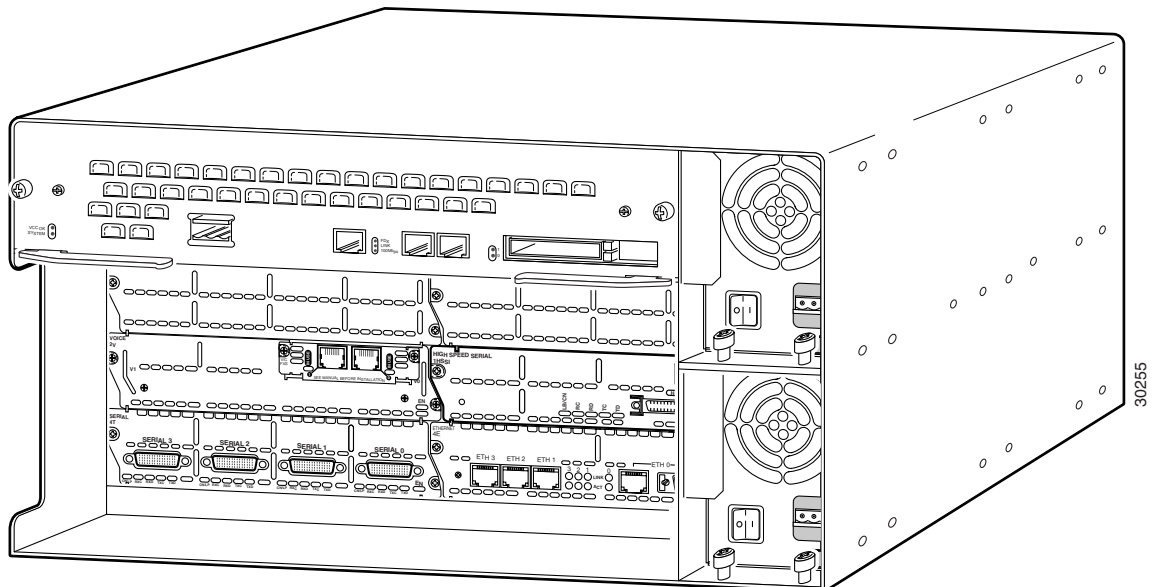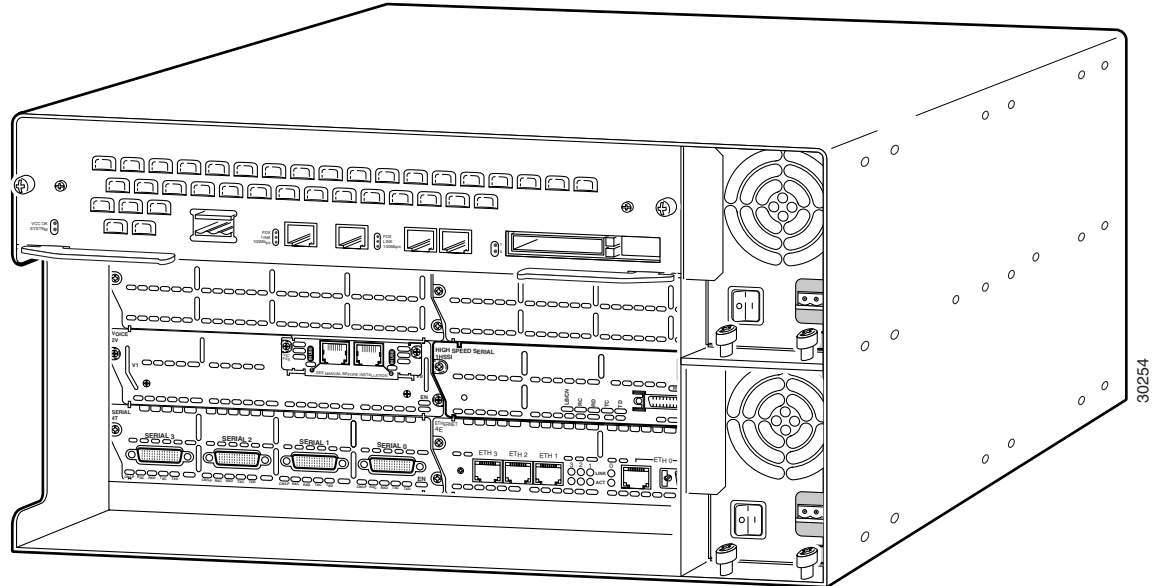**Note**   In this publication, references to Cisco 3660 routers include both Cisco 3661 and Cisco 3662 models.

Figure 1-5   Cisco 3661 Router with One Fast Ethernet Interface

Figure 1-6   Cisco 3662 Router with Two Fast Ethernet Interfaces

Modules and Interface Cards

The latest information on network modules, WAN interface cards (WICs), voice interface cards (VICs), and advanced integration modules (AIMs) is available online and on the documentation CD-ROM.

- For information on installing network modules, refer to the following documents:

  - *Quick Start Guide: Network Modules for Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Routers*

  - *Cisco Network Modules Hardware Installation Guid*e

- For information on installing WICs and VICs, refer to the following documents:

  - *Quick Start Guide: Interface Cards for Cisco 1600, 1700, 2600, 3600, and 3700 Series*

  - *Cisco Interface Cards Hardware Installation Guide*

- For information on installing AIMs, refer to the following documents:

  - *AIM Installation Quick Start Guide: Cisco 2600, 3600, and 3700 Series*

  - *Installing Advanced Integration Modules in Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Routers*

Memory

This section describes the various types of memory that may be present in a Cisco 3600 series router.

Memory Types

Cisco 3600 series routers support the following types of memory:

- DRAM or SDRAM—Stores the running configuration and routing tables, and is used for packet buffering by the router's network interfaces. The Cisco IOS software executes from DRAM.

- Nonvolatile random-access memory (NVRAM)—Stores the system configuration file and the virtual configuration register. (For more information, see Appendix C, "Configuration Register.")

- Flash memory—Stores the operating system software image. You can also add Flash memory on PCMCIA cards and compact Flash cards, depending on the router.

- EPROM-based memory—Stores the ROM monitor, which allows you to boot an operating system software image from Flash memory or PCMCIA memory.

Memory Installation Documentation

For information about installing DRAM, SDRAM, NVRAM, and Flash memory SIMMs, refer to the following hardware configuration note:

- *Upgrading System Memory in Cisco 3600 Series Routers*

For information about installing Flash memory PCMCIA cards, refer to the following hardware configuration note:

- *Installing and Configuring Flash Memory Cards in Cisco 3600 Series Routers*

For information about installing compact Flash memory cards, refer to the following hardware configuration note:

- *Installing and Formatting Cisco 2691, Cisco 3631 and Cisco 3700 Compact Flash Memory Cards*

Memory Specifications

Table 1-1 through Table 1-4 list processor and memory specifications for the routers.

Table 1-1   Cisco 3620 Router Processor and Memory Specifications

Description	Specification
Processor	80-MHz IDT[1] R4700 RISC
DRAM (main plus shared)	4 to 64 MB
NVRAM	32 KB
Flash memory (SIMM)	4 to 32 MB
Flash memory (PCMCIA)	2 to 40 MB
Boot ROM	512 KB

1. IDT = Integrated Device Technology.

Table 1-2   Cisco 3631 Router Processor and Memory Specifications

Description	Specification
Processor	240-MHz PMC-Sierra RM7061A RISC processor
SDRAM (main plus shared)	64 to 256 MB
NVRAM	55 KB
Flash memory (compact Flash)	32 to 128 MB
Boot ROM	512 KB

Table 1-3   Cisco 3640 Router Processor and Memory Specifications

Description	Specification
Processor	100-MHz IDT R4700 RISC
DRAM (main plus shared)	4 to 128 MB
NVRAM	128 KB
Flash memory (SIMM)	4 to 32 MB
Flash memory (PCMCIA)	2 to 40 MB
Boot ROM	512 KB

Table 1-4   Cisco 3660 Router Processor and Memory Specifications

Description	Specification
Processor	225-MHz QED RM5271
SDRAM (main plus shared)	32 to 256 MB
NVRAM	128 KB
Flash memory (SIMM)	8 to 64 MB
Flash memory (PCMCIA)	2 to 40 MB
Boot ROM	512 KB

Interface Numbering

Cisco 3620 and Cisco 3640 Interfaces

Each individual network interface on a Cisco 3620 or Cisco 3640 router is identified by a slot number and a unit number.

Slot Numbering

The Cisco 3620 or Cisco 3640 router chassis contains two or four slots in which you can install modules. You can install any module into any available slot in the chassis. For Cisco 3620 and Cisco 3640 routers, the slots are numbered as follows:

- Slot 0 is at the bottom right (as viewed from the rear of the chassis), near the power supply.
- Slot 1 is at the bottom left.
- Slot 2 is at the top right, above slot 0.
- Slot 3 is at the top left, above slot 1.

Unit Numbering

Cisco 3600 series routers have unit numbers that identify the interfaces on the modules and WAN interface cards installed in the router. Unit numbers begin at 0 for each interface type, and continue from right to left and (if necessary) from bottom to top. Modules and WAN interface cards are identified by interface type, slot number, followed by a forward slash (/), and then the unit number; for example, Ethernet 0/0.

Figure 1-7 shows a router with a 2E 2-slot module in slots 0 and 1. Two serial WAN interface cards are installed in the module in slot 0. One serial and one ISDN BRI WAN interface card are installed in the module in slot 1.

Figure 1-7   Cisco 3600 Series Unit Numbers
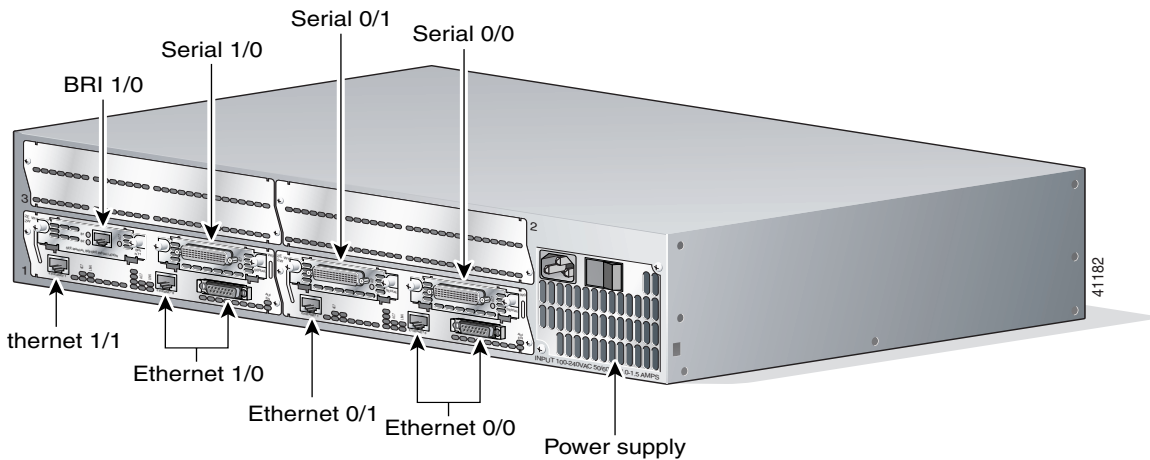
Voice Interface Numbering

Voice interfaces are numbered as follows:

interface-type chassis-slot/voice-module-slot/voice-interface

For example, Slot 1, voice network module slot 0, is referred to as *voice 1/0/0* (closest to chassis slot 0).

Cisco 3631 Interfaces

Each individual interface (port) on a Cisco 3631 router is identified by number as described in the following sections.

WAN and LAN Interface Numbering

The Cisco 3631 router chassis contains the following WAN and LAN interface types:

- One built-in FastEthernet LAN interface
- Two slots in which you can install WAN interface cards (WICs)
- Two single-width slots (slot 1 and slot 2) in which you can install single-width network modules

The numbering format is *Interface-type Slot-number/Interface-number*. Two examples are:

- `FastEthernet 0/0`
- `Serial 1/2`

The slot numbers are as follows:

- 0 for all built-in interfaces
- 0 for all WIC interfaces
- 1 for interfaces in the lower network module slot
- 2 for interfaces in the upper network module slot

Interface (port) numbers begin at 0 for each interface type, and continue from right to left and (if necessary) from bottom to top.

Figure 1-8 shows an example of interface numbering on a Cisco 3631 router with:

- A WIC in each WIC slot (containing interfaces serial 0/0 and serial 0/1 in physical slot W0, and interface serial 0/2 in physical slot W1)
- A 32-port asynchronous network module in slot 1 (containing interfaces serial 1/0 through serial 1/31)
- An alarm interface controller network module in slot 2 (internally connected to interface serial 2/0)
- One built-in Ethernet 10/100 interface—FastEthernet 0/0

Figure 1-8   Interface Numbering—Example
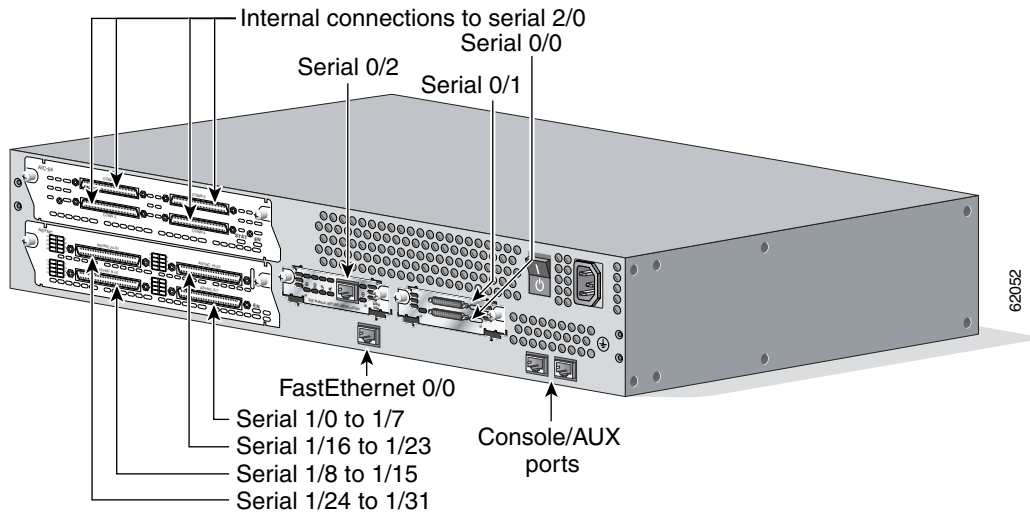
Note   The slot number for all WIC interfaces is always 0. (The W0 and W1 slot designations are for physical slot identification only.) Interfaces in the WICs are numbered from right to left, starting with 0/0 for each interface type, regardless of which physical slot the WICs are installed in. Some examples are:

– If slot W0 is empty and slot W1 contains a 1-port serial WIC, the interface in the WIC is numbered serial 0/0.

– If slot W0 contains a 2-port serial WIC and slot W1 contains a 1-port serial WIC, the interfaces in physical slot W0 are numbered serial 0/0 and serial 0/1, and the interface in physical slot W1 is numbered serial 0/2.

– If slot W0 contains a 2-port serial WIC and slot W1 contains a 1-port BRI WIC, the interfaces in physical slot W0 are numbered serial 0/0 and serial 0/1, and the interface in physical slot W1 is numbered BRI 0/0.

Cisco 3660 Interfaces

Each individual network interface on a Cisco 3600 series router is identified by a slot number and port number.

Slot Numbering

The Cisco 3660 router chassis has six network module slots. Each network module slot accepts a variety of network module interface cards, supporting a variety of LAN and WAN technologies. Figure 1-9 shows the locations of the network module slots.

Figure 1-9   Cisco 3660 Slot Numbers
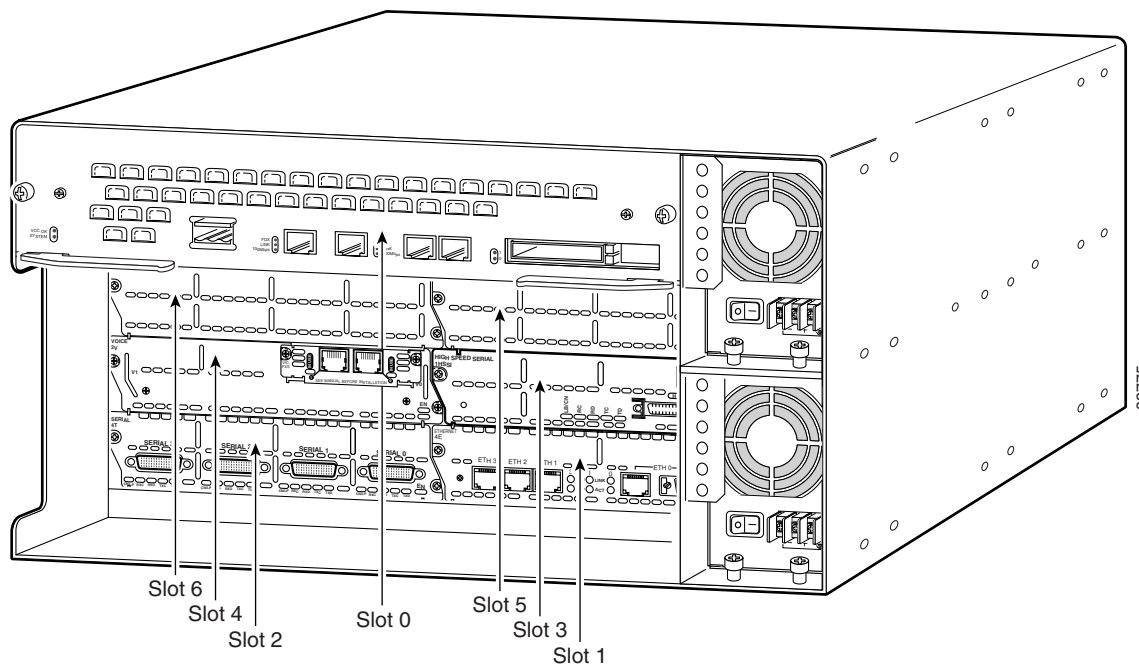
Modules and WAN interface cards are identified by interface type, slot number, followed by a forward slash (/), and then the port number; for example, Ethernet 0/0.

- Slot 0 contains fixed Fast Ethernet ports and is located at the top of the chassis.
- Slot 1 through Slot 6 accept up to six network modules.

Port numbers usually begin at 0 for each interface slot, and continue from right to left and, if necessary, from bottom to top. However, interface numbering for the Cisco 3660 series routers and for Ethernet and Token Ring network modules with two WAN interface card slots differs in the following ways:

- WAN interface card slot numbers always appear as slot 0, even if the interface card is installed in the slot labeled W1.
- WAN interface cards are numbered dynamically, starting with the first card installed. For example:
  - If slot W0 is empty and slot W1 contains a 1-port serial WAN interface card, the interface number would be serial 0/0.
  - If slot W0 contains a 2-port serial WAN interface card and slot W1 contains a 1-port serial interface card, serial 0/0 and 0/1 would reside in slot W0 and serial 0/2 would reside in slot W1.

Voice Interface Numbering

Voice interfaces are numbered differently from WAN interfaces. Voice interfaces are numbered as follows:

interface-type chassis-slot/voice-module-slot/voice-interface

If you have a 4-channel voice network module installed in slot 1 of your router, the voice interfaces will be as follows:

- Chassis-slot 1, voice-network-module-slot 0, voice-interface 0, referred to as **voice 1/0/0** (closest to chassis-slot 0)

- Chassis-slot 1, voice-network-module-slot 0, voice-interface 1, referred to as **voice 1/0/1**

- Chassis-slot 1, voice-network-module-slot 1, voice-interface 0, referred to as **voice 1/1/0**

- Chassis-slot 1, voice-network-module-slot 1, voice-interface 1, referred to as **voice 1/1/1** (farthest from chassis-slot 0)

System Specifications

Table 1-5 through Table 1-8 contain Cisco 3600 series system specifications.

Table 1-5   Cisco 3620 Router System Specifications

Description	Specification
Dimensions (H x W x D)	1.75 x 17.5 x 13.5 inches (4.4 x 44.5 x 34.3 cm), one rack unit in height
Weight	23 lb (10.45 kg), maximum including chassis and two network modules
Input voltage, AC power supply Current Frequency Input surge current (AC)	100 to 240 VAC, autoranging 2.0A 47 to 64 Hz 50A, one cycle
Input rating, DC power supply Current Input surge current (DC)	–3 to –75 VDC 5.0 A 65 A, 250 ms
Power dissipation	95 W (maximum)
Console and auxiliary ports	RJ-45 connector
Operating humidity	5 to 95%, noncondensing
Operating temperature	32 to 104° F (0 to 40° C)
Nonoperating temperature	–40 to 185° F (–40 to 85° C)
Noise level	45 dBA (maximum)
Regulatory compliance	FCC Part 15 Class A. For additional compliance information, refer to the *Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Regulatory Compliance and Safety Information* document that accompanied the router.
Safety compliance	UL 60950; CAN/CSA C22.2 No. 60950-00; IEC 60950; AS/NZS 3260; TS001

Table 1-6   Cisco 3631 Router System Specifications

Description	Specification
Dimensions (H x W x D)	3.46 x 17.07 x 11.20 inches (8.78 x 45.36 x 28.45 cm), two rack units in height
Weight	15 lb (6.8 kg)
Input voltage, AC power supply Current Frequency Input surge current (AC)	100 to 240 VAC, autoranging 2.0 A 47 to 63 Hz 50 A, one cycle
Input rating, DC power supply Operational between Current Input surge current (DC)	–48 to –60 VDC –48 to –60 VDC 4.0 A 50 A, 250 ms
Power dissipation	105 W (maximum)
Console and auxiliary ports	RJ-45 connector
Operating humidity	5 to 95%, noncondensing
Operating temperature	32 to 104° F (0 to 40° C)
Nonoperating temperature	–40 to 185° F (–40 to 85° C)
Noise level	45 dBA (maximum)
Regulatory compliance	FCC Part 15 Class A. For additional compliance information, refer to the *Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Regulatory Compliance and Safety Information* document that accompanied the router.
Safety compliance	UL 60950; CAN/CSA C22.2 No. 60950-00; IEC 60950; AS/NZS 3260; TS001

Table 1-7   Cisco 3640 Router System Specifications

Description	Specification
Dimensions (H x W x D)	3.44 x 17.5 x 15.8 inches (8.7 x 44.5 x 40.0 cm), two rack units in height
Weight	30 lb (13.6 kg), including chassis and four modules
Input voltage, AC power supply Current Frequency Input surge current (AC)	100 to 240 VAC, autoranging 2.0 A 47 to 64 Hz 50 A, one cycle
Input rating, DC power supply Current Input surge current (DC)	–38 to –75 VDC 5.0 A 65 A, 250 ms
Power dissipation	220 W (maximum)
Console and auxiliary ports	RJ-45 connector
Operating humidity	5 to 95%, noncondensing
Operating temperature	32 to 104° F (0 to 40° C)
Nonoperating temperature	–40 to 185° F (–40 to 85° C)
Noise level	51.9 dBA (maximum)
Regulatory compliance	FCC Part 15 Class A. For additional compliance information, refer to the *Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Regulatory Compliance and Safety Information* document that accompanied the router.
Safety compliance	UL 60950; CAN/CSA C22.2 No. 60950-00; IEC 60950; AS/NZS 3260; TS001

Table 1-8   Cisco 3660 Router System Specifications

Description	Specification
Dimensions (H x W x D)	8.75 x 17.5 x 11.5 inches (22.1 x 44.5 x 29.1 cm), five rack units in height
Weight	48 lb (21.8 kg), including chassis, six modules, and two power supplies
Input voltage, AC power supply (dual, redundant) Current Frequency Input surge current (AC)	100 to 240 VAC, autoranging 4.0 A/2.0 A 47 to 63 Hz 50 A, half-cycle
Input rating, DC power supply (dual, redundant) Operational between Current Input surge current (DC)	–48 to –60 VDC –36 to –72 VDC 10.0 A 50 A, 10 ms
Power dissipation	380 W (maximum)
Console and auxiliary ports	RJ-45 connector
Operating humidity	5 to 95%, noncondensing
Operating temperature	32 to 104° F (0 to 40° C)
Nonoperating temperature	–40 to 185° F (–40 to 85° C)
Noise level	50 dBA
Regulatory compliance	FCC Part 15 Class A. For additional compliance information, refer to the *Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Regulatory Compliance and Safety Information* document.
Safety compliance	UL 60950; CAN/CSA C22.2 No. 60950-00; IEC 60950; AS/NZS 3260; TS001

Regulatory Compliance

For compliance information, refer to the *Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Regulatory Compliance and Safety Information* document that accompanied your router.

Preparing to Install the Router

This chapter describes site requirements and equipment needed to install your Cisco 3600 series router. It includes the following sections:

- Safety Recommendations, page 2-1
- General Site Requirements, page 2-3
- Installation Checklist, page 2-6
- Creating a Site Log, page 2-7
- Inspecting the Router, page 2-7
- Tools and Equipment for Installation and Maintenance, page 2-8
- Console and Auxiliary Port Considerations, page 2-9
- Preparing to Connect to a Network, page 2-10

After you have completed this chapter, proceed to Chapter 3, "Installing the Router" for installation instructions.

Safety Recommendations

Follow these guidelines to ensure general safety:

- Keep the chassis area clear and dust-free during and after installation.
- If you remove the chassis cover, put it in a safe place.
- Keep tools and chassis components away from walk areas.
- 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 when working under conditions that might be hazardous to your eyes.
- Do not perform any action that creates a hazard to people or makes the equipment unsafe.

Safety with Electricity

Follow these guidelines when working on equipment powered by electricity:

Warning **Read the installation instructions before connecting the system to the power source.** Statement 1004

- Locate the emergency power-off switch in the room in which you are working. Then, if an electrical accident occurs, you can quickly turn off the power.

- Disconnect all power before doing the following:

    - Installing or removing a chassis

    - Working near power supplies

- Look carefully for possible hazards in your work area, such as moist floors, ungrounded power extension cables, frayed power cords, and missing safety grounds.

- Do not work alone if hazardous conditions exist.

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

- If an electrical accident occurs, proceed as follows:

    - Use caution; do not become a victim yourself.

    - Turn off power to the device.

    - If possible, send another person to get medical aid. Otherwise, assess the victim's condition and then call for help.

    - Determine if the person needs rescue breathing or external cardiac compressions; then take appropriate action.

In addition, use the following guidelines when working with any equipment that is disconnected from a power source, but still connected to telephone wiring or other network cabling:

- Never install telephone wiring during a lightning storm.

- Never install telephone jacks in wet locations unless the jack is specifically designed for it.

- Never touch uninsulated telephone wires or terminals unless the telephone line is disconnected at the network interface.

- Use caution when installing or modifying telephone lines.

Preventing Electrostatic Discharge Damage

Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry. It can occur if electronic printed circuit cards are improperly handled and can cause complete or intermittent failures. Always follow ESD prevention procedures when removing and replacing modules:

- Ensure that the router chassis is electrically connected to earth ground.

- Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. Connect the clip to an unpainted surface of the chassis frame to channel unwanted ESD voltages safely to ground. To guard against ESD damage and shocks, the wrist strap and cord must operate effectively.

- If no wrist strap is available, ground yourself by touching a metal part of the chassis.

⚠ **Caution**   For the safety of your equipment, periodically check the resistance value of the antistatic strap. It should be between 1 and 10 megohms (Mohm).

General Site Requirements

This section describes the requirements your site must meet for safe installation and operation of your router. Ensure that the site is properly prepared before beginning installation. If you are experiencing shutdowns or unusually high errors with your existing equipment, this section can also help you isolate the cause of failures and prevent future problems.

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 for connection to TN and IT power systems.** Statement 1007

The AC power supply includes the following features:

*   Autoselects either 110-V or 220-V operation.

*   All units include a 6-foot (1.8-meter) electrical power cord. (A label near the power cord indicates the correct voltage, frequency, current draw, and power dissipation for the unit.)

Table 2-1 describes power requirements for Cisco 3600 series routers.

Table 2-1   Power Requirements for Cisco 3600 Series Routers

Router	Power Supply	Input Power	Input Voltage Tolerance Limits
Cisco 3620	AC	100 - 240 VAC, 1.0 A, 50 - 60 Hz	85 - 264 VAC
	DC, nominal 48 VDC	48 - 60 VDC, 3.0 A, positive or negative input	38 - 72 VDC
Cisco 3631	AC	100 - 240 VAC, 2.0 A, 50 - 60 Hz	85 - 264 VAC
	DC, nominal 24/48 VDC	24 - 36 VDC, 8 A, positive or negative input	18 - 72 VDC
		36 - 60 VDC, 4 A, positive or negative input	
	DC, nominal 48 VDC	48 - 60 VDC, 4 A, positive or negative input	38 - 72 VDC
Cisco 3640	AC	100 - 240 VAC, 2.0 A, 50 - 60 Hz	85 - 264 VAC
	DC, nominal 48 VDC	48 - 60 VDC, 5.0 A, positive or negative input	38 - 72 VDC
Cisco 3660	AC	100 - 240 VAC, 4.0 A, 50 - 60 Hz	85 - 264 VAC
	DC, nominal 24/48 VDC	24 - 36 VDC, 16 A, positive or negative input	18 - 72 VDC
		36 - 60 VDC, 7 A, positive or negative input	
	DC, nominal 48 VDC	48 - 60 VDC, 8 A, positive or negative input	38 - 72 VDC

Site Environment

All Cisco 3600 series routers can be placed on a desktop or mounted in a rack. The Cisco 3620 and Cisco 3640 routers can also be installed on a wall. The location of your router and the layout of your equipment rack or wiring room are 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. Plan for access to both front and rear panels of the router.

When planning your site layout and equipment locations, remember the precautions described in the next section, "Site Configuration" to help avoid equipment failures and reduce the possibility of environmentally caused shutdowns. If you are currently experiencing shutdowns or unusually high errors with your existing equipment, these precautions may help you isolate the cause of the failures and prevent future problems.

Site Configuration

The following precautions will help you plan an acceptable operating environment for your router and will help you avoid environmentally caused equipment failures:

- Ensure that the room where your router operates has adequate circulation. Electrical equipment generates heat. Without adequate circulation, ambient air temperature may not cool equipment to acceptable operating temperatures.

- Always follow ESD-prevention procedures described in the "Preventing Electrostatic Discharge Damage" section on page 2-2 to avoid damage to equipment. Damage from static discharge can cause immediate or intermittent equipment failure.

- Ensure that the chassis cover or mainboard tray and module rear panels are secure. All empty network module slots, WAN interface card slots, and power supply bays (in the Cisco 3660 router) must have filler panels installed. The chassis is designed to allow cooling air to flow within it, through specially designed cooling slots. A chassis with uncovered openings will create air leaks, which may interrupt and reduce the flow of air across internal components.

Equipment Racks

You can mount the Cisco 3620 and Cisco 3640 routers in a 19-inch rack (with a 17.5- or 17.75-inch opening), a 23-inch rack, or a 24-inch rack.

The Cisco 3631 and Cisco 3660 routers can be mounted in a 19-inch rack (with a 17.5- or 17.75-inch opening), or a 23-inch rack.

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

- Allow clearance around the rack for maintenance.

- Enclosed racks must have adequate ventilation. Ensure that the rack is not congested, because each router 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 ports or exhaust ports. If the chassis is installed on slides, check the position of the chassis when it is seated into the rack.

- Baffles can help to isolate exhaust air from intake air, which also helps to draw cooling air through the chassis. The best placement of the baffles depends on the airflow patterns in the rack, which can be found by experimenting with different configurations.

- When equipment installed in a rack (particularly in an enclosed rack) fails, try operating the equipment by itself, if possible. Power off other equipment in the rack (and in adjacent racks) to allow the router under test a maximum of cooling air and clean power.

Installation Checklist

The sample Installation Checklist lists items and procedures for installing a new router. Make a copy of this checklist and mark the entries when completed. Include a copy of the checklist for each router in your Site Log (described in the next section, "Creating a Site Log").

Installation checklist for site_____

Router name_____

Task	Verified by	Date
Installation Checklist copied		
Background information placed in Site Log		
Site power voltages verified		
Installation site power check completed		
Required tools available		
Additional equipment available		
Router received		
The appropriate quick start guide for your router received		
Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Regulatory Compliance and Safety Information document received		
Product registration card received		
Cisco.com contact information label received		
Chassis components verified		
Initial electrical connections established		
ASCII terminal (for local configuration) or modem (for remote configuration)		
Signal distance limits verified		
Startup sequence steps completed		
Initial operation verified		
Software image verified		

Creating a Site Log

The Site Log provides a record of all actions related to the router. Keep it in an accessible place near the chassis where anyone who performs tasks has access to it. Use the Installation Checklist to verify steps in the installation and maintenance of the router. Site Log entries might include the following:

- Installation progress—Make a copy of the Installation Checklist and insert it into the Site Log. Make entries as each procedure is completed.

- Upgrade and maintenance procedures—Use the Site Log as a record of ongoing router maintenance and expansion history. A Site Log might include the following events:

    - Installation of network modules

    - Removal or replacement of network modules and other upgrades

    - Configuration changes

    - Maintenance schedules and requirements

    - Maintenance procedures performed

    - Intermittent problems

    - Comments and notes

Inspecting the Router

Do not unpack the router until you are ready to install it. If the final installation site will not be ready for some time, keep the chassis in its shipping container to prevent accidental damage. When you are ready to install the router, proceed with unpacking it.

The router, cables, publications, and any optional equipment you ordered may be shipped in more than one container. When you unpack the containers, check the packing list to ensure that you received all the following items:

- Router
- 6-foot (1.8-meter) power cord
- Rubber feet for desktop mounting (with Cisco 3620 routers only)
- Rack-mount brackets for 19-inch rack
- Grounding lug and bracket
- RJ-45-to-DB-9 adapter cable
- RJ-45-to-DB-25 adapter cable
- Ethernet cables: one with Cisco 3631 and Cisco 3640; two with Cisco 3660
- Optional equipment (such as network connection cables or additional rack-mount brackets)
- *Cisco 3620 and Cisco 3640 Modular Access Routers Quick Start Guide*, if applicable
- *Cisco 3631 Router Quick Start Guide*, if applicable
- *Cisco 3660 Modular Access Router Quick Start Guide*, if applicable
- *Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Regulatory Compliance and Safety Information* document

Inspect all items for shipping damage. If anything appears to be damaged, or if you encounter problems installing or configuring your router, contact customer service. Warranty, service, and support information is in the quick start guide that shipped with your router.

Tools and Equipment for Installation and Maintenance

You need the following tools and equipment to install and upgrade the router and its components:

- ESD-preventive cord and wrist strap
- Number 2 Phillips screwdriver
- Flat-blade screwdrivers: small, 3/16-inch (0.476 cm) and medium, 1/4-inch (0.625 cm)
  - To install or remove modules
  - To remove the cover or mainboard tray, if you are upgrading memory or other components
- Number 15 Torx screwdriver
  - For replacing components in the Cisco 3660 router
- Rack-mount screws
- ROM 32-pin PLCC extractor tool
- Needlenose pliers
  - For straightening any pins bent when you install the ROM
- Cable ties, if required, for organizing cables

To install a Cisco 3620 router on a wall, you need suitable screws or wall anchors.

In addition, depending on the type of modules you plan to use, you might need the following equipment to connect a port to an external network:

- Cables for connection to the WAN and LAN ports (dependent on configuration).

Note For more information on cable specifications, refer to the *Cisco Modular Access Router Cable Specifications* document online or on the Documentation CD-ROM.

- Ethernet hub or PC with a network interface card for connection to Ethernet (LAN) ports.
- Console terminal (an ASCII terminal or a PC running terminal emulation software) configured for 9600 baud, 8 data bits, no parity, and 2 stop bits.
- Modem for connection to the auxiliary port for remote administrative access (optional).
- Token Ring interfaces require a Token Ring media attachment unit (MAU).
- Serial interfaces may require a data service unit (DSU) or channel service unit/data service unit (CSU/DSU).
- CT1/PRI modules without the built-in CSU require an external CSU.
- ISDN BRI S/T interfaces require an NT1 device if one is not supplied by your service provider.

Console and Auxiliary Port Considerations

The router includes an asynchronous serial console port and an auxiliary port. The console and auxiliary ports provide access to the router either locally using a console terminal, or remotely using a modem connected to the auxiliary port. This section discusses important cabling information to consider before connecting a console terminal, which can be either an ASCII terminal or a PC running terminal emulation software, to the console port or modem to the auxiliary port.

The main difference between the console and auxiliary ports is that the auxiliary port supports hardware flow control and the console port does not. Flow control paces the transmission of data between a sending device and a receiving device. Flow control ensures that the receiving device can absorb the data sent to it before the sending device sends more. When the buffers on the receiving device are full, a message is sent to the sending device to suspend transmission until the data in the buffers has been processed. Because the auxiliary port supports flow control, it is ideally suited for use with the high-speed transmissions of a modem. Console terminals transmit at slower speeds than modems; therefore, the console port is ideally suited for use with console terminals.

Console Port Connections

The router has an EIA/TIA-232 asynchronous serial console port (RJ-45). Depending on the cable and the adapter used, this port appears as a DTE or DCE device at the end of the cable.

For connection to a PC running terminal emulation software, your router is provided with an RJ-45 to DB-9 adapter cable.

To connect the router to an ASCII terminal, use an RJ-45 rollover cable and an RJ-45-to-DB-25 female adapter (not provided).

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, refer to the "Connecting to a Console Terminal or Modem" section on page 3-43.

For cable and port pinouts, refer to the *Cisco Modular Access Router Cable Specifications* document online or on the Documentation CD-ROM.

Auxiliary Port Connections

The router has an EIA/TIA-232 asynchronous serial auxiliary port (RJ-45) that supports flow control. Depending on the cable and the adapter used, this port appears as a DTE or DCE device at the end of the cable.

For connection to a modem, your router is provided with an RJ-45-to-DB-25 adapter cable.

For detailed information about connecting devices to the auxiliary port, refer to the "Connecting to a Console Terminal or Modem" section on page 3-43.

For cable and port pinouts, refer to the *Cisco Modular Access Router Cable Specifications* document online or on the Documentation CD-ROM.

Preparing to Connect to a Network

When setting up your router, consider distance limitations and potential electromagnetic interference (EMI) as defined by the applicable local and international regulations.

Network connection considerations are provided for several types of network interfaces and are described in the following sections:

- Ethernet Connections, page 2-10
- Token Ring Connections, page 2-11
- Serial Connections, page 2-11
- ISDN BRI Connections, page 2-13
- 56-K/Switched-56-kbps DSU/CSU Connections, page 2-14

Refer to the following online documents for more information about network connections and interfaces:

- *Cisco Network Modules Hardware Installation Guide*
- *Cisco Interface Cards Installation Guide*
- *Cisco Modular Access Router Cable Specifications*

⚠

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 both use RJ-45 connectors.** Statement 1021

Ethernet Connections

The IEEE has established Ethernet as standard IEEE 802.3. The most common Ethernet implementations are as follows:

- 100BASE-T—2-pair Category 5 or unshielded twisted-pair (UTP) straight-through RJ-45 cable.
- 10BASE-2—Ethernet on thin coaxial cable, also known as thin Ethernet. The maximum segment distance is 607 feet (186 meters).
- 10BASE-5—Ethernet on thick coaxial cable, also known as thick Ethernet. The maximum segment distance is 1,640 feet (500 meters).
- 10BASE-T—Ethernet on unshielded twisted-pair (UTP) cable. The maximum segment distance is 328 feet (100 meters). UTP cables look like the wiring used for ordinary telephones; however, UTP cables meet certain electrical standards that telephone cables do not meet.

Refer to the *Cisco Modular Access Router Cable Specifications* online document for information about Ethernet cables, connectors, and pinouts. This document is available online and on the Cisco Documentation CD-ROM.

Token Ring Connections

The IEEE has established Token Ring as standard IEEE 802.5. Specifications indicate a maximum segment distance of 328 feet (100 meters) for UTP cabling.

> **Note** To ensure agency compliance with FCC Class B electromagnetic emissions requirements (EMI), make sure that you use a shielded RJ-45 Token Ring cable when connecting your router to a Token Ring network.

Token Ring can operate at two different ring speeds: 4 and 16 Mbps. All devices on the Token Ring must use the same operating speed.

Use a Token Ring cable to connect the router to a switch. Refer to the section "Token Ring Port Pinouts" in the *Cisco Modular Access Router Cable Specifications* online document for the Token Ring port pinouts. This document is available online and on the Cisco Documentation CD-ROM.

Serial Connections

Serial connections are provided by WAN interface cards and network modules. For more information on WAN interface cards, refer to the *Cisco Interface Cards Installation Guide*. For more information on network modules, refer to the *Cisco Network Modules Hardware Installation Guide*. These documents are accessible online and on the Cisco Documentation CD-ROM.

Before you connect a device to a serial port, you need to know the following:

- Type of device, data terminal equipment (DTE) or data communications equipment (DCE), you are connecting to the synchronous serial interface
- Type of connector, male or female, required to connect to the device
- Signaling standard required by the device

Configuring Serial Connections

The serial ports on the asynchronous/synchronous serial network modules and the serial WAN interface card use DB-60 connectors. Serial ports can be configured as DTE or DCE, depending on the serial cable used.

Serial DTE or DCE Devices

A device that communicates over a synchronous serial interface is either a DTE or DCE device. A DCE device provides a clock signal that paces the communications between the device and the router. A DTE device does not provide a clock signal. DTE devices usually connect to DCE devices. The documentation that accompanied the device should indicate whether it is a DTE or DCE device. (Some devices have a jumper to select either DTE or DCE mode.) Table 2-2 lists typical DTW and DCE devices.

Table 2-2   Typical DTE and DCE Devices

Device Type	Gender	Typical Devices
DTE	Male[1]	Terminal
		PC
DCE	Female[2]	Modem
		CSU/DSU
		Multiplexer

1. If pins protrude from the base of the connector, the connector is male.

2. If the connector has holes to accept pins, the connector is female.

Signaling Standards Supported

The synchronous serial ports available for the router support the following signaling standards: EIA/TIA-232, EIA/TIA-449, V.35, X.21, and EIA-530. You can order a Cisco DB-60 shielded serial transition cable that has the appropriate connector for the standard you specify. The documentation for the device you want to connect should indicate the standard used for that device. The router end of the shielded serial transition cable has a DB-60 connector, which connects to the DB-60 port on a serial WAN interface card. The other end of the serial transition cable is available with a connector appropriate for the standard you specify.

The synchronous serial port can be configured as DTE or DCE, depending on the attached cable (except EIA-530, which is DTE only). To order a shielded cable, contact customer service. See the "Obtaining Technical Assistance" section on page xviii.

✎
Note   All serial ports configured as DTE require external clocking from a CSU/DSU or other DCE device.

Although manufacturing your own serial cables is not recommended (because of the small size of the pins on the DB-60 serial connector), cable pinouts are provided in the *Cisco Modular Access Router Cable Specifications* document.

Distance Limitations

Serial signals can travel a limited distance at any given bit rate; generally, the slower the data rate, the greater the distance. All serial signals are subject to distance limits, beyond which a signal significantly degrades or is completely lost.

✎
Note   Only the serial WAN interface card supports bit rates above 128 Kbps.

Table 2-3 lists the recommended maximum speeds and distances for each serial interface type; however, you might get good results at speeds and distances greater than those listed, if you understand the electrical problems that might arise and can compensate for them. For instance, the recommended maximum rate for V.35 is 2 Mbps, but 4 Mbps is commonly used.

Table 2-3   Serial Signal Transmission Speeds and Distances

	EIA/TIA-232 Distance		EIA/TIA-449, X.21, V.35, EIA-530 Distance	
Rate (bps)	**Feet**	**Meters**	**Feet**	**Meters**
2400	200	60	4100	1250
4800	100	30	2050	625
9600	50	15	1025	312
19200	25	7.6	513	156
38400	12	3.7	256	78
56000	8.6	2.6	102	31
1544000 (T1)	—	—	50	15

Balanced drivers allow EIA/TIA-449 signals to travel greater distances than EIA/TIA-232 signals. The recommended distance limits for EIA/TIA-449 shown in Table 2-3 are also valid for V.35, X.21, and EIA-530. Typically, EIA/TIA-449 and EIA-530 can support 2-Mbps rates, and V.35 can support 4-Mbps rates.

Asynchronous/Synchronous Serial Module Baud Rates

The following baud-rate limitations apply to the slow-speed serial interfaces found in the asynchronous/synchronous serial modules:

- Asynchronous interface—Maximum baud rate is 115.2 kbps.
- Synchronous interface—Maximum baud rate is 128-kbps full duplex.

ISDN BRI Connections

The BRI WAN interface cards provide Integrated Services Digital Network (ISDN) Basic Rate Interface (BRI) connections. The BRI modules and BRI WAN interface cards are available with either an S/T interface that requires an external Network Terminator 1 (NT1), or a U interface that has a built-in NT1.

You can install the BRI modules in any available slot in the chassis.

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

Use a BRI cable (not included) to connect the BRI WAN interface card directly to an ISDN. Table 2-4 lists the specifications for ISDN BRI cables. Also, refer to the *Cisco Modular Access Router Cable Specifications* online document for pinouts. This document is located on Cisco.com and the Documentation CD-ROM.

Table 2-4   ISDN BRI Cable Specifications

Specification	High-Capacitance Cable	Low-Capacitance Cable
Resistance (at 96 kHz)	160 ohms/km	160 ohms/km
Capacitance (at 1 kHz)	120 nF[1]/km	30 nF/km
Impedance (at 96 kHz)	75 ohms	150 ohms
Wire diameter	0.024 in. (0.6 mm)	0.024 in. (0.6 mm)
Distance limitation	32.8 ft (10 m)	32.8 ft (10 m)

1.   nF = nanoFarad

For more information on BRI WAN interface cards, refer to the *Cisco Interface Cards Installation Guide* online document. This document is located on Cisco.com and the Documentation CD-ROM.

56-K/Switched-56-kbps DSU/CSU Connections

Switched-56-kbps connections are provided by the 56-kbps DSU/CSU WAN interface card.

For more information on Switched-56-kbps WAN interface cards, refer to the *Cisco Interface Cards Installation Guide* online document. This document is located on Cisco.com and the Documentation CD-ROM.

C H A P T E R 3

Installing the Router

This chapter describes how to install your Cisco 3600 series router and connect it to networks and external devices. It contains the following sections:

- Installing Modules, Interface Cards, and Power Supplies, page 3-2
- Installing the Chassis, page 3-3
- Installing Chassis Ground Connection, page 3-19
- Power Connections, page 3-27
- Connecting WAN, LAN, and Voice Cables, page 3-37
- Connecting to a Console Terminal or Modem, page 3-43
- Powering Up the Router, page 3-51
- Configuring the Router, page 3-53

Warning   **Only trained and qualified personnel should be allowed to install, replace, or service this equipment.**
Statement 1030

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

Note   See the "Tools and Equipment for Installation and Maintenance" section on page 2-8 for a list of tools and equipment that might be required for your installation.

Installing Modules, Interface Cards, and Power Supplies

Cisco routers are normally shipped with network modules, WAN interface cards (WICs), voice interface cards (VICs), advanced integration modules (AIMs), and power supplies already installed. If you need to remove or install any of these items, refer to the applicable documents online.

For network modules:

- *Quick Start Guide: Network Modules for Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Routers*
- *Cisco Network Modules Hardware Installation Guide*

For WICs and VICs:

- *Quick Start Guide: Interface Cards for Cisco 1600, 1700, 2600, 3600, and 3700 Series*
- *Cisco Interface Cards Hardware Installation Guide*

For AIMs:

- *AIM Installation Quick Start Guide: Cisco 2600, 3600, and 3700 Series*
- *Installing Advanced Integration Modules in Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Routers*

For internal power supplies:

- *Installing Power Supplies in Cisco 3600 Series Routers*
- *Installing Power Supplies in Cisco 3631 Routers*
- *Installing Universal DC Power Supplies in Cisco 3631 Routers*
- *Installing Universal DC Power Supplies in Cisco 3660 Routers*

For external power supplies:

- *Cisco RPS Hardware Installation Guide*

Note If there are modules, interface cards, or power supplies to be removed or installed, Cisco suggests that you perform the installation or removal before you install the chassis. If a chassis cover needs to be removed, the chassis may have to be removed from the rack to permit cover removal.

Note The Cisco 3660 accommodates two AC or two DC hot-swappable power supplies (PS1 and PS2) in bays at the rear of the unit. Each unit provides up to 250 W of power, and a single installed power supply meets the router's requirements. The second installed power supply provides redundancy, load sharing, and increased system availability. It can be removed without affecting system operation.

If the required network modules, interface cards, and power supplies are already installed, proceed to the "Installing the Chassis" section on page 3-3.

Installing the Chassis

Depending on your router, you can set the chassis on a desktop, install it in a rack, or mount it on a wall or other flat surface. Select the procedure that best meets the needs of your network:

- Setting the Chassis on a Desktop, page 3-3
- Rack-Mounting the Chassis, page 3-3
- Wall-Mounting the Cisco 3620 Router, page 3-18

Note The Cisco 3640, Cisco 3661 and the Cisco 3660 routers cannot be wall-mounted.

Setting the Chassis on a Desktop

You can place Cisco 3600 series routers on a desktop or shelf. For Cisco 3620 routers only, attach the rubber feet supplied in the accessory kit. The procedure is as follows:

Step 1 Place the router upside-down on a smooth, flat surface.

Step 2 Peel the rubber feet off the black adhesive strip and place them adhesive-side down at each corner of the underside of the chassis.

Step 3 Place the router top-side up on a flat, smooth, secure surface.

The following warning applies to Cisco 3660 routers:

Warning **To prevent personal injury or damage to the chassis, never attempt to lift or tilt the chassis using the handles on modules (such as power supplies, fans, or cards); these types of handles are not designed to support the weight of the unit.** Statement 1032

Caution Do not place anything on top of the router that weighs more than 10 pounds (4.5 kg). Excessive weight on top could damage the chassis.

After the router has been installed, you must connect the chassis to a reliable earth ground. For the chassis ground connection procedures, see the "Installing Chassis Ground Connection" section on page 3-19.

Rack-Mounting the Chassis

If you are planning to rack-mount the router, do so before making network and power connections. If you need to install network modules or WAN and voice interface cards, you can do so either before or after rack-mounting the router. Ideally, you would install modules or WAN interface cards when you have the best access to the router's rear panel.

Note You need a number 2 Phillips screwdriver to mount the chassis in a rack.

The router is shipped with one set of brackets and the screws to attach the brackets to the router chassis. Figure 3-1 through Figure 3-5 show both sizes of brackets for the various routers.

Figure 3-1   Cisco 3620 Rack-Mount Brackets

Use with 23-inch rack
Use with 24-inch rack

Bracket for 19-inch rack   Bracket for 23- or 24-inch rack   H7270
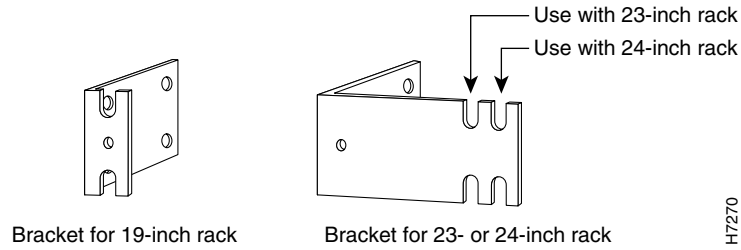
Figure 3-2   Cisco 3631 Rack-Mount Brackets for 19-Inch Rack

LEFT   Slots for cable tie attachment   RIGHT

Narrow bracket for chassis side opposite fans   Wide bracket for chassis side with fans   72283
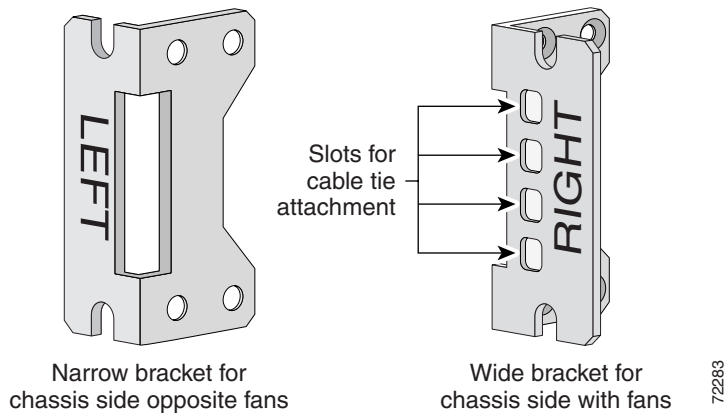
Figure 3-3   Cisco 3631 Rack-Mount Brackets for 23-Inch Rack

23" ETSI, NEBS LEFT   Slots for cable tie attachment   23" ETSI, NEBS RIGHT

For chassis side opposite fans   For chassis side with fans   82532
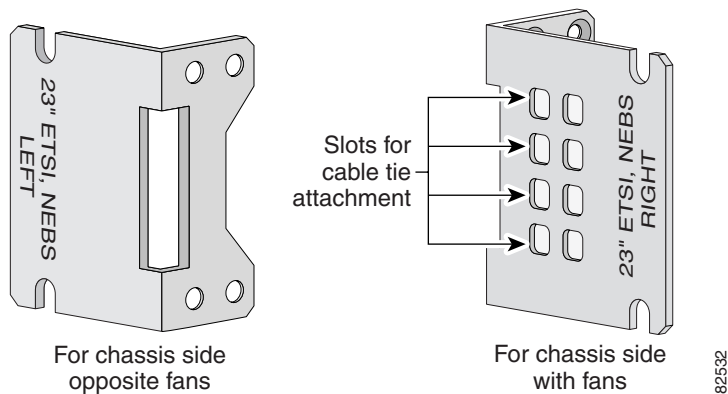
Figure 3-4   Cisco 3640 Rack-Mount Brackets

Bracket for 19-inch rack   Bracket for 23- or 24-inch rack
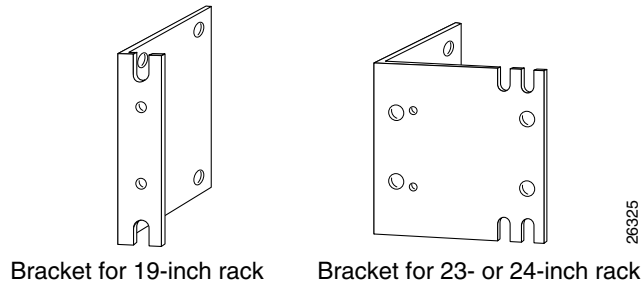
Figure 3-5   Cisco 3660 Rack-Mount Brackets

Bracket for 19-inch rack   Bracket for 23-inch rack
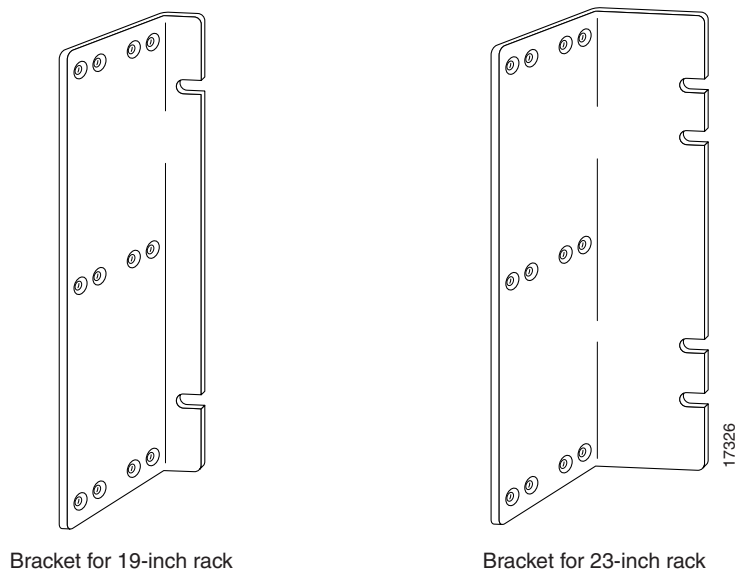
Attaching Brackets to the Router

You can rack-mount a Cisco 3600 series router with either the front or the rear of the chassis facing forward. See the following sections for bracket installation instructions for each chassis orientation:

- Front-Panel-Forward Installation, page 3-6
- Rear-Panel-Forward Installation, page 3-9
- Center-Mount Installation, page 3-12

Note   Use the screws supplied with the brackets for this installation.

Note   If you are installing a Cisco 3620 or Cisco 3640 router in a 19-inch rack with a 17.5-inch opening, orient the brackets so that they will not need to slide between the chassis and the rack; the 17.5-inch rack opening is not wide enough for the chassis plus the bracket thickness. (See Figure 3-6, Figure 3-7, Figure 3-12 and Figure 3-13.)

> ✎
> **Note** In this publication, references to Cisco 3660 routers include both Cisco 3661 and Cisco 3662 models.

Front-Panel-Forward Installation

Figure 3-6 through Figure 3-11 show the front-panel-forward bracket attachment locations.

> ✎
> **Note** When installed in a 19-inch rack with a 17.5-inch opening, the Cisco 3620 and Cisco 3640 routers protrude beyond the front of the rack.

Figure 3-6   Cisco 3620 or Cisco 3640 Bracket Attachment—Front Panel Forward (19-Inch Rack with a 17.5-Inch Opening or 17.75-Inch Opening)
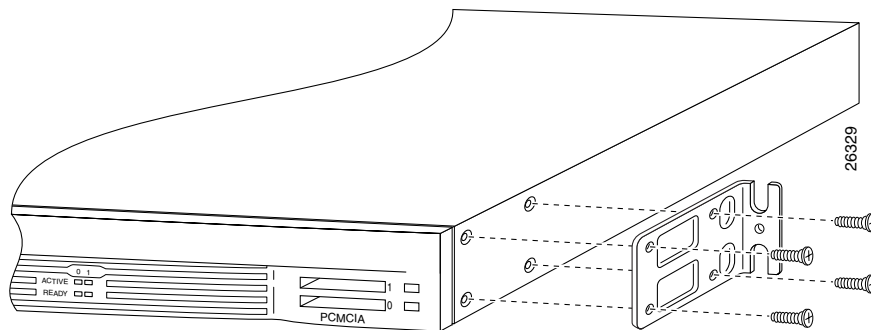
Note: The second bracket attaches to the other side of the chassis.

Figure 3-7   Cisco 3620 or Cisco 3640 Bracket Attachment—Front Panel Forward (19-Inch Rack with a 17.75-Inch Opening)
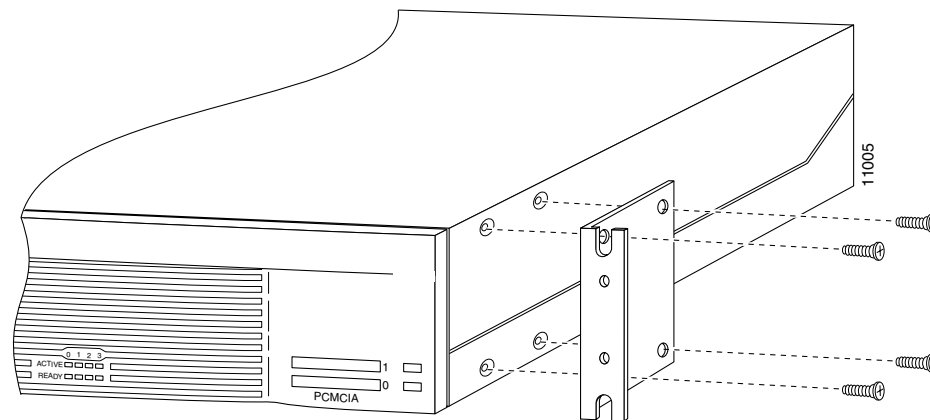
Note: The second bracket attaches to the other side of the chassis.

*Figure 3-8   Cisco 3620 or Cisco 3640 Bracket Attachment—Front Panel Forward
(23- or 24-Inch Rack)*
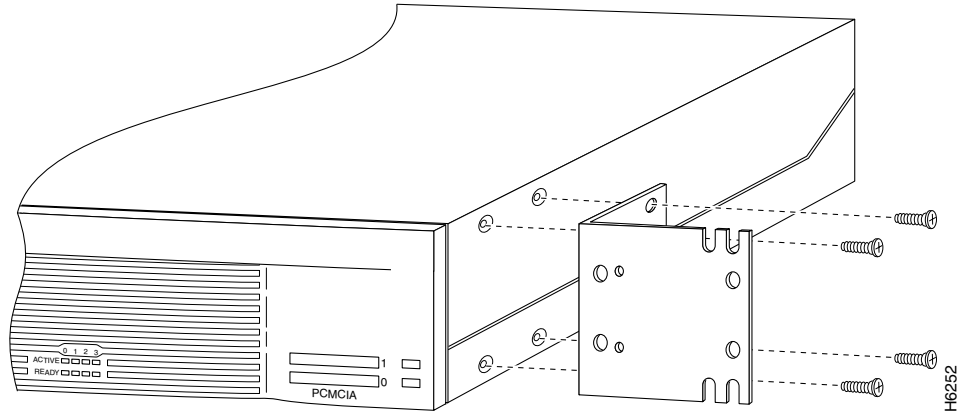
Note: The second bracket attaches to the other side of the chassis.

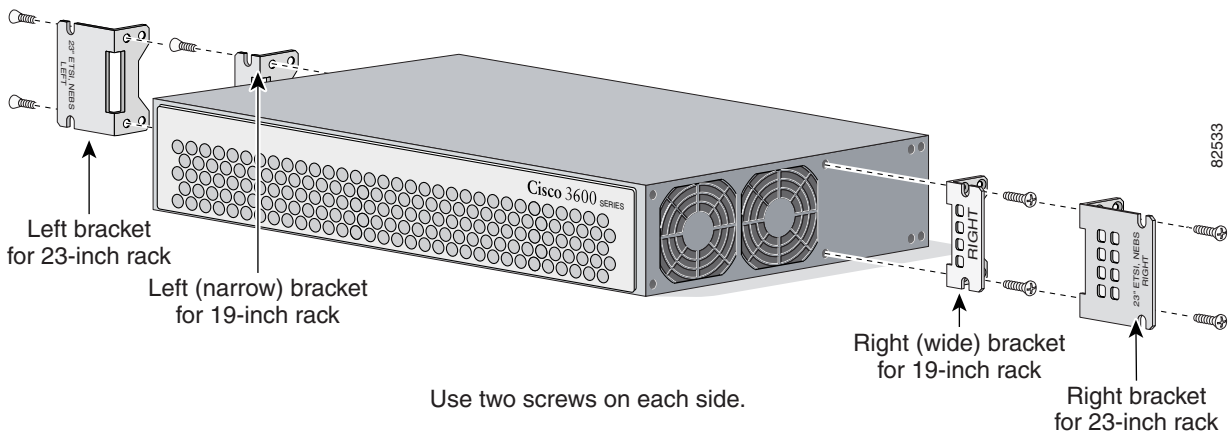*Figure 3-9   Cisco 3631 Bracket Attachment—Front Panel Forward (19- and 23-Inch Racks)*

Left bracket
for 23-inch rack

Left (narrow) bracket
for 19-inch rack

Use two screws on each side.

Right bracket
for 23-inch rack

Right (wide) bracket
for 19-inch rack
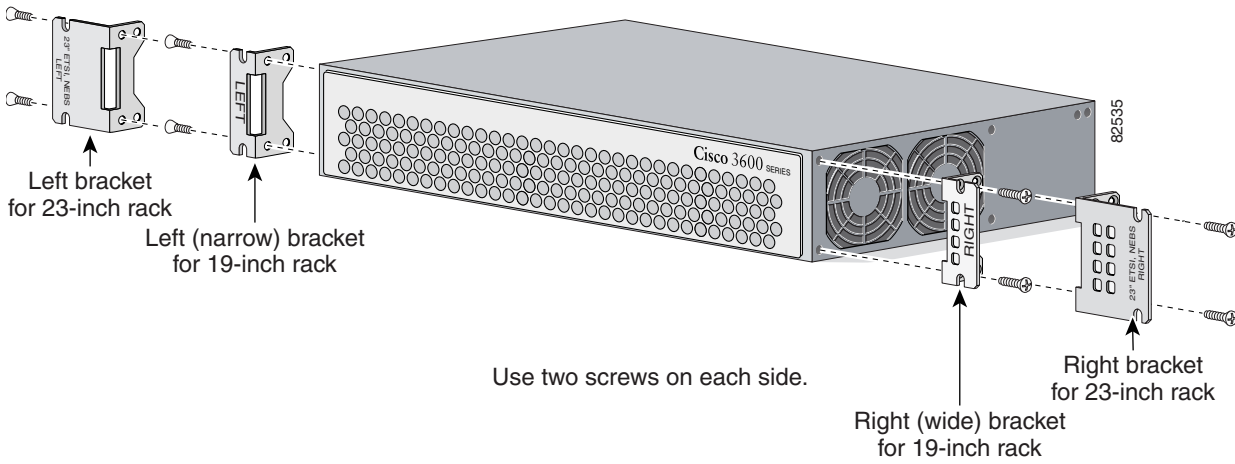
Figure 3-10   Cisco 3660 Bracket Attachment—Front Panel Forward (19-Inch Rack)

17327
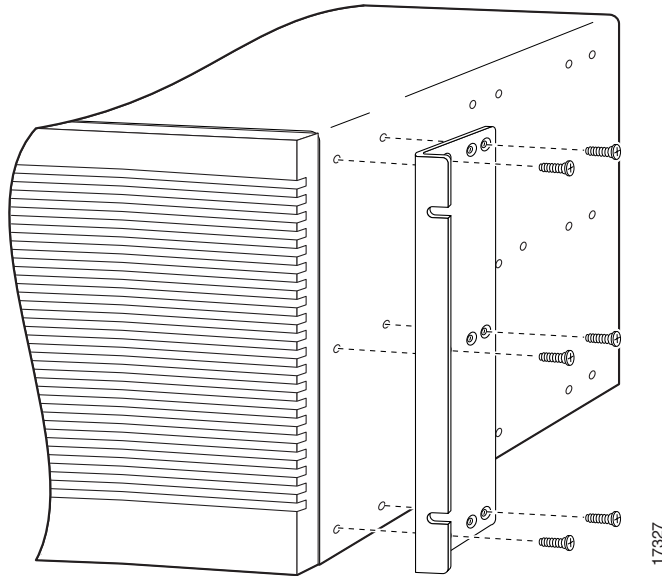
Note: The second bracket attaches to the other side of the chassis.

Figure 3-11   Cisco 3660 Bracket Attachment—Front Panel Forward (23-Inch Rack)

26322
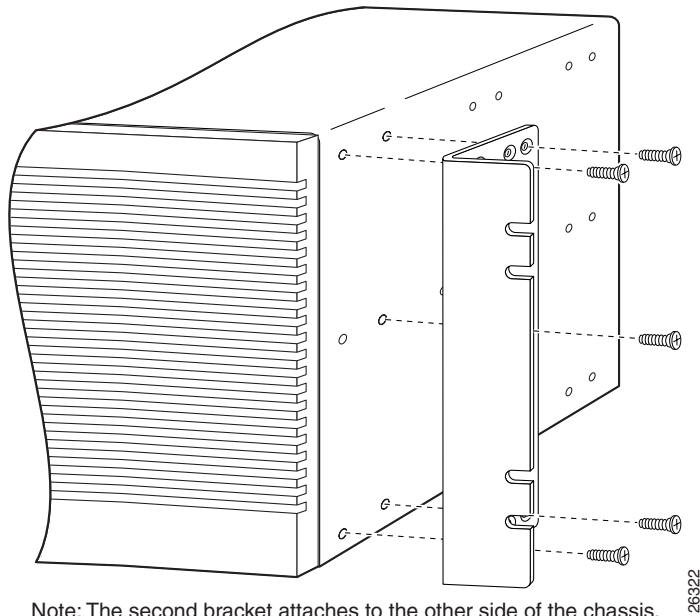
Note: The second bracket attaches to the other side of the chassis.

Rear-Panel-Forward Installation

Figure 3-12 through Figure 3-17 show the rear-panel-forward bracket attachment locations.

Figure 3-12   Cisco 3620 or Cisco 3640 Bracket Attachment—Rear Panel Forward (19-Inch Rack with a 17.5-Inch Opening)
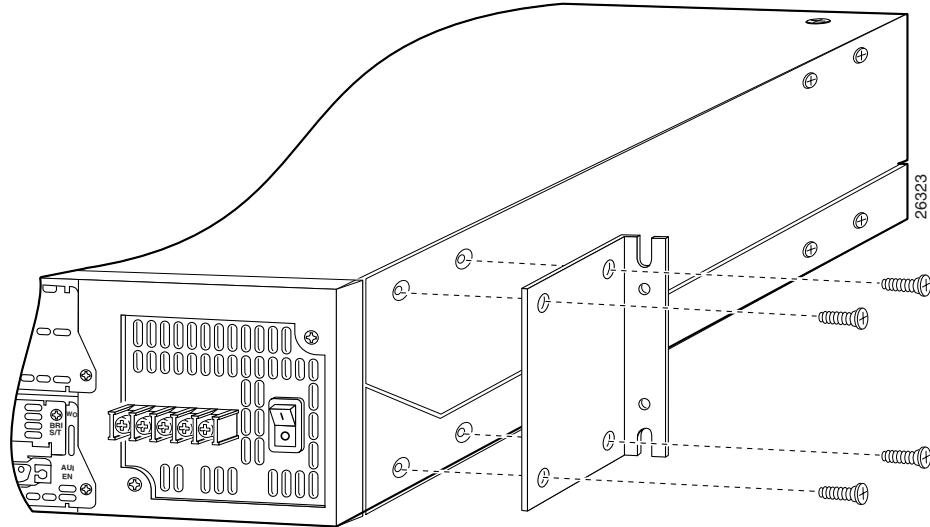
Note: The second bracket attaches to the other side of the chassis.

Figure 3-13   Cisco 3620 or Cisco 3640 Bracket Attachment—Rear Panel Forward (19-Inch Rack with a 17.75-Inch Opening)
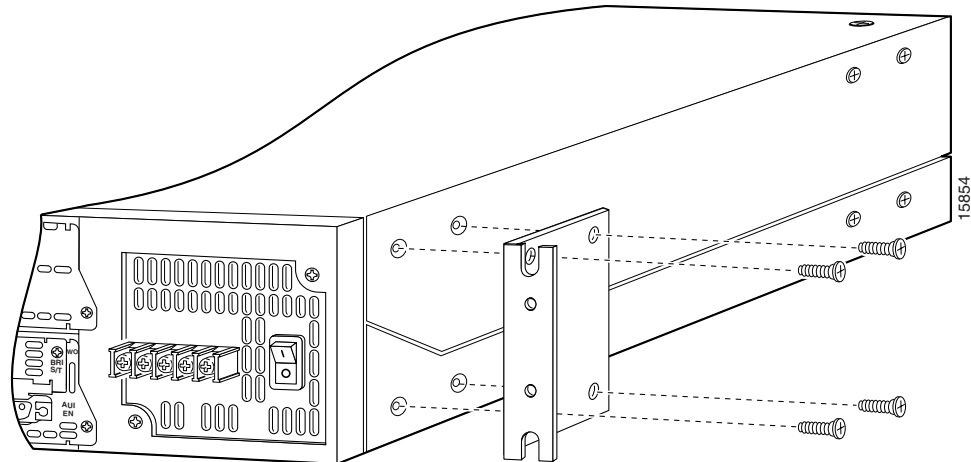
Note: The second bracket attaches to the other side of the chassis.

Figure 3-14   Cisco 3620 or Cisco 3640 Bracket Attachment—Rear Panel Forward (23- or 24-Inch Rack)
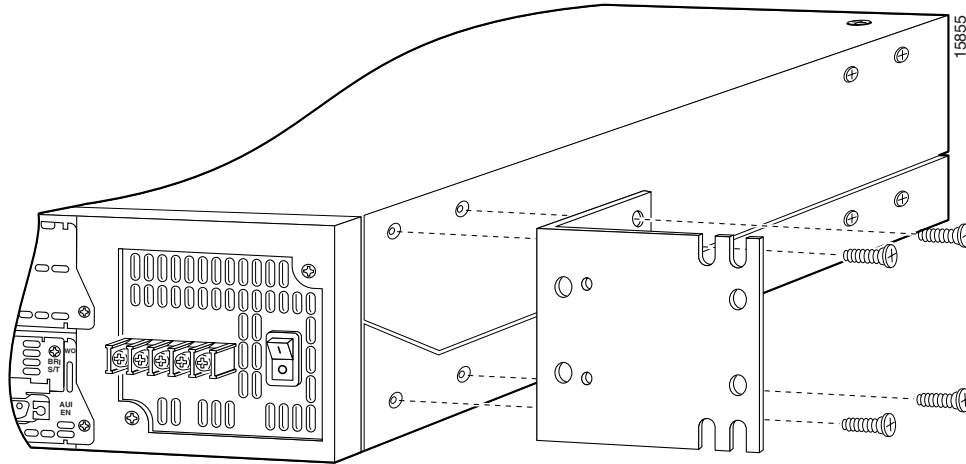
Note: The second bracket attaches to the other side of the chassis.

Figure 3-15   Cisco 3631 Bracket Attachment—Rear Panel Forward (19- or 23-Inch Rack)

Right bracket
for 23-inch rack

Right (wide) bracket
for 19-inch rack

Four screws are required on each side.

Left (narrow) bracket
for 19-inch rack

Left bracket
for 23-inch rack
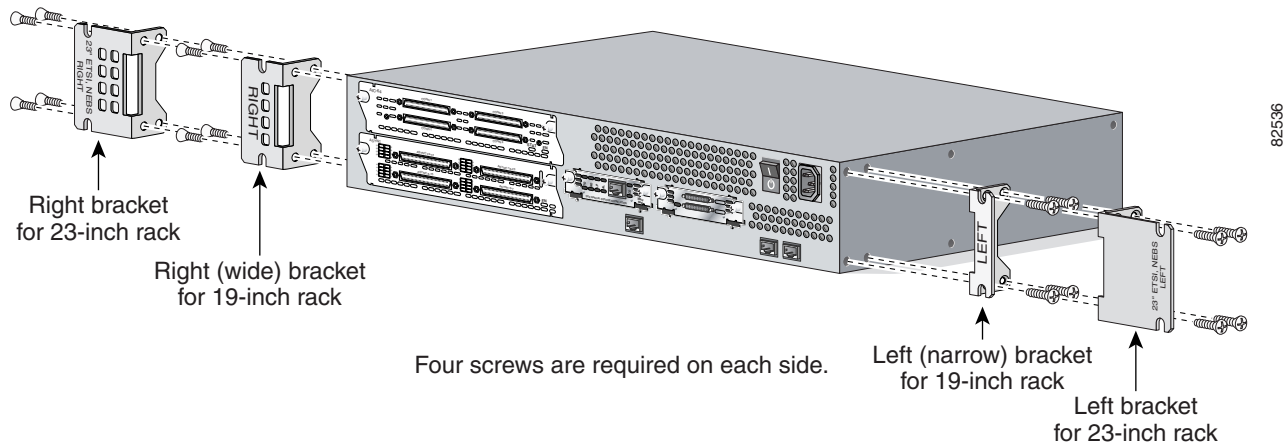
Figure 3-16   Cisco 3660 Bracket Attachment—Rear Panel Forward (19-Inch Rack)
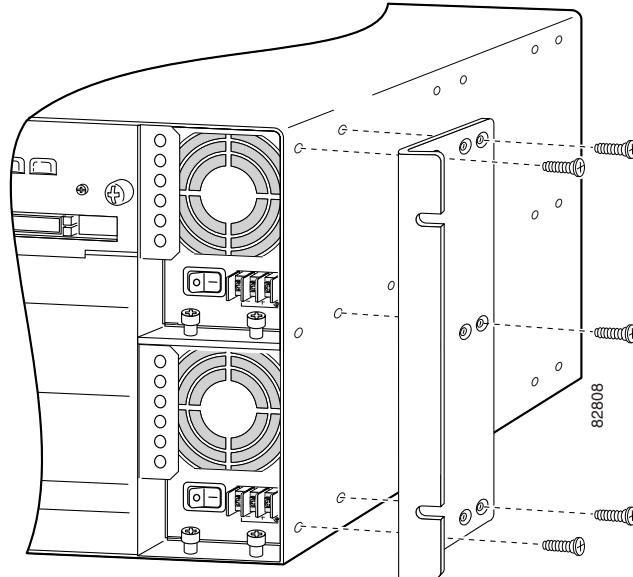
Note: The second bracket attaches to the other side of the chassis.

Figure 3-17   Cisco 3660 Bracket Attachment—Rear Panel Forward (23-Inch Rack)
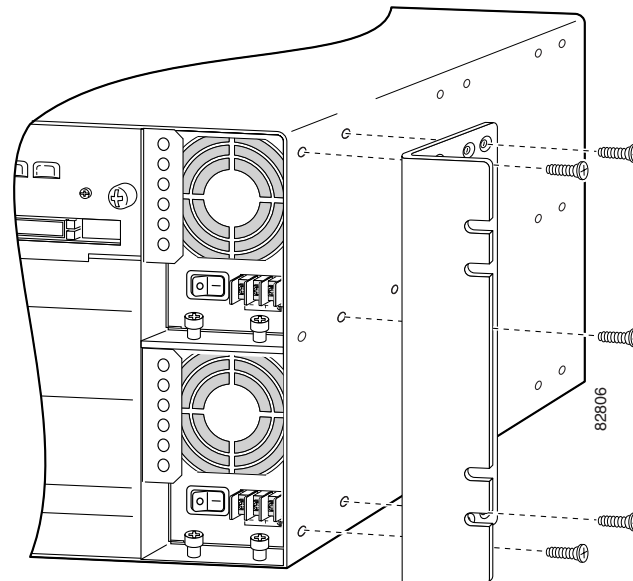
Note: The second bracket attaches to the other side of the chassis.

Center-Mount Installation

Figure 3-18 through Figure 3-22 show how to install brackets for a center-mounted rack installation.

Figure 3-18   Cisco 3620 Center-Mount Bracket Attachment
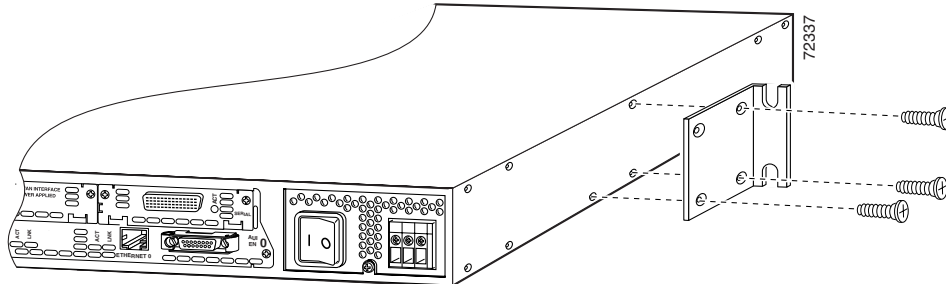
Note: The second bracket attaches to the other side of the chassis.

Figure 3-19   Cisco 3631 Center-Mount Bracket Attachment—Front Panel Forward (19- or 23-Inch Rack)

Figure 3-20   Cisco 3631 Center-Mount Bracket Attachment—Rear Panel Forward (19- or 23-Inch Rack)
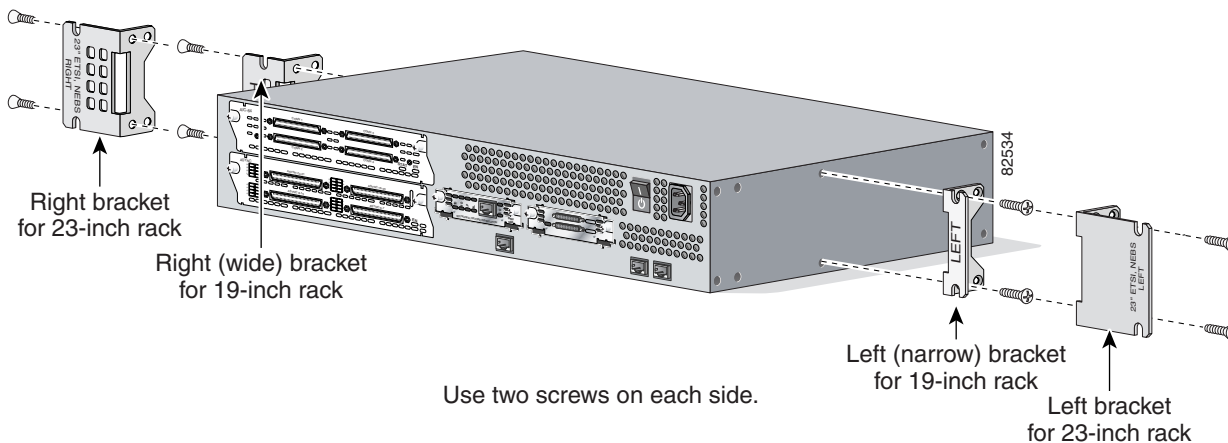
Figure 3-21   Cisco 3640 Center-Mount Bracket Attachment (Requires Optional NEBS/ETSI Kit)
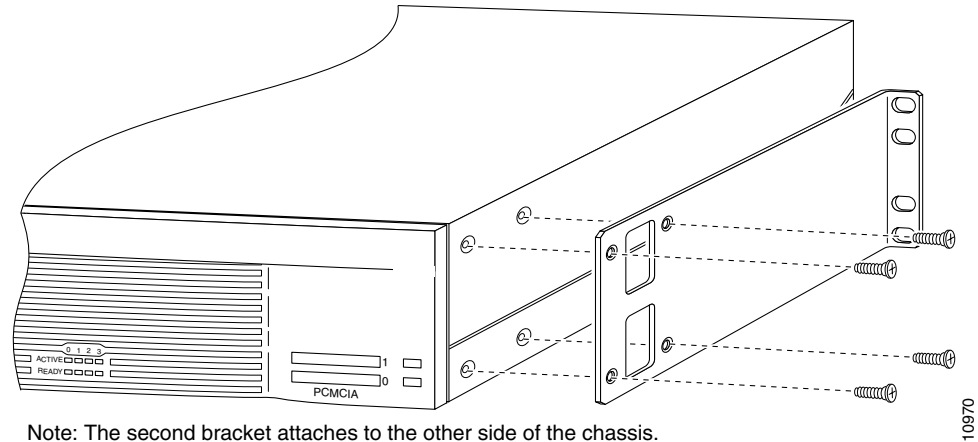
Note: The second bracket attaches to the other side of the chassis.
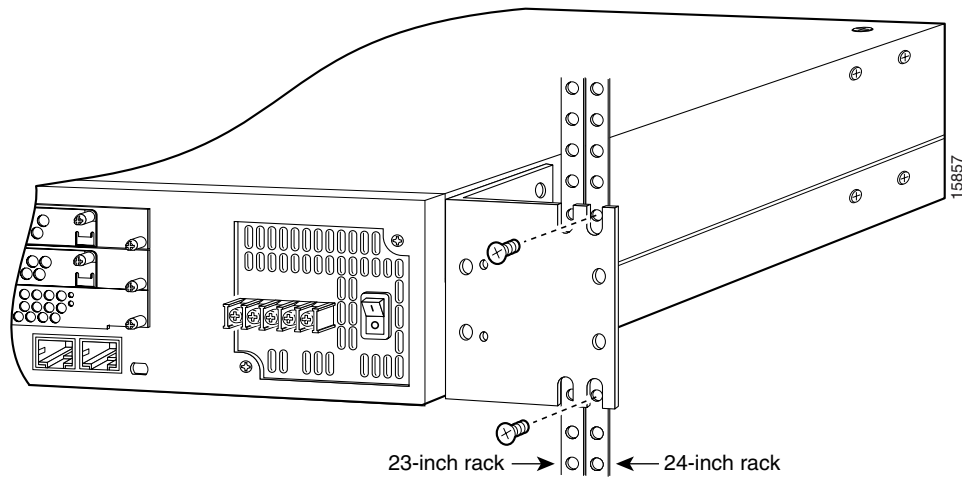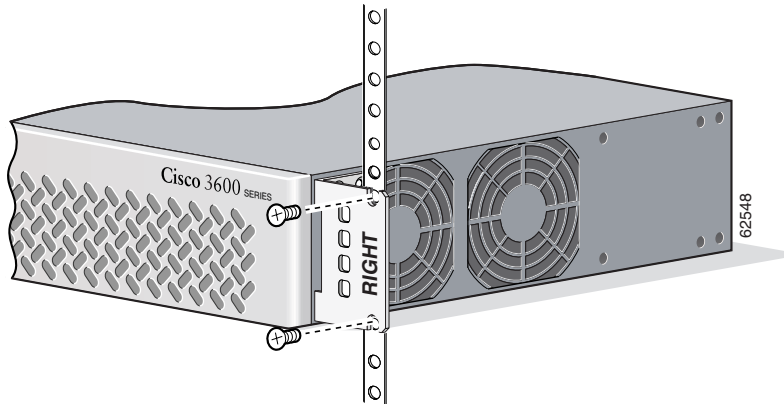
Figure 3-22   Cisco 3660 Center-Mount Bracket Attachment
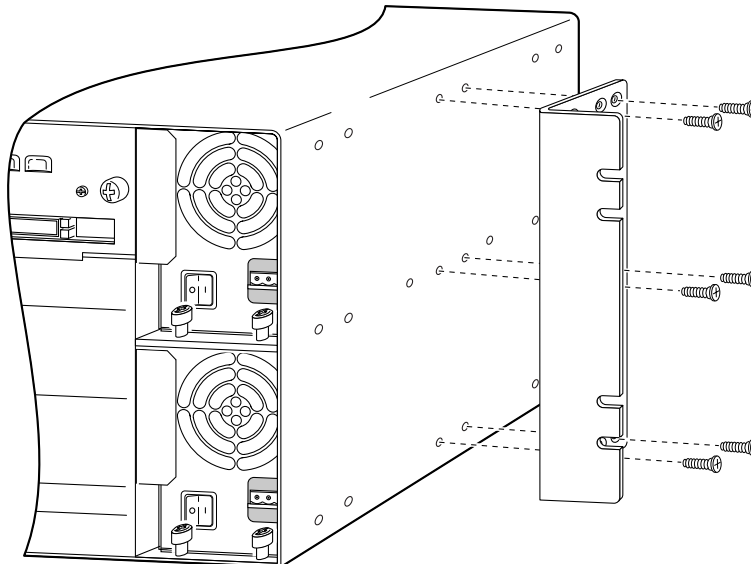
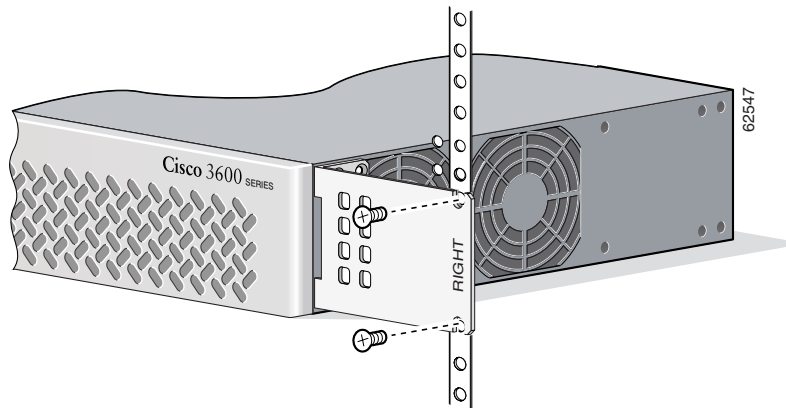

Note: The second bracket attaches to the other side of the chassis.
      The brackets can also be installed with the front panel forward.

Mounting the Router in the Rack

After you attach the brackets to the router, slide the router into the rack in the position shown in one of the following illustrations. Using your own screws, fasten the chassis to the rack.

⚠ **Warning**   **To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:**

*   **This unit should be mounted at the bottom of the rack if it is the only unit in the rack.**
*   **When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.**
*   **If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.** Statement 1006

⚠ **Warning**   **To prevent personal injury or damage to the chassis, never attempt to lift or tilt the chassis using the handles on modules (such as power supplies, fans, or cards); these types of handles are not designed to support the weight of the unit.** Statement 1032

Figure 3-23 through Figure 3-25 show the Cisco 3640 router in a standard 19-, 23-, or 24-inch rack. The procedure is the same for the Cisco 3620 router.

Figure 3-26 through Figure 3-29 show the Cisco 3631 and Cisco 3660 router in a standard 19- or 23-inch rack.

Figure 3-23   Mounting the Cisco 3620 or Cisco 3640 Router (19-Inch Rack with a 17.5-Inch Opening)
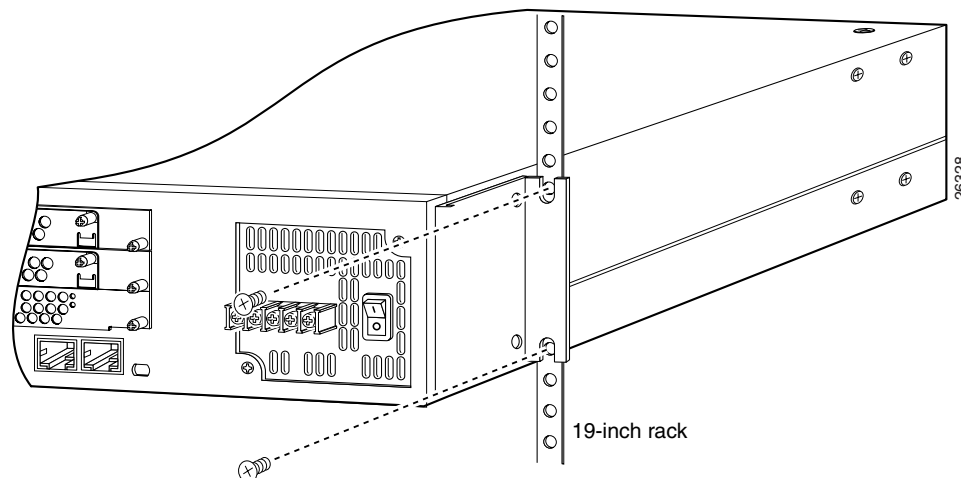
19-inch rack

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

Figure 3-24   Mounting the Cisco 3620 or Cisco 3640 Router (19-Inch Rack with a 17.75-Inch Opening)
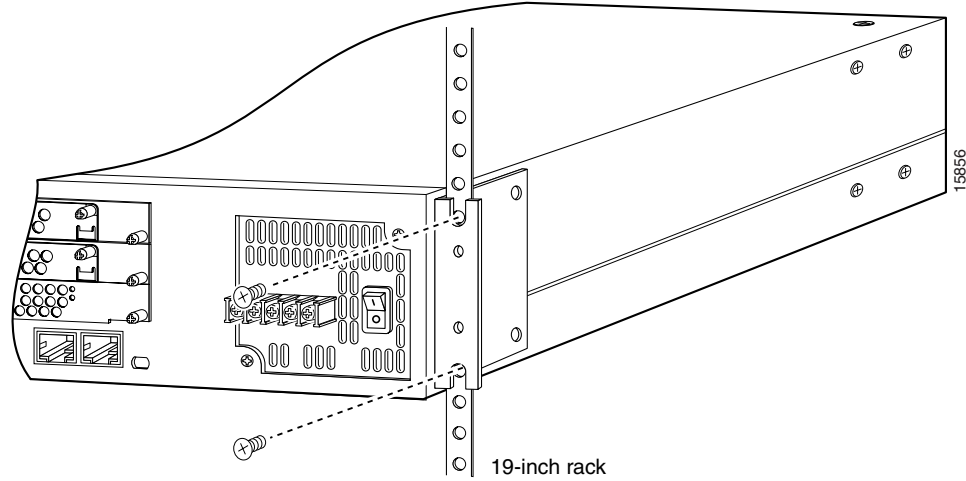
Note: The second bracket attaches to the rack at the other side of the chassis.
The brackets can also be installed with the front panel forward.

Figure 3-25   Mounting the Cisco 3620 or Cisco 3640 Router (23- or 24-Inch Rack)

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

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Figure 3-26   Mounting the Cisco 3631 Router (19-Inch Rack)

Note: The brackets can also be installed with the rear panel forward.

Figure 3-27   Mounting the Cisco 3631 Router (23- Inch Rack)

Note: The brackets can also be installed with the rear panel forward.

Figure 3-28   Mounting the Cisco 3660 Router (19-Inch Rack)
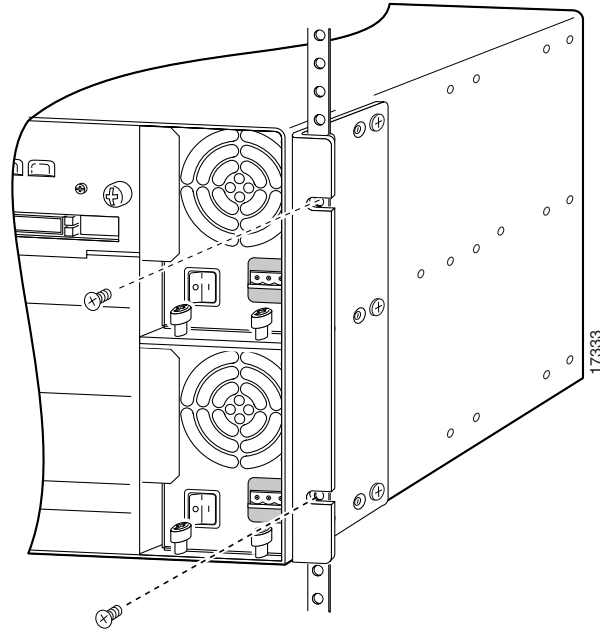
Note: The second bracket attaches to the rack at the other side of the
        chassis. The brackets can also be installed with the front panel forward.

Figure 3-29   Mounting the Cisco 3660 Router (23-Inch Rack)
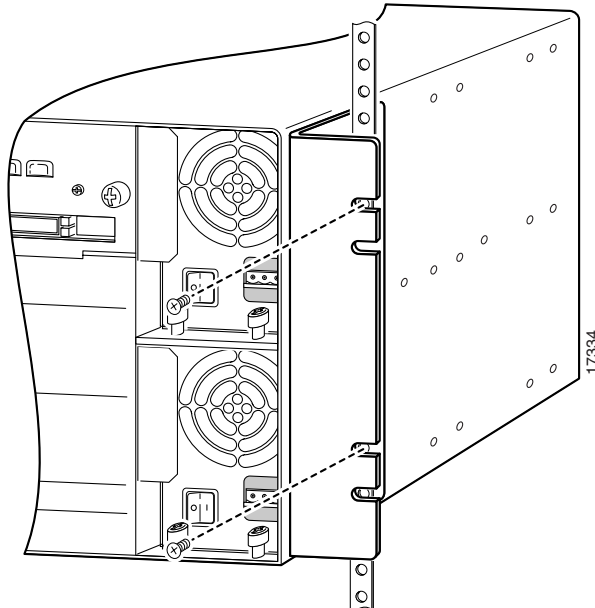
Note: The second bracket attaches to the rack at the other side of the
        chassis. The brackets can also be installed with the front panel forward.

After the router has been installed, you must connect the chassis to a reliable earth ground. For the
chassis ground connection procedures, see the "Installing Chassis Ground Connection" section on
page 3-19.

Wall-Mounting the Cisco 3620 Router

This section explains how to mount the Cisco 3620 router on a wall.

Tip   When choosing a wall-mounting location, consider cable limitations and wall structure.

The router is shipped with 19-inch rack-mount brackets, which can also be used for wall-mounting. If you ordered the 23- or 24-inch brackets, either pair could be used to wall-mount your router. The rubber feet are required to provide spacing between the wall and the router for ventilation and proper cooling.

Attaching Rubber Feet to the Router

Attach the rubber feet supplied in the accessory kit. Peel the rubber feet off the black adhesive strip and attach one rubber foot at each corner of the underside of the chassis.

Attaching Wall-Mount Brackets to the Router

To install the Cisco 3620 router on a wall, first attach the brackets on each side of the chassis as shown in Figure 3-30, using plastic washers and slotted hex-head screws. Position the washers so that the narrow shoulder faces the router chassis.

Note   The hex-head screws and plastic washers are used only for wall-mounting the router. For rack-mounting, the brackets are attached using Phillips-head screws, without washers.

Figure 3-30   Attaching Wall-Mount Brackets to the Cisco 3620 Router
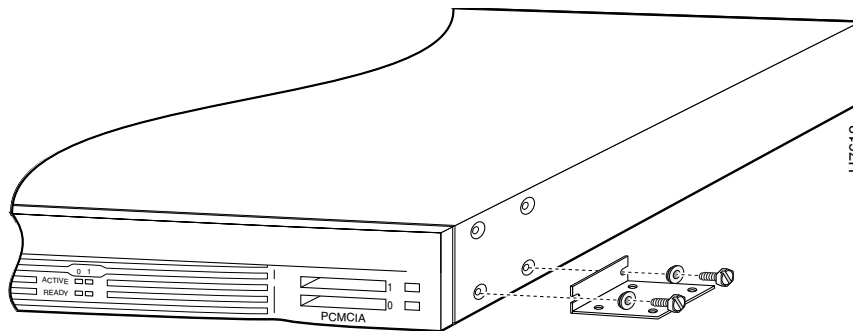
Note: The second bracket attaches to the other side of the chassis.

Mounting the Router on the Wall

After fastening the brackets to the chassis, mount the chassis on the wall:

- Orient the front and rear of the chassis vertically.
- Position the end nearest the power cable at the top.
- Align the screws (not included) with a wall stud, or use wall anchors.

After the router is installed, you must connect the chassis to a reliable earth ground. For the chassis ground connection procedures, see the "Installing Chassis Ground Connection" section on page 3-19.

Installing Chassis Ground Connection

All Cisco 3600 series router chassis require a reliable earth ground connection. You must connect the chassis to a reliable earth ground; the ground wire must be installed in accordance with local electrical safety standards.

- For NEBS-compliant grounding, use size AWG 6 (13 mm^2) wire and the ground lug provided in the accessory kit.
- For NEC-compliant grounding, use size AWG 14 (2 mm^2) or larger wire and an appropriate user-supplied ring terminal.
- For EN/IEC 60950-compliant grounding, use size AWG 18 (1 mm^2) or larger wire and an appropriate user-supplied ring terminal.

For chassis grounding instruction, see one of the following sections:

Cisco 3620 and Cisco 3640 Chassis Ground Connection

To connect a Cisco 3620 or Cisco 3640 chassis to ground, perform this procedure:

Step 1 Attach the ground-lug bracket to the power supply as shown in Figure 3-31 or Figure 3-32. Use a number 2 Phillips screwdriver and the screw or screws that are already in the router chassis.

For Cisco 3620 routers, use the power-supply retaining screw at the bottom of the power supply.

For Cisco 3640 routers, use the two power-supply retaining screws: one at the lower left and one at the upper right.

DC power supply is shown. The bracket attachment for the AC power supply and the Cisco Redundant Power System (RPS) is similar.

Figure 3-31   Required Ground-Lug Bracket Attachment on a Cisco 3620 Router (DC Power Supply Shown)

Power supply
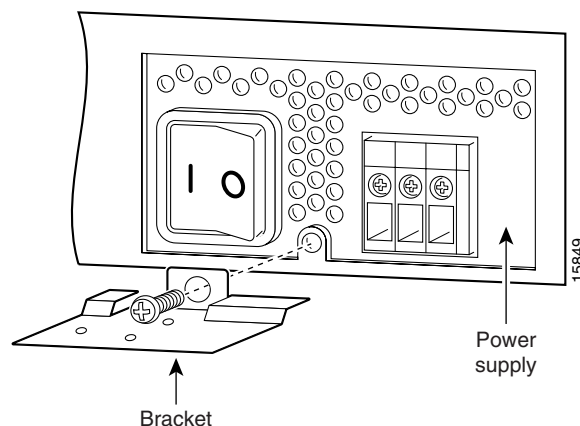
Bracket

Figure 3-32   Required Ground-Lug Bracket Attachment on a Cisco 3640 Router (DC Power Supply Shown)
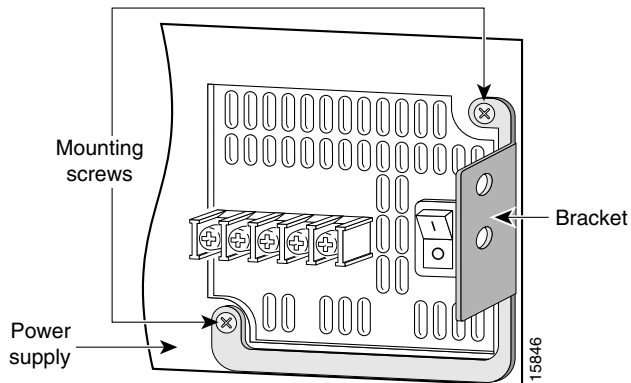
Step 2   Strip one end of the ground wire to the length required for the ground lug or terminal.

  – For the NEBS ground lug—approximately 0.75 in. (20 mm)

  – For user-provided ring terminal—as required

Step 3   Crimp the ground wire to the ground lug or ring terminal, using a crimp tool of the appropriate size.

Step 4   Attach the ground lug to the ground-lug bracket as shown in Figure 3-33, Figure 3-34, or Figure 3-35, or attach the ring terminal to the ground-lug bracket as shown in Figure 3-36, Figure 3-37, or Figure 3-38. For the ground lug, use the two screws with captive locking washers provided. For a ring terminal, use one of the screws provided. Use a number 2 Phillips screwdriver, and tighten the screws to a torque of 8 to 10 in-lb (0.9 to 1.1 N-m).

Where a DC power supply is shown, AC power supply attachment is similar.

Diagonal attachment of the ground lug to the bracket provides clearance for the RPS power cable.

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

Figure 3-33   NEBS-Compliant Ground Lug Attachment on a Cisco 3620 Router with Internal AC or DC Power Supply
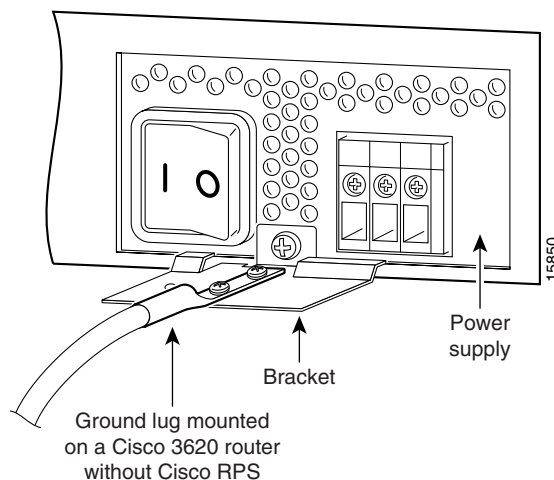
Figure 3-34   NEBS-Compliant Ground Lug Attachment on a Cisco 3620 Router with Redundant Power Supply (Cisco RPS)
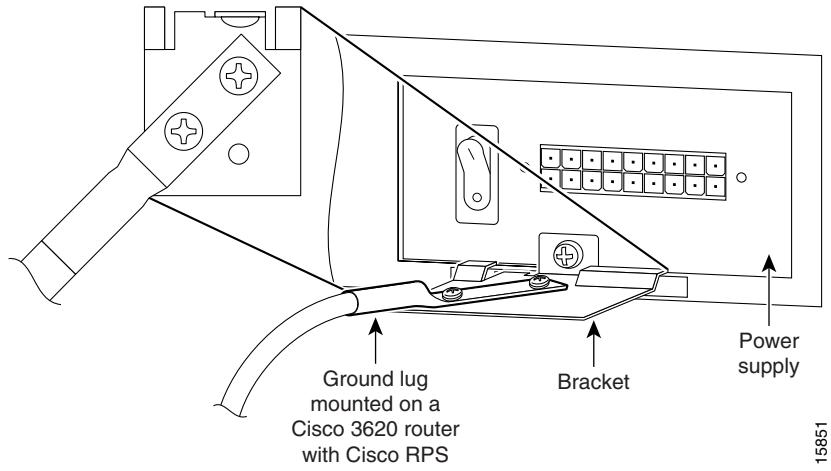
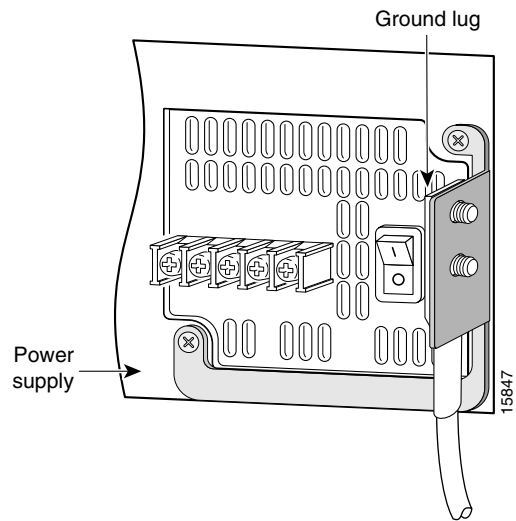*Figure 3-35   NEBS-Compliant Ground Lug Attachment on a Cisco 3640 Router*

Figure 3-36   Ground Lug Attachment Using Ring Terminal on a Cisco 3620 Router with Internal AC or DC Power Supply
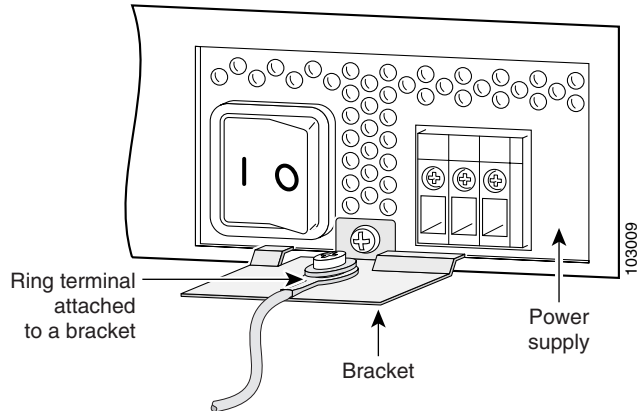

Figure 3-37   Ground Lug Attachment Using Ring Terminal on a Cisco 3620 Router with Redundant Power Supply (Cisco RPS)
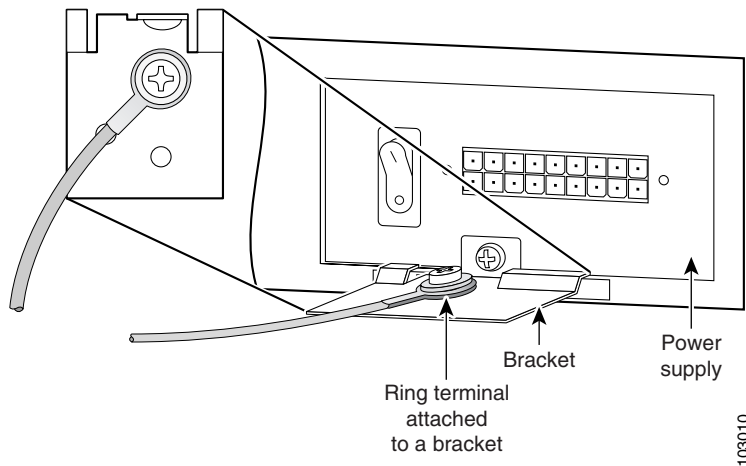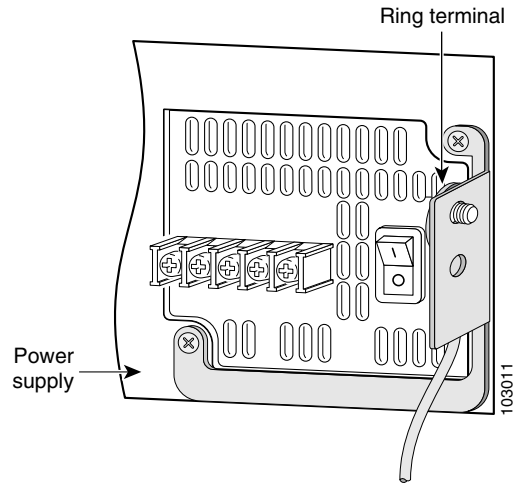
Figure 3-38   Ground Lug Attachment Using Ring Terminal on a Cisco 3640 Router

After the router has been installed and properly grounded, you can connect the power wiring; the WAN, LAN, and voice cables; and the cables for administrative access, as required for your installation. For cable connection procedures, see the "Power Connections" section on page 3-27, the "Connecting WAN, LAN, and Voice Cables" section on page 3-37, and the "Connecting to a Console Terminal or Modem" section on page 3-43.

Cisco 3631 Chassis Ground Connection

To connect a Cisco 3631 chassis to ground, perform this procedure:

Step 1 Strip one end of the ground wire to the length required for the ground lug or terminal.

- For the NEBS ground lug—approximately 0.75 in. (20 mm)
- For user-provided ring terminal—as required

Step 2 Crimp the ground wire to the ground lug or ring terminal, using a crimp tool of the appropriate size.

Step 3 Attach the ground lug or ring terminal to the chassis as shown in Figure 3-39 or Figure 3-40. For the ground lug, use the two screws with captive locking washers provided. For a ring terminal, use one of the screws provided. Use a number 2 Phillips screwdriver, and 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 3-39   NEBS-Compliant Ground Lug Attachment on a Cisco 3631 Router
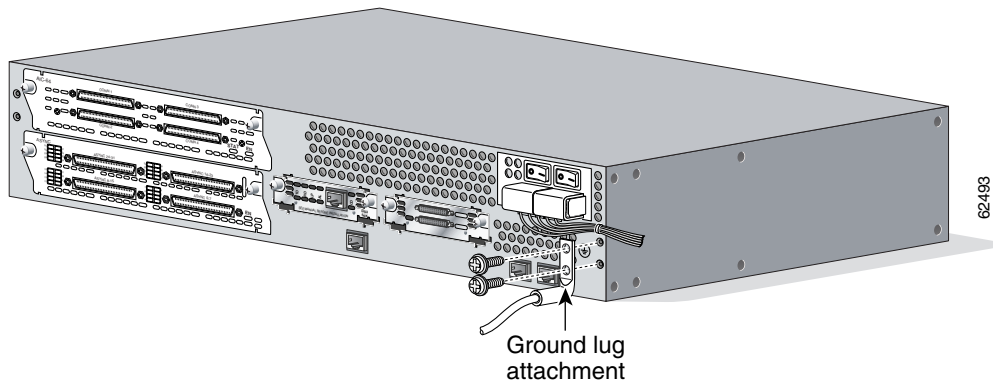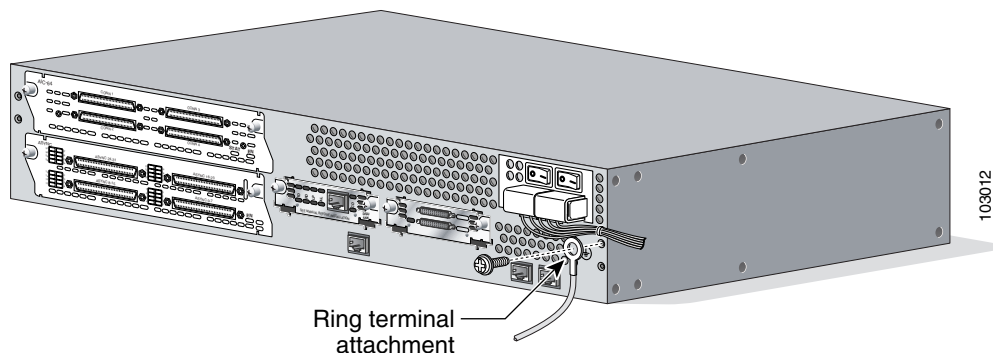

Figure 3-40   Chassis Ground Connection Using Ring Terminal on a Cisco 3631 Router

After the router has been installed and properly grounded, you can connect the power wiring; the WAN, LAN, and voice cables; and the cables for administrative access, as required for your installation. For cable connection procedures, see the "Power Connections" section on page 3-27, the "Connecting WAN, LAN, and Voice Cables" section on page 3-37, and the "Connecting to a Console Terminal or Modem" section on page 3-43.

Cisco 3660 Chassis Ground Connection

To connect a Cisco 3660 chassis to ground, perform this procedure:

Step 1 Strip one end of the ground wire to the length required for the ground lug or terminal.

– For the NEBS ground lug—approximately 0.75 in. (20 mm)

– For user-provided ring terminal—as required

Step 2 Crimp the ground wire to the ground lug or ring terminal, using a crimp tool of the appropriate size.

Step 3 Attach the ground lug or ring terminal to the chassis as shown in Figure 3-41 or Figure 3-42. For the ground lug, use the two screws with captive locking washers provided. For a ring terminal, use one of the screws provided. Use a number 2 Phillips screwdriver, and 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.

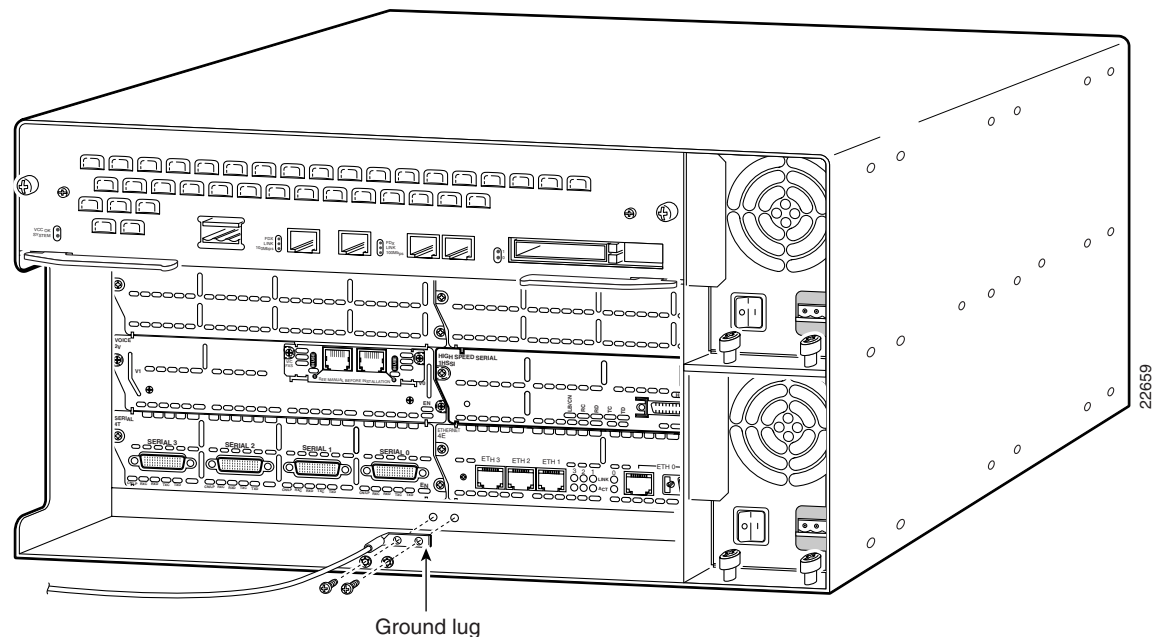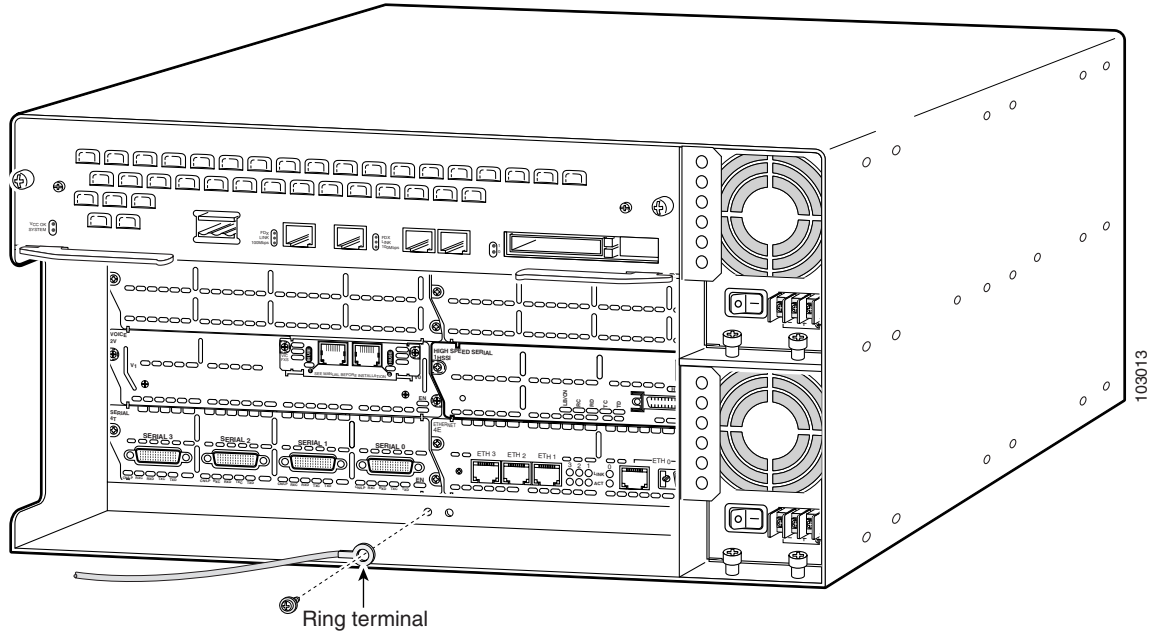*Figure 3-41   NEBS-Compliant Ground Lug Attachment on a Cisco 3660 Router*

Ground lug

Figure 3-42   Chassis Ground Connection Using Ring Terminal on a Cisco 3660 Router

Ring terminal

After the router has been installed and properly grounded, you can connect the power wiring; the WAN, LAN, and voice cables; and the cables for administrative access, as required for your installation. For cable connection procedures, see the "Power Connections" section on page 3-27, the "Connecting WAN, LAN, and Voice Cables" section on page 3-37, and the "Connecting to a Console Terminal or Modem" section on page 3-43.

Power Connections

This section explains how to connect AC or DC power to Cisco 3600 series routers. It covers the following topics:

Connecting Routers to AC Power

If your router uses AC power, connect it to a 15 A, 120 VAC (10 A, 240 VAC) circuit with overcurrent protection.

Note The input voltage tolerance limits for AC power are 85 and 264 VAC.

Warning **AC connected units must have a permanent ground connection in addition to the power cable ground wire. NEBS-compliant grounding satisfies this requirement.** Statement 284

Warning **This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than:**
15A, 120VAC (10A, 240VAC). Statement 1005

Connecting Routers to a DC-Input Power Supply

Warning **Before performing any of the following procedures, ensure that power is removed from the DC circuit.** Statement 1003

Warning **This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than:**
15A, 60VDC. Statement 1005

Warning **Use copper conductors only.** Statement 1025

Note The installation must comply with the 1996 National Electric Code (NEC) and other applicable codes.

If your router has a DC-input power supply, follow the directions in this section for proper wiring. A router with a DC-input power supply has a terminal block for the DC power connections.

Depending on the type of router you are installing, see one of the following procedures:

- Wiring the DC-Input Power Supply in Cisco 3620 and Cisco 3640 Routers, page 3-28
- Wiring the DC-Input Power Supply in Cisco 3631 Routers, page 3-30
- Wiring the DC-Input Power Supply in Cisco 3660 Routers, page 3-32

Wiring the DC-Input Power Supply in Cisco 3620 and Cisco 3640 Routers

If your router has a DC-input power supply, follow the directions in this section for proper wiring.

DC Wiring Requirements

Cisco 3620 and Cisco 3640 routers with a DC-input power supply require copper wire for the power connections.

For Cisco 3640 routers, DC power connections require crimp-type ring terminals or spade terminals with upturned lugs.

Table 3-1   DC Wiring Requirements for Cisco 3620 and Cisco 3640 Routers

DC Power Source	DC Input	DC Input Wire Size	Safety Ground Wire Size	Overcurrent Protection
Nominal 48 VDC	–48 to –60 VDC[1], 4 A	AWG 14 (2.0 mm^2)	AWG 14 (2.0 mm^2)	15 A, maximum

1. The input voltage tolerance limits for nominal 48-V power supplies are 38 and 72 VDC.

Wiring Procedure for Nominal 48 VDC Input

To connect the router to a DC power source, perform this procedure.

Step 1   Remove power from the DC circuit. To ensure that power is removed from the DC circuit, locate the circuit breaker for the DC circuit, switch the circuit breaker to the OFF position, and tape the circuit-breaker switch in the OFF position.

Tip   Secure all power cabling when installing this unit to avoid disturbing field-wiring connections.

Step 2   For Cisco 3620 routers, strip the wires to the appropriate length for the terminal block on the power supply.

For Cisco 3640 routers, crimp appropriate ring terminals or spade terminals to the DC power input wires. Strip the wires to the appropriate length for the terminals used. The following warning applies to Cisco 3640 routers:

Warning   **When stranded wiring is required, use approved wiring terminations, such as closed-loop or spade-type terminals with upturned lugs. These terminations should be the appropriate size for the wires and should clamp both the insulation and conductor.** Statement 1002

Step 3   Connect the DC power input wires to the terminal block as shown in Figure 3-43 or Figure 3-44.

Warning   **The illustration shows the DC power supply terminal block. Wire the DC power supply as illustrated. The proper wiring sequence is ground to ground, positive to positive, and negative to negative. The ground wire should always be connected first and disconnected last.** Statement 239

Caution   The terminal arrangement on your router may not be identical to the arrangement shown in Figure 3-43 or Figure 3-44. You must connect the positive, negative, and ground wires according to the labels on the terminals.

Caution   Do not overtorque the terminal block captive thumbscrew or terminal block contact screws. The recommended torque is 8.2 ±0.4 in-lb (0.9 ± 0.05 N-m).

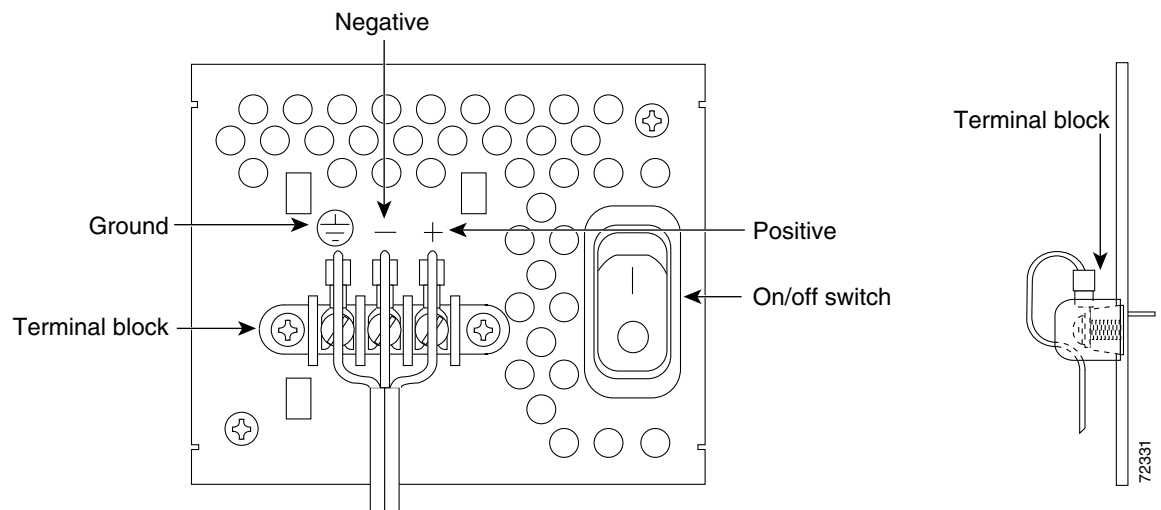*Figure 3-43   DC Power Connections for Cisco 3620 Routers (Typical)*
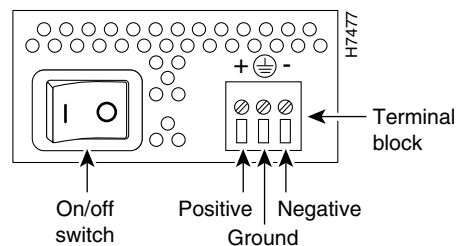
Figure 3-44   DC Power Connections for Cisco 3640 Routers (Typical)

Step 4   Secure the wires using cable ties.

Step 5   Turn on power to the DC circuit.

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Wiring the DC-Input Power Supply in Cisco 3631 Routers

If your router has a DC-input power supply, follow the directions in this section for proper wiring.

DC Wiring Requirements

A Cisco 3631 router with a DC-input power supply requires copper wire and crimp-type terminals for the power connections. Table 3-2 summarizes the wiring requirements.

You can connect a single DC power source to either the A input or the B input. If there are dual power sources, connect one source to the A input and one source to the B input; both sources must be the same polarity and voltage.

Table 3-2   DC Wiring Requirements for Cisco 3631 Routers

Installed Power Supply	DC Input	DC Input Wire Size	Safety Ground Wire Size	Wire Terminal (Lug)	Overcurrent Protection
Nominal 24/48 VDC[1] Identified by a printed label near the DC wire terminals: INPUT +/- 24-36V ⎓ 8 A 36-60V ⎓ 4 A	24 - 36 V, 8 A, positive or negative, single or dual sources	AWG 14 (2.0 mm^2)	AWG 14 (2.0 mm^2)	AMP part number 324159-0, or equivalent	15 A maximum
	36 - 60 V, 4 A, positive or negative, single or dual sources	AWG 18 (1.0 mm^2)	AWG 14 (2.0 mm^2))	Source DC: Molex part number 19193-0009, or equivalent Ground: AMP part number 324159-0, or equivalent	15 A maximum
Nominal 48 VDC[2] Identification stamped near the DC wire terminals: INPUT -48 TO -60V ⎓ 4 A	48 - 60 V, 4 A, positive or negative, single or dual sources	AWG 18 (1.0 mm^2)	AWG 14 (2.0 mm^2)	Source DC: Molex part number 19193-0009, or equivalent Ground: AMP part number 34119, or equivalent	15 A maximum

1. The input voltage tolerance limits for nominal 24/48-V power supplies are 18 and 72 VDC.

2. The input voltage tolerance limits for nominal 48-V power supplies are 38 and 72 VDC.

Wiring Procedure for DC Input

To connect the router to a DC power source, perform the following steps:

Step 1 Remove power from the DC circuit. To ensure that power is removed from the DC circuit, locate the circuit breaker for the DC circuit, switch the circuit breaker to the OFF position, and tape the circuit-breaker switch in the OFF position.

Tip Secure all power cabling when installing this unit to avoid disturbing field-wiring connections.

Step 2 Strip the wires to the appropriate length for the terminals. The strip length is 1/8 to 3/16 inch (3 to 5 mm) for Molex number 19193-0009 and for AMP number 324159-0 terminals.

Step 3 Crimp the terminals to the DC power input wires.

Warning   **When stranded wiring is required, use approved wiring terminations, such as closed-loop or spade-type with upturned lugs. These terminations should be the appropriate size for the wires and should clamp both the insulation and conductor.** Statement 1002

Step 4   Remove the plastic covers from the terminal block. Save them for reinstallation after you finish wiring.

Note   Do not remove the colored screw at either end of the terminal block. Those are the terminal mounting screws.

Step 5   Connect the DC power input wires to the terminal block as shown in Figure 3-45 or Figure 3-46. To avoid interference with the on/off switches, and to bring the wires close to the cable-tie attachment point, organize the wires downward from the terminal block.

Warning   **The illustration shows the DC power supply terminal block. Wire the DC power supply as illustrated. The proper wiring sequence is ground to ground, positive to positive, and negative to negative. The ground wire should always be connected first and disconnected last.** Statement 239

Caution   Do not overtorque the terminal block contact screws. Recommended torque is 8.0 ±0.5 in-lb (0.93 ±0.05 N-m).

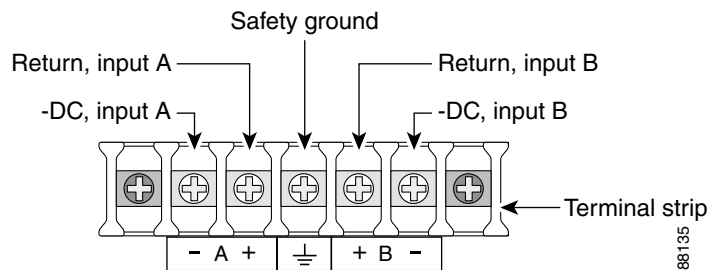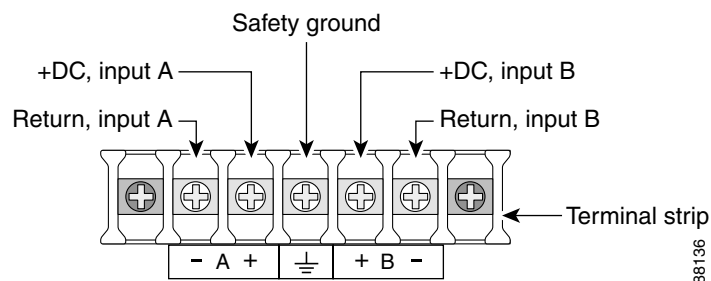*Figure 3-45   DC Power Connections for –DC Input to Cisco 3631 Routers*

Figure 3-46   DC Power Connections for +DC Input to Cisco 3631 Routers


Step 6   Install the plastic covers over the terminal block. (See Figure 3-47.)

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Warning   **The safety cover is an integral part of the product. Do not operate the unit without the safety cover installed. Operating the unit without the cover in place will invalidate the safety approvals and pose a risk of fire and electrical hazards.** Statement 117

Step 7   Secure the wires using cable ties as shown in Figure 3-47. The chassis has a cable-tie attachment below and to the right of the terminal block.

Step 8   Turn on power to the DC circuit.

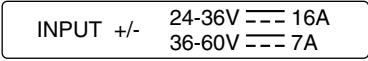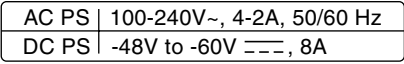*Figure 3-47   Wire Routing and Attachment for Cisco 3631 Routers*
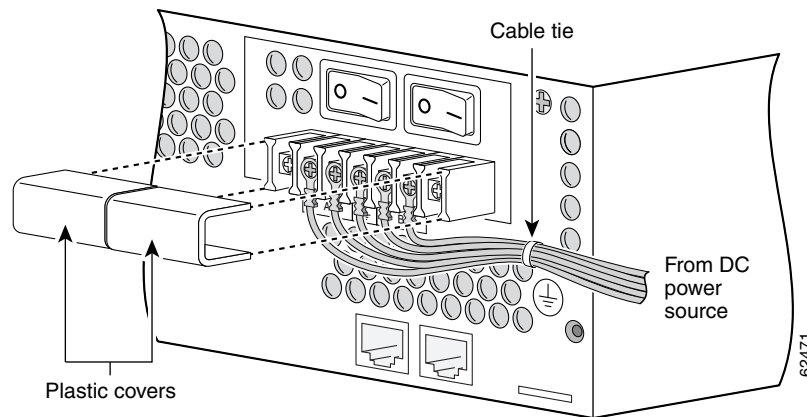
Wiring the DC-Input Power Supply in Cisco 3660 Routers

If your router has a DC-input power supply, follow the directions in this section for proper wiring.

DC Wiring Requirements

A Cisco 3660 router with a DC-input power supply requires copper wire for the power connections. Table 3-3 summarizes the wiring requirements.

Table 3-3   DC Wiring Requirements for Cisco 3660 Routers

Installed Power Supply	DC Input	Wire Size	Wire Termination Method	Safety Ground Wire Size	Overcurrent Protection
Nominal 24/48 VDC[1] Identified by a terminal block and the following printed label: INPUT +/- 24-36V --- 16A / 36-60V --- 7A	24 - 36 V, 16 A	AWG 12 (3.0 mm^2)	Terminal block; wires retained by retention screws	AWG 12 (3.0 mm^2)	20 A maximum
	36 - 60 V, 7 A	AWG 14 (2.0 mm^2), minimum	Terminal block; wires retained by retention screws	AWG 12 or 14 (3.0 or 2.0 mm^2)	15 A maximum
Nominal 48 VDC[2] Identified by a plug connector and the following printed label: AC PS | 100-240V~, 4-2A, 50/60 Hz DC PS | -48V to -60V ---, 8A	48 - 60 V, 8 A	AWG 14 (2.0 mm^2), minimum	Plug connector; wires retained by spring-loaded receptacle	AWG 12 or 14 (3.0 or 2.0 mm^2)	15 A maximum

1. The input voltage tolerance limits for nominal 24/48-V power supplies are 18 and 72 VDC.

2. The input voltage tolerance limits for nominal 48-V power supplies are 38 and 72 VDC.

Wiring Procedure for DC Input

To connect the router to a DC power source, perform the following steps:

Step 1   Remove power from the DC circuit. To ensure that power is removed from the DC circuit, locate the circuit breaker for the DC circuit, switch the circuit breaker to the OFF position, and tape the circuit-breaker switch in the OFF position.

Tip   Secure all power cabling when installing this unit to avoid disturbing field-wiring connections.

Step 2   Cut the wires to length. Allow enough length for attachment to the bracket and for a service loop. (See Figure 3-47.)

Step 3   Strip the insulation to expose approximately 0.4 inch (10 mm) of conductor.

Step 4   If the power supply in your router has screw terminals, first connect the safety ground wire to the safety ground terminal of the DC terminal block, and then connect the power wires to the appropriate terminals of the DC terminal block. (See Figure 3-48 or Figure 3-49.) Tighten the terminal screw to a torque of 8.0 ± 0.5 in-lb (0.93 ± 0.05 N-m).

Warning   **The illustration shows the DC power supply terminal block. Wire the DC power supply as illustrated. The proper wiring sequence is ground to ground, positive to positive, and negative to negative. The ground wire should always be connected first and disconnected last.** Statement 239

Figure 3-48   Terminal Block Connections for –DC Input Power to Cisco 3660 Routers
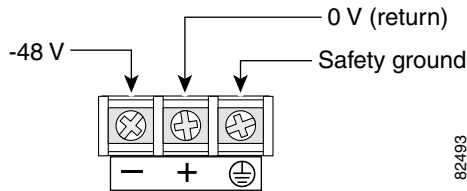
*Figure 3-49   Terminal Block Connections for +DC Input Power to Cisco 3660 Routers*
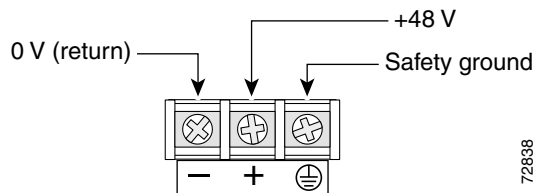
If the power supply in your router has a plug connector, press the corresponding orange-colored release, and insert the positive, negative, and ground wires into the corresponding receptacles of the plug connector. (See Figure 3-50.) Then plug the wired plug connector into the receptacle on the power supply at the rear of the router. (See Figure 3-51.)

Note   To remove wires from a plug connector, press the orange-colored release next to each receptacle.

Figure 3-50   DC Power Connections for Plug Connector to Cisco 3660 Routers
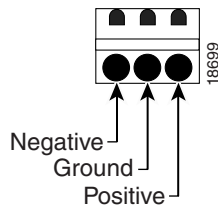
Step 5   Secure the wires to the wire management bracket (recommended method) or to the equipment rack (optional method). The wire management bracket has holes for attaching cable ties. Make sure that the service loop does not extend above or below the power supply. (See Figure 3-51 or Figure 3-52.)

Caution   Power wires must exit to the right, and the service loop must not extend above or below the power supply.

Note   The power wires may pass in front of the power supply cooling vents. The wires do not restrict ventilation.

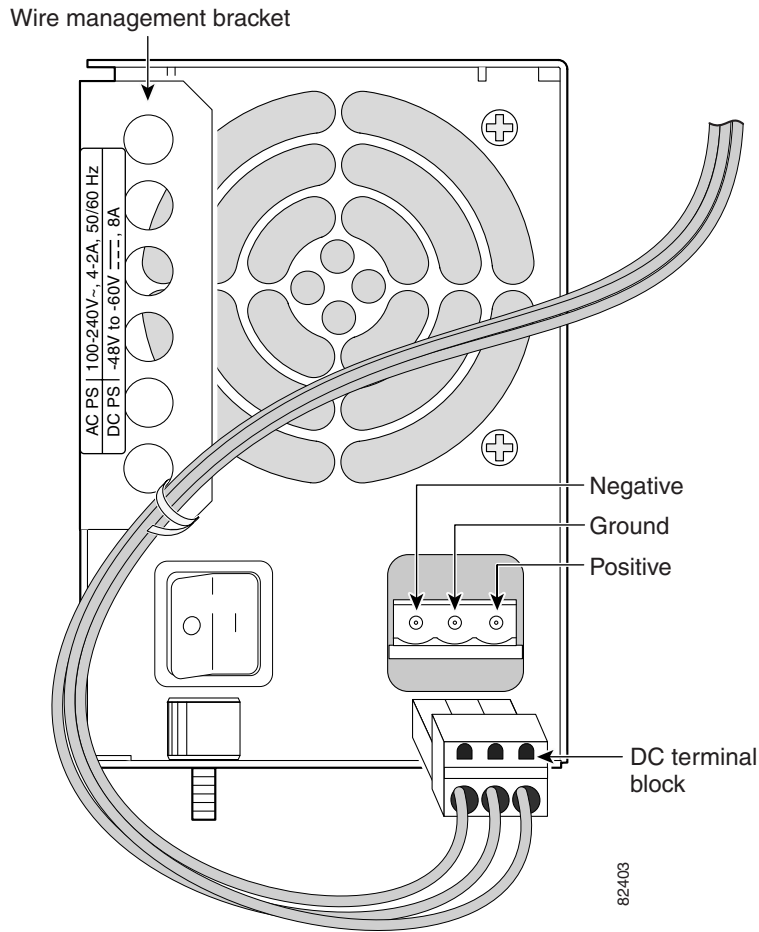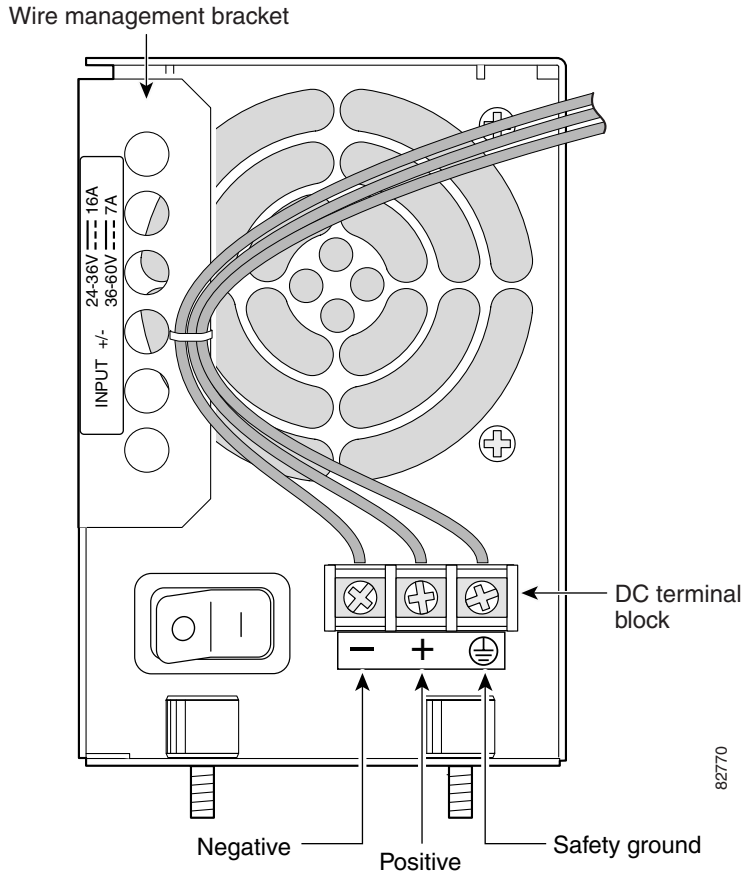**Figure 3-51   DC Wiring—Power Supply with Plug Connector in Cisco 3660 Routers**

Wire management bracket

Negative

Ground

Positive

DC terminal block

82403

Figure 3-52   DC Wiring—Power Supply with Terminal Block in Cisco 3660 Routers

Wire management bracket

Negative   Positive   Safety ground

Step 6   If your router has two power supplies installed, repeat Step 1 through Step 5 for the second power supply.

Step 7   Turn on power to the DC circuit.

Connecting Routers to the Cisco Redundant Power System

If your router uses the Cisco Redundant Power System (RPS), refer to the *Cisco RPS Hardware Installation Guide* for instructions about the power connections. You can access this document at the location described in the "Obtaining Documentation" section on page xvii.

Connecting WAN, LAN, and Voice Cables

This chapter describes how to connect the WAN, LAN, and voice interface cables. It includes the following sections:

- "Ports and Cabling" section on page 3-37
- "Connections for Cisco 3620, Cisco 3640, and Cisco 3631 Routers" section on page 3-39
- "Connections for Cisco 3660 Routers" section on page 3-39

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Note   One or two Ethernet cables are typically provided with the router. Additional cables and transceivers can be ordered from Cisco. For ordering information, refer to the *Cisco Product Catalog* at http://www.cisco.com/en/US/products/products_catalog_links_launch.html. For cable pinouts, refer to the *Cisco Modular Access Router Cable Specifications* document available online and on the Documentation CD-ROM.

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

Ports and Cabling

Table 3-4 summarizes some typical WAN, LAN, and voice connections for Cisco 3600 series routers.

The connections summarized here are also described in detail in the following documents:

- *Cisco Modular Access Router Cable Specifications*
- *Cisco Network Modules Hardware Installation Guide*
- *Cisco Interface Cards Hardware Installation Guide*

You can access these documents at the location described in the "Obtaining Documentation" section on page xvii.

Table 3-4   WAN, LAN, and Voice Connections

Port or Connection	Port type, color	Connected to:	Cable
Ethernet	RJ-45, yellow	Ethernet hub	Straight-through Ethernet
T1/E1 WAN	RJ-48C/CA81A, blue	Network demarcation (telco demarc or equivalent)	RJ-48 T1
Cisco serial	60-pin D-sub	CSU/DSU and serial network or equipment	Cisco serial transition cable that matches the signaling protocol (EIA/TIA-232, EIA/TIA-449, V.35, X.21, or EIA/TIA-530) and the serial port operating mode (DTE or DCE). Refer to the *Cisco Modular Access Router Cable Specifications* document for information about selecting these cables.
Cisco Smart serial	Cisco Smart compact connector, blue	CSU/DSU and serial network or equipment For WIC-2T and WIC-2A/S only	
DSL	RJ-11C/CA111A, lavender	Network demarcation device for service provider's DSL interface	RJ-11
T1 Digital voice	RJ-48C/CA81A, tan	Digital PBX	RJ-48 T1 cable
Analog voice FXS	RJ-11, gray	Telephone, fax	RJ-11
Analog voice FXO	RJ-11, pink	Central office, analog PBX	RJ-11
Analog voice E&M	RJ-11, brown	Analog PBX	RJ-11
BRI S/T WAN (external NT1)	RJ-48C/CA81A, orange	NT1 device or private integrated network exchange (PINX)	RJ-48
BRI U WAN (built-in NT1)	RJ-49C/CA-A11, red	ISDN network	RJ-49
BRI S/T LL (external NT1)	RJ-48C/CA81A, orange	NT1 device	RJ-48
CT1/PRI	T1	External T1 CSU	DB-15 T1 serial cable
CT1/PRI-CSU	T1	RJ-48C/CA81A interface	RJ-48 straight-through
CTE/PRI	E1	E1 network	DB-15 to BNC, DB-15 to DB-15, DB-15 to twinax, or DB-15 to RJ-45
Token Ring	UTP, purple STP, purple	Token Ring device	RJ-45 Token Ring cable
56/64-kbps DSU/CSU	8-pin modular, blue	RJ-48S interface	RJ-48 straight-through
Alarm interface controller	50-pin SCSI connectors	External alarm inputs Alarm control relays	Serial transition cable

Connections for Cisco 3620, Cisco 3640, and Cisco 3631 Routers

Connect each WAN, LAN, and voice cable to the appropriate connector on the chassis or on a network module or interface card.

- Position the cables carefully, so that they do not put strain on the connectors.
- Organize cables in bundles such that cables do not intertwine.
- Inspect the cables to make sure that the routing and bend radiuses are satisfactory. Reposition cables, if necessary.
- Install cable ties in accordance with site requirements.

For cable pinouts, refer to the online document *Cisco Modular Access Router Cable Specifications*.

For more information about connecting and configuring network modules, WAN interface cards, and voice interface cards, refer to the following documents:

- *Cisco Network Modules Hardware Installation Guide*
- *Cisco Interface Cards Hardware Installation Guide*

Connections for Cisco 3660 Routers

Connecting WAN, LAN, and Voice Cables (Without Chassis Shield)

If your Cisco 3660 router does not use a chassis shield, perform this procedure:

Step 1   Connect each WAN, LAN, and voice cable to the appropriate connector on a network module or interface card.

Step 2   Route the cables to the left side of the router, and organize the cables in bundles. (See Figure 3-53.)

- Position the cables carefully, so that they do not put strain on the connectors.
- Organize cables in bundles such that cables do not intertwine.

Step 3   Inspect the cables to make sure that the routing and bend radiuses are satisfactory. Reposition cables, if necessary.

Step 4   Install cable ties in accordance with site requirements.

Figure 3-53   Typical Cable Arrangement
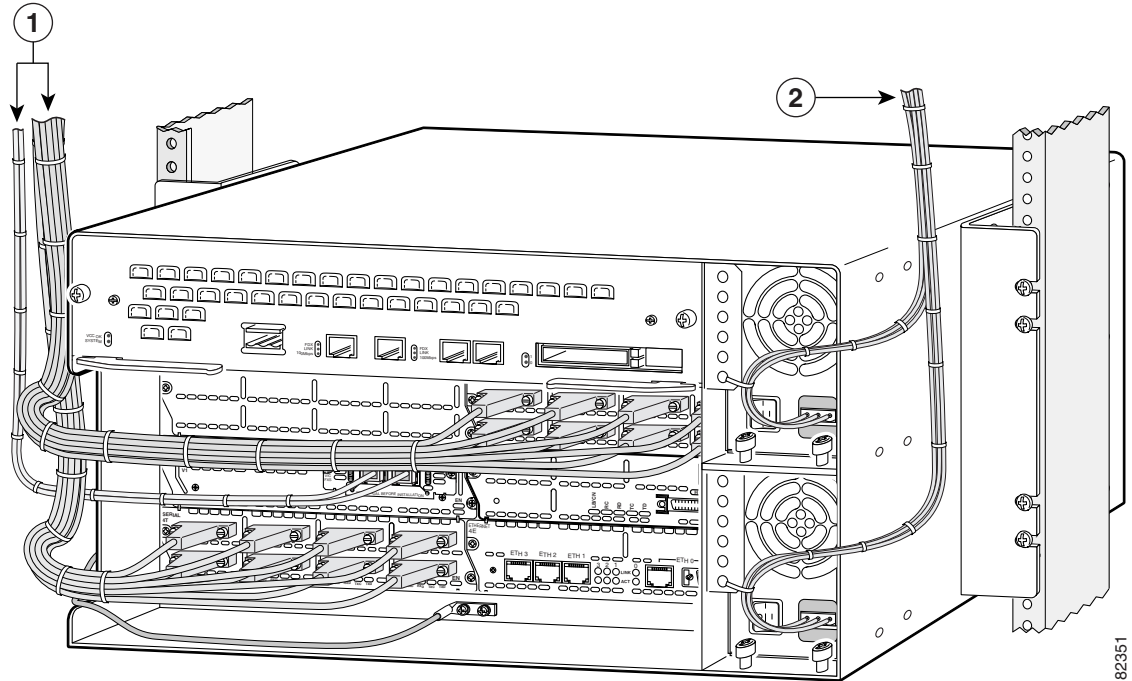
1	LAN, WAN, and voice cables	2	Power wires

Connecting WAN, LAN, and Voice Cables (With Chassis Shield—Telco Only)

To connect the cables, install the chassis shield, and organize the cables into bundles, perform this procedure:

Note   The Cisco 3660 router telco chassis is identified by its part number, CISCO3662-xC-CO.

Step 1   Connect each WAN, LAN, and voice cable to the appropriate connector on a network module or interface card.

Note   Do not organize the cables into bundles until after you install the chassis shield. Leave a generous length of cable to allow for installation of the cable shield.

Note   You can route cables through the cutout at the left of the chassis, through the openings in the chassis shield, or through both areas. In each routing, all WAN, LAN, and voice cables must exit toward the left. (See Figure 3-55 and Figure 3-56.)

Step 2   If all of the cables are routed through the cutout at the left, leave the small panels in place on the chassis shield. If cables are routed through the openings in the chassis shield, remove the small panels as required to provide openings for the cables. (See Figure 3-54.)

> **Note**   If you are going to route cables through the upper openings in the chassis shield, you must remove the lower panels to permit chassis shield installation.

Figure 3-54   Removing Panels from Chassis Shield
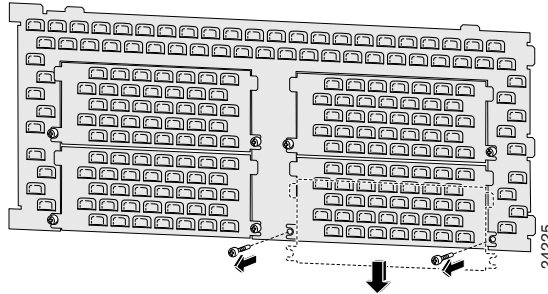
Step 3   Hold the chassis shield at a 45-degree angle to the chassis, and attach it to the hinges at the right side.

Step 4   Position the cables to allow closing of the chassis shield, and close the chassis shield.

> **Note**   If cables are routed through the openings in the chassis shield, cables on the left side must exit through the left openings, and cables on the right side must exit through the right openings.

Step 5   Tighten the two captive screws at the left side of the shield.

Step 6   Reinstall the panels over any openings that are not used for cables.

Step 7   Route the cables to the left side of the router, and organize the cables in bundles (see Figure 3-55 and Figure 3-56):

- Position the cables carefully, so that they do not put strain on the connectors.
- Organize cables in bundles such that cables do not intertwine.

Step 8   Inspect the cables to make sure that the routing and bend radiuses are satisfactory. Reposition cables, if necessary.

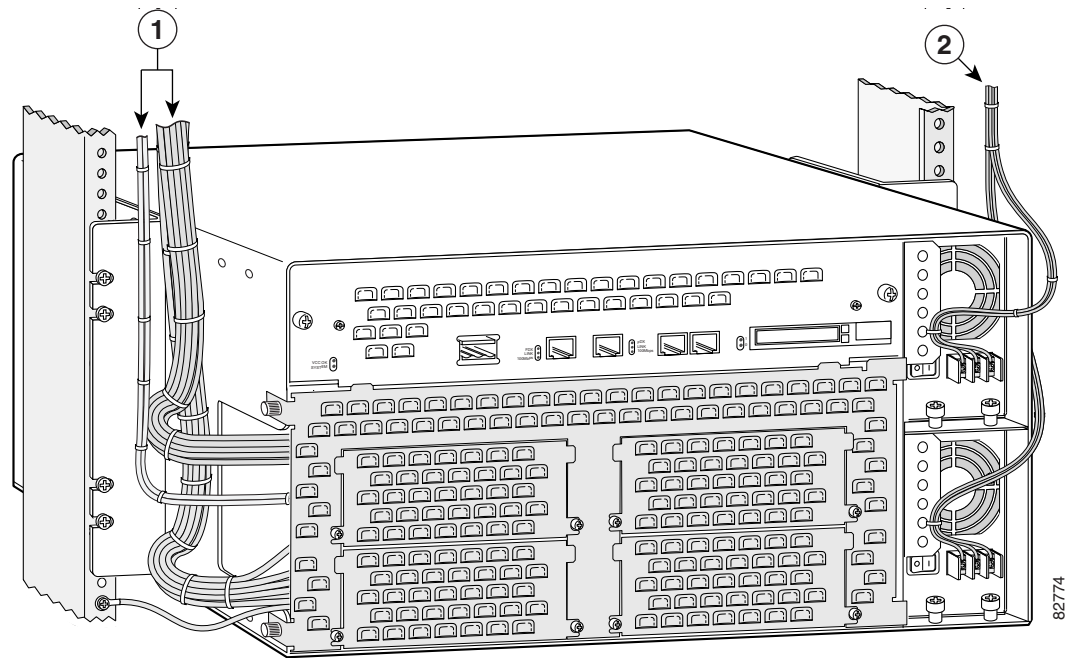**Step 9**   Install cable ties in accordance with site requirements.

Figure 3-55   Cables Routed Through Openings in the Chassis Shield
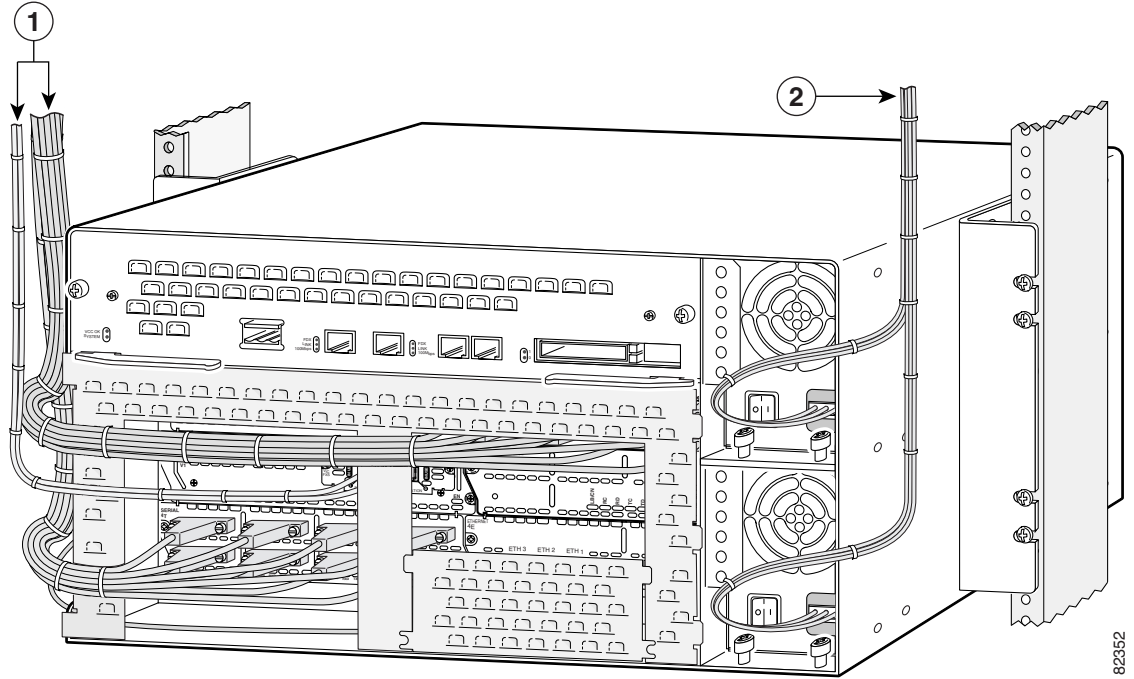
1	LAN, WAN, and voice cables	2	Power wires

Figure 3-56   Cables Routed Through the Chassis Cutout

1	LAN, WAN, and voice cables	2	Power wires

Connecting to a Console Terminal or Modem

Your router has asynchronous serial console and auxiliary ports. These ports provide administrative access to your router either locally (with a console terminal or PC) or remotely (with a modem).

Cisco provides the following cables and adapters for connecting your router to a console terminal, PC, or modem:

- One console adapter cable (RJ-45-to-DB-9, blue)
- One modem adapter cable (RJ-45-to-DB-25, black)

This section describes how to connect a console terminal or PC to the console port, and how to connect a modem to the auxiliary port. It contains the following sections:

- Connecting to the Console Port, page 3-44
- Connecting to the Auxiliary Port, page 3-46
- Identifying a Rollover Cable, page 3-50

Note   For information on identifying rollover cables, refer to the "Identifying a Rollover Cable" section on page 3-50.

Connecting to the Console Port

To connect a console terminal or a PC running terminal emulation software to the console port on the router, perform the following procedure:

Step 1 Use the blue RJ-45-to-DB-9 console adapter cable to connect the router to a terminal. (See Figure 3-57 through Figure 3-60.)

For information about console port pinouts, refer to the *Cisco Modular Access Router Cable Specifications* document available online and on the Documentation CD-ROM.

Note On the Cisco routers, the console port is color-coded blue.

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

Note Because hardware flow control is not possible on the console port, Cisco does not recommend that modems be connected to the console port. Modems should be connected only to the auxiliary port.

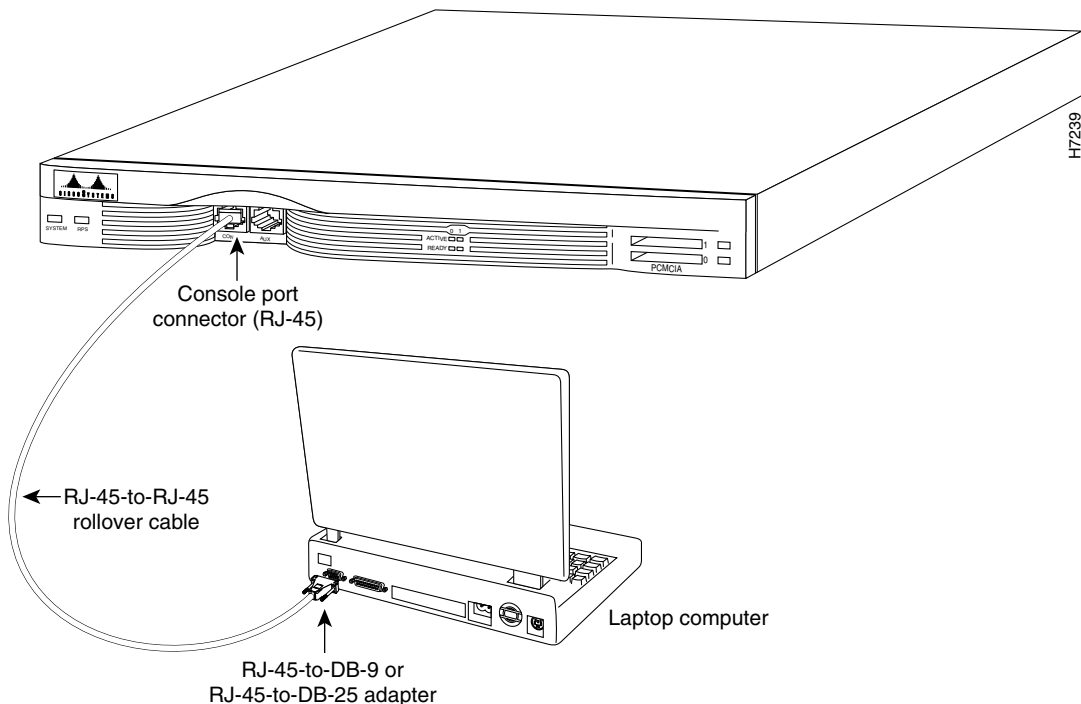*Figure 3-57   Connecting a Console Terminal to a Cisco 3620 Router*

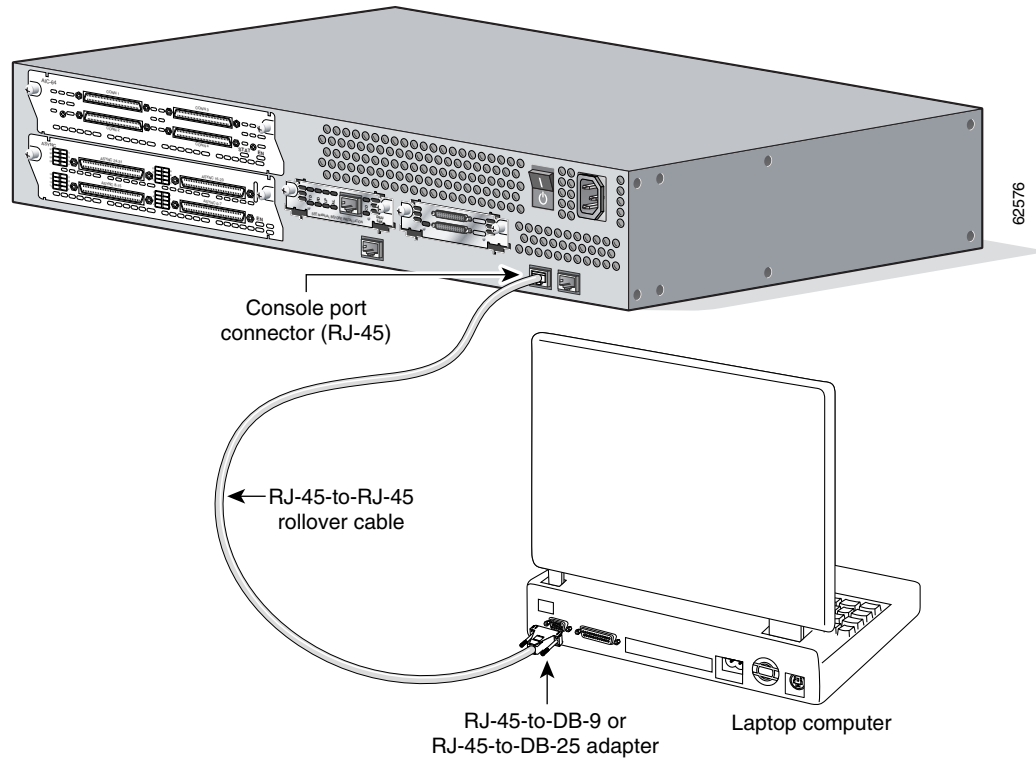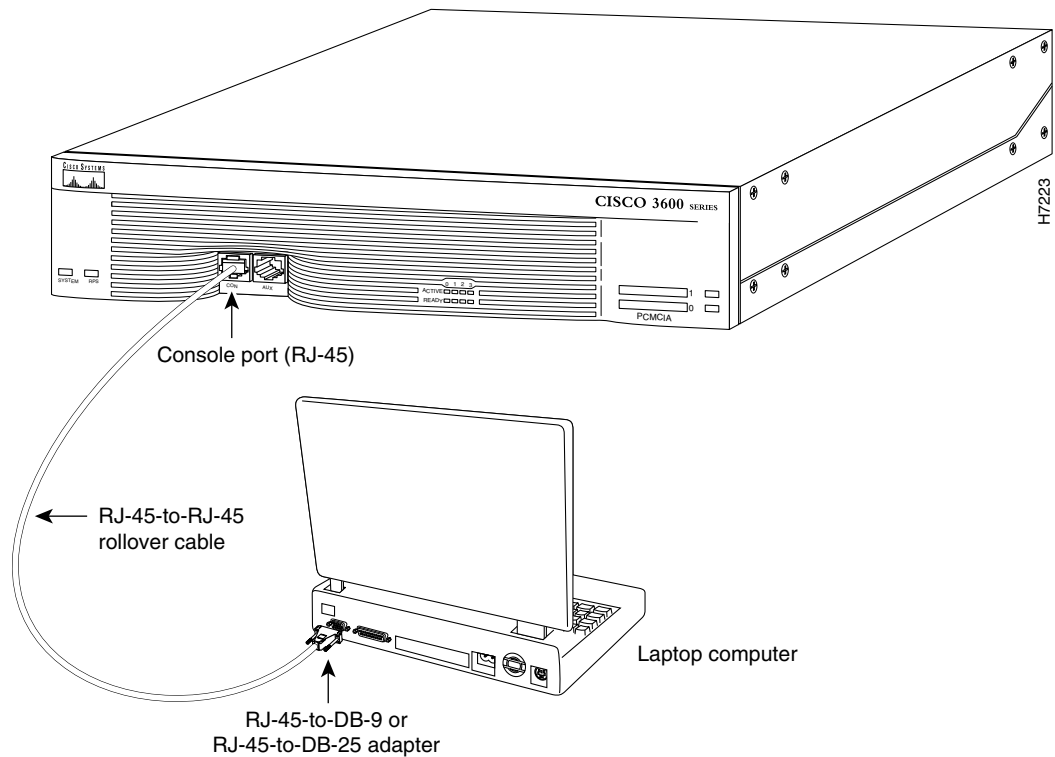*Figure 3-58   Connecting a Console Terminal to a Cisco 3631 Router*

Console port
connector (RJ-45)

RJ-45-to-RJ-45
rollover cable

RJ-45-to-DB-9 or
RJ-45-to-DB-25 adapter

Laptop computer

62576

Figure 3-59   Connecting a Console Terminal to a Cisco 3640 Router

CISCO 3600 SERIES

Console port (RJ-45)

RJ-45-to-RJ-45
rollover cable

RJ-45-to-DB-9 or
RJ-45-to-DB-25 adapter

Laptop computer

H7223

Cisco 3600 Series Routers Hardware Installation Guide
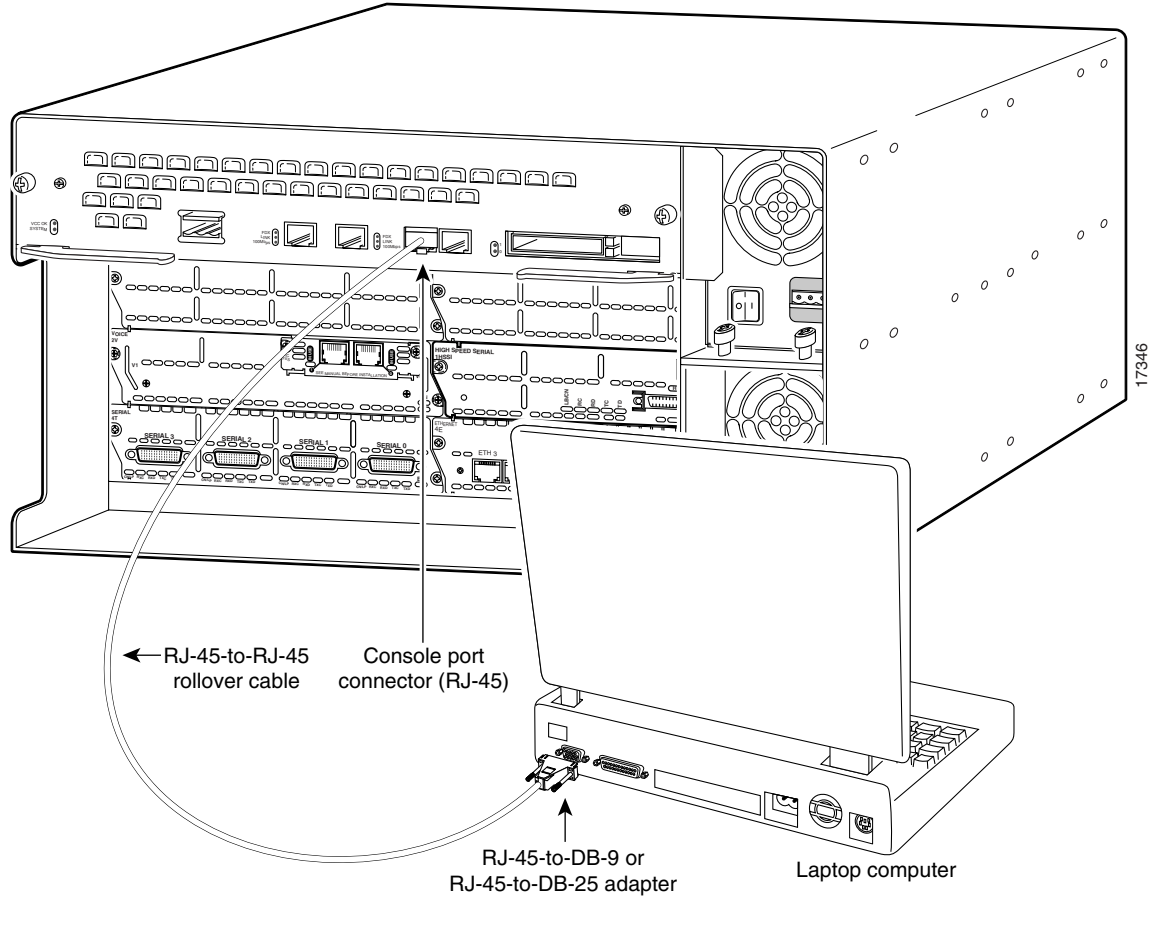
Figure 3-60   Connecting a Console Terminal to a Cisco 3660 Router

Connecting to the Auxiliary Port

To connect a modem to the auxiliary port on the router, perform the following procedure:

Step 1 Use the black RJ-45-to-DB-25 modem adapter cable to connect the router to a modem. (See Figure 3-61 through Figure 3-64.)

For information about auxiliary port pinouts, refer to the *Cisco Modular Access Router Cable Specifications* document available online and on the Documentation CD-ROM.

Note On the Cisco routers, the auxiliary port is color-coded black.

Step 2 Make sure that your modem and the router auxiliary port are configured for the same transmission speed (up to 115200 bps is supported) and hardware flow control with data carrier detect (DCD) and data terminal ready (DTR) operations.

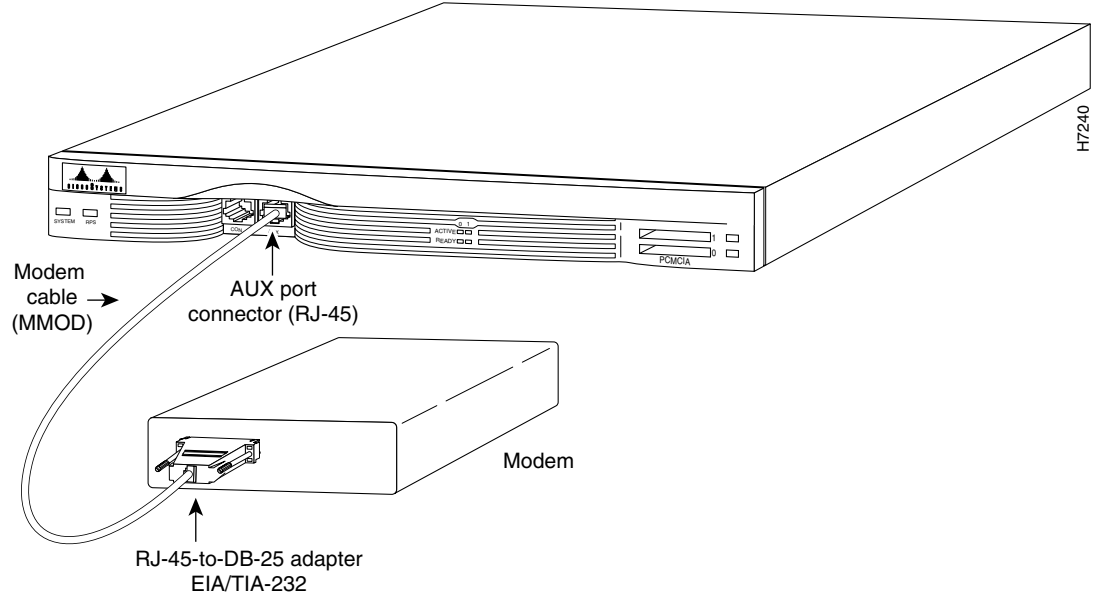*Figure 3-61   Connecting a Modem to the Auxiliary Port on the Cisco 3620 Router*

Figure 3-62   Connecting a Modem to the Auxiliary Port on the Cisco 3631 Router
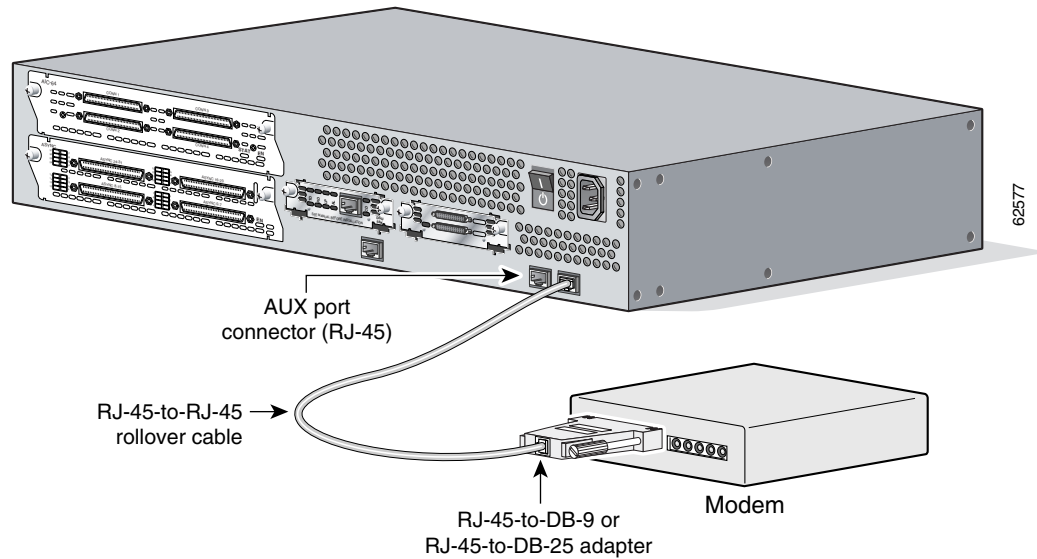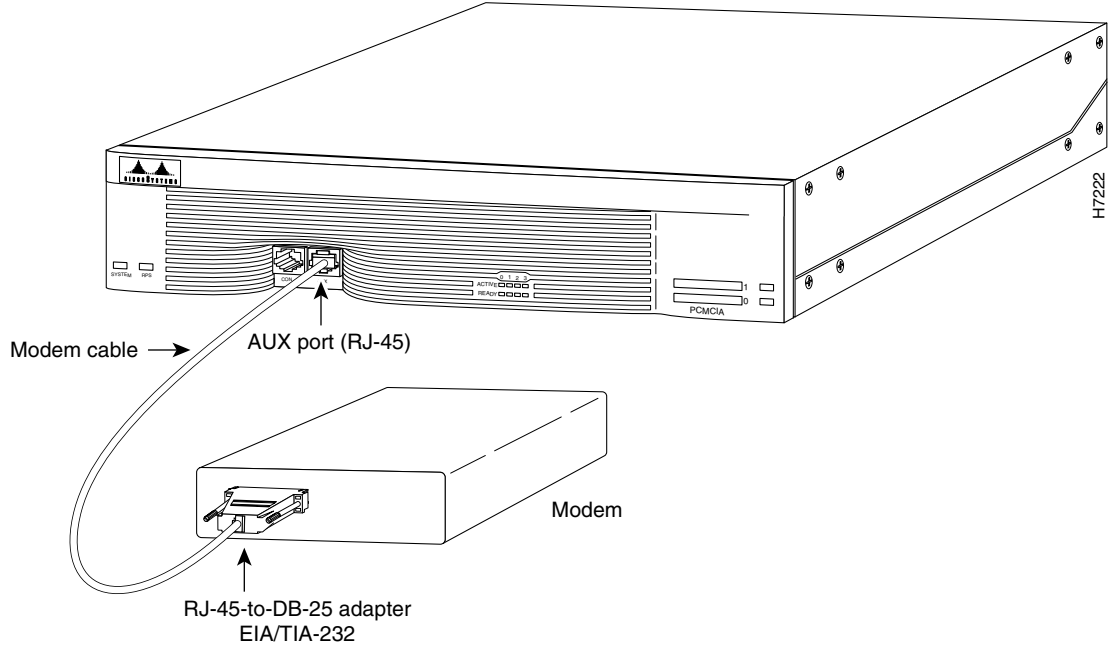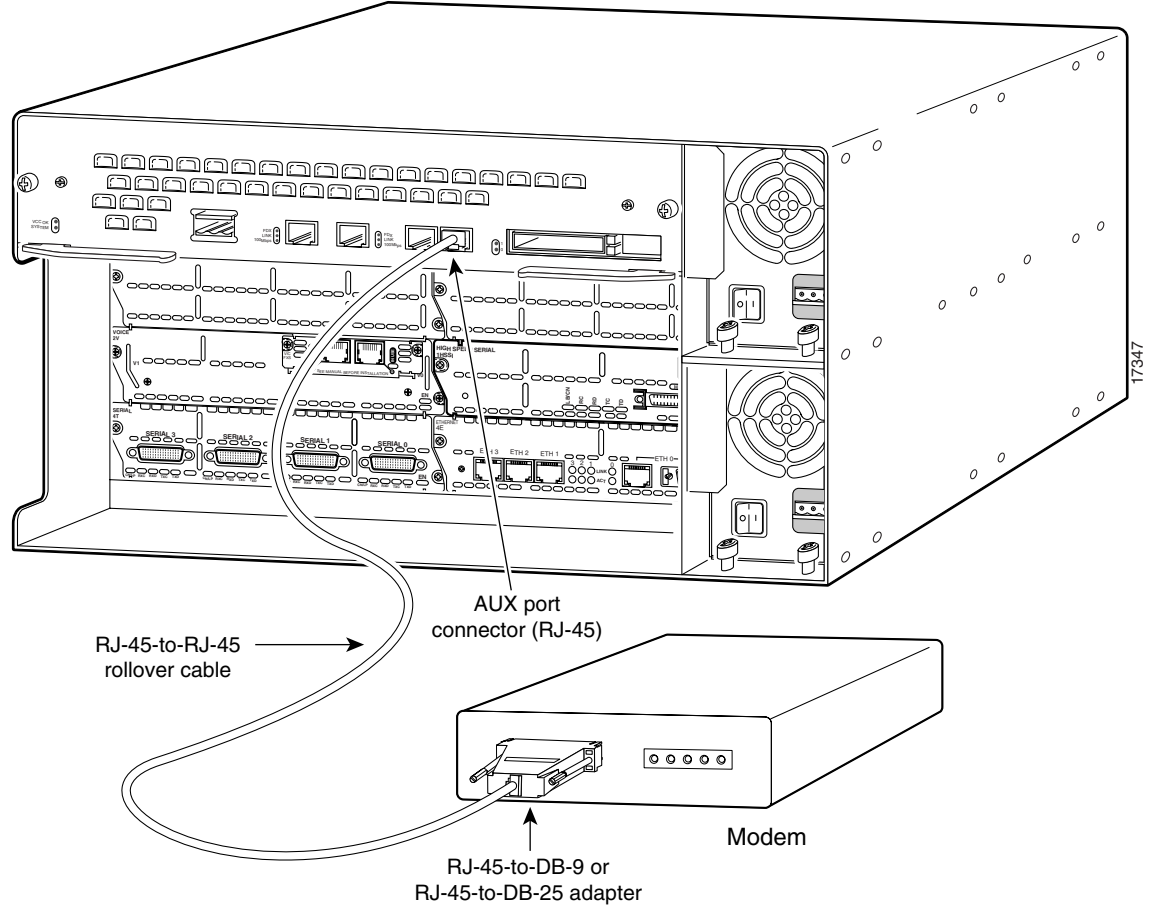
Figure 3-63   Connecting a Modem to the Auxiliary Port on the Cisco 3640 Router

Modem cable →   AUX port (RJ-45)

Modem

RJ-45-to-DB-25 adapter
EIA/TIA-232

Figure 3-64   Connecting a Modem to the Auxiliary Port on the Cisco 3660 Router

RJ-45-to-RJ-45
rollover cable

AUX port
connector (RJ-45)

Modem

RJ-45-to-DB-9 or
RJ-45-to-DB-25 adapter

Identifying a Rollover Cable

Use a rollover cable to connect to the asynchronous serial console and auxiliary ports. You can identify a rollover cable by comparing the two modular ends of the cable. Hold 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 3-65.) If your cable came from Cisco, pin 1 will be white on one connector, and pin 8 will be white on the other (a rollover cable reverses pins 1 and 8, 2 and 7, 3 and 6, and 4 and 5).

Figure 3-65   Identifying a Rollover Cable
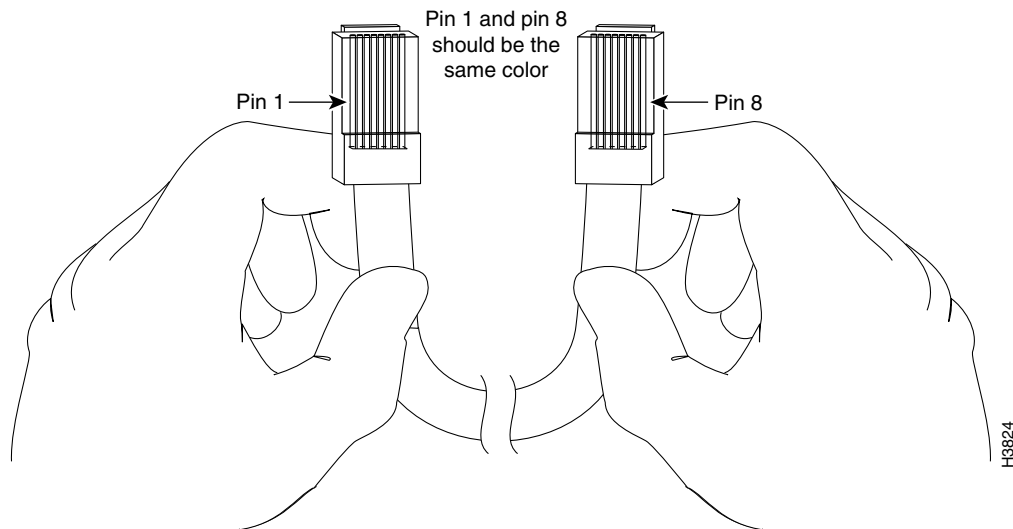
Powering Up the Router

⚠️

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

⚠️

Caution   To ensure adequate cooling, never operate the router unless the unit is completely closed.

This section covers the following topics:

- Checklist for Power Up, page 3-51
- Front Panel Indicators, page 3-51
- Power-Up Procedure, page 3-52

Checklist for Power Up

You are ready to power up the Cisco router if the following steps are completed:

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

Front Panel Indicators

The following indicator LEDs provide power, activity, and status information:

- Power (green)—Lit when power is on
- Sys/RPS (green):
  - Rapid blinking (200 ms)—System is booting
  - Slow blinking (1 s)—Redundant power supply (RPS) failure
  - Continuous on—System OK
- Activity (green)—Blinks during system activity, such as interrupts and packet transfers

For more detailed information about the LEDs, see Appendix A, "Troubleshooting."

Power-Up Procedure

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

If you encounter problems when you power on the router, see Appendix A, "Troubleshooting." For information about the ROM monitor and the bootstrap program, see Appendix B, "Using the ROM Monitor." For information about the configuration register, see Appendix C, "Configuration Register."

Note To view the boot sequence through a terminal session, you must have a console connection to the Cisco router *before* it powers up.

Step 1   Make sure that your PC is powered up and connected as described in the "Checklist for Power Up" section on page 3-51.

Step 2   Move the power switch to the ON position.

The following indications appear:

In Cisco 3620 series and Cisco 3640 series

*   The green LED next to the auxiliary port comes on.

*   The fan operates.

In Cisco 3631

*   The green LED on the front of the chassis comes on.

*   The fan operates.

In Cisco 3660

*   The LED on each power supply comes on.

*   The system and PS1 (and PS2) LEDs on the router front and rear panels come on.

Depending on your installation, Fast Ethernet (0/0, 0/1) and Network Module (Active, Ready) LEDs might also come on.

If you encounter problems when you power up the router, see Appendix A, "Troubleshooting."

Messages begin to appear in your terminal emulation program window.

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

You may see different startup messages:

*   If you see the following messages, the router has booted with a configuration file and is ready for initial configuration using Security Device Manager (SDM).

    ```
    yourname con0 is now available

    Press RETURN to get started.
    ```

If SDM is installed on your router, Cisco recommends using SDM to perform the initial configuration. For configuration procedures using SDM, refer to the quick start guide that shipped with your router.

You can also access the Cisco 3600 series routers quick start guides online at:

http://www.cisco.com/univercd/cc/td/doc/product/access/acs_mod/cis3600/36xx_qsg/index.htm

• If you see the following messages, the router has booted and is ready for initial configuration using the setup command facility or the command line interface (CLI).

```
--- System Configuration Dialog ---

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

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

To learn how to use the setup command facility to configure the router, see the "Initial Configuration Using the Setup Command Facility" section on page 3-54. To learn how to use the CLI to configure the router, see the "Initial Configuration Using the CLI (Manual Configuration)" section on page 3-57.

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

Configuring the Router

You can configure your router by using one of the following tools:

• Security Device Manager. If your router was purchased with a VPN bundle, Security Device Manager is installed on the router. See the "Initial Configuration Using SDM" section on page 3-53

• Setup command facility. you can use the setup command facility to prompt you for basic router information. After the configuration file has been created, you can use the CLI or use Security Device Manager to perform additional configuration. See the "Initial Configuration Using the Setup Command Facility" section on page 3-54.

• Command-line interface (CLI). If you prefer to use the Cisco IOS CLI, see the "Initial Configuration Using the CLI (Manual Configuration)" section on page 3-57 for instructions on how to use the CLI.

Initial Configuration Using SDM

If Security Device Manager has been installed on your router, the following messages appear at the end of the startup sequence:

```
yourname con0 is now available

Press RETURN to get started.
```

For configuration procedures using SDM, refer to the quick start guide that shipped with your router.

You can also access the Cisco 3600 series routers quick start guides online at:

http://www.cisco.com/univercd/cc/td/doc/product/access/acs_mod/cis3600/36xx_qsg/index.htm

✎
Note If you need help with interface and port numbering, see the "Interface Numbering" section on page 1-8.

Initial Configuration Using the Setup Command Facility

This section shows how to use the setup command facility to configure a host name for the router, set passwords, and configure an interface for communication with the management network. If you see the following messages at the end of the startup sequence, the setup command facility has been invoked automatically:

```
--- System Configuration Dialog ---

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

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

The setup command facility prompts you for basic information about your router and network, and it creates an initial configuration file.The prompts vary, depending on your router model, the installed interface modules, and the software image. The following example and the user entries (in **bold**) are shown as examples only.

For a description of the interface numbering, see the "Interface Numbering" section on page 1-8.

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

Step 1 To proceed using the setup command facility, enter **yes** when the power-up messages have ended.

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

Step 2 When the following messages appear, press **Return** to enter basic management setup:

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

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

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

Step 3 Enter a host name for the router (this example uses **3600**):

```
Configuring global parameters:

Enter host name [Router]: 3600
```

Step 4 Enter an enable secret password. This password is encrypted (more secure) and cannot be seen when viewing the configuration:

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

Step 5 Enter an enable password that is different from the enable secret password. This password is *not* encrypted (less secure) and can be seen when viewing the configuration:

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

Step 6 Enter the virtual terminal password, which prevents unauthenticated access to the router through ports other than the console port:

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

Step 7 Respond to the following prompts as appropriate for your network:

```
Configure SNMP Network Management? [yes]:
    Community string [public]:
```

Step 8 A summary of the available interfaces is displayed:

Note The interface numbering that appears is dependent on the type of Cisco modular router platform and on the installed interface modules and cards.

```
Current interface summary

Controller Timeslots D-Channel Configurable modes Status
T1 0/0     24        23        pri/channelized    Administratively up

Interface               IP-Address    OK? Method Status             Prol
FastEthernet0/0         unassigned    NO  unset  up                 up
FastEthernet0/1         unassigned    NO  unset  up                 dow
```

Step 9 Select one of the available interfaces for connecting the router to the management network:

```
Enter interface name used to connect to the
management network from the above interface summary: fastethernet0/0
```

Step 10 Respond to the following prompts as appropriate for your network:

```
Configuring interface FastEthernet0/0:
Use the 100 Base-TX (RJ-45) connector? [yes]: yes
Operate in full-duplex mode? [no]: no
Configure IP on this interface? [yes]: yes
    IP address for this interface: 172.1.2.3
    Subnet mask for this interface [255.255.0.0] : 255.255.0.0
    Class B network is 172.1.0.0, 16 subnet bits; mask is /16
```

Step 11 The configuration is displayed:

```
The following configuration command script was created:

hostname fig
enable secret 5 $1$D5P6$PYx41/lQIASK.HcSbfO5q1
enable password xxxxxx
line vty 0 4
password xxxxxx
snmp-server community public
!
no ip routing
```

```
!
interface FastEthernet0/0
no shutdown
media-type 100BaseX
half-duplex
ip address 172.1.2.3 255.255.0.0
!
interface FastEthernet0/1
shutdown
no ip address
!
end
```

Step 12   Respond to the following prompts. Select [2] to save the initial configuration.:

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

Enter your selection [2]: 2
Building configuration...
Use the enabled mode 'configure' command to modify this configuration.


Press RETURN to get started!
```

Step 13   The user prompt appears:

```
3600>
```

After you complete the initial configuration tasks, your Cisco router is ready to configure for specific functions. For configuration procedures, refer to the *Software Configuration Guide for Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Routers* or the Cisco IOS software configuration documentation. You can access these documents on Cisco.com and on the Documentation CD-ROM.

Initial Configuration Using the CLI (Manual Configuration)

This section shows how to bring up a command-line interface (CLI) prompt for configuration using the CLI, and it directs you to documentation for the CLI configuration. You can use the CLI if you see the following messages at the end of the startup sequence:

```
--- System Configuration Dialog ---

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

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

Note   If these messages do not appear, SDM and a default configuration file have been installed on the router at the factory. To use SDM to configure the router, refer to the quick start guide that shipped with your router. You can also access the Cisco 3600 series routers quick start guides online at:

http://www.cisco.com/univercd/cc/td/doc/product/access/acs_mod/cis3600/36xx_qsg/index.htm

Note   To avoid losing work you have completed, be sure to save your configuration occasionally as you proceed. Use the **copy running-config startup-config** command to save the configuration to NVRAM.

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

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

Step 2   Press **Return** to terminate autoinstall and continue with manual configuration.

```
Would you like to terminate autoinstall? [yes] Return

Several messages are displayed, ending with a line similar to the following:
...
Copyright (c) 1986-2000 by cisco Systems, Inc.
Compiled <date> <time> by <person>
```

Step 3   Press **Return** to bring up the Router> prompt.

```
...
flashfs[4]: Initialization complete.
Router>
```

Step 4   Enter privileged EXEC mode.

```
Router> enable
Router#
```

For configuration using the CLI, refer to the *Software Configuration Guide for Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Routers* or the Cisco IOS software configuration documentation. You can access these documents on Cisco.com and on the Documentation CD-ROM.

APPENDIX **A**

Troubleshooting

Your Cisco 3600 series router goes through extensive testing and burn-in before leaving the factory. If you encounter problems, use the information in this appendix to help isolate problems or to eliminate the router as the source of the problem.

This appendix contains the following sections:

- Isolating Problems, page A-1
- Reading Front-Panel LEDs, page A-4
- Reading Rear-Panel LEDs, page A-8
- Error Messages, page A-10
- Recovering a Lost Password, page A-16

Note To troubleshoot a network module refer to the *Cisco Network Modules Hardware Installation Guide*; to troubleshoot a WAN interface card, refer to the *Cisco Interface Cards Hardware Installation Guide*.

If you cannot locate the source of the problem, contact a customer service representative for information on how to proceed. For technical support information, refer to the "Obtaining Technical Assistance" section on page xviii. Before you call, have the following information ready:

- Chassis type and serial number
- Maintenance agreement or warranty information
- Type of software and version number
- Date you received the new chassis
- Brief description of the problem
- Brief explanation of the steps you have taken to isolate the problem

Isolating Problems

The key to problem solving is to isolate the problem to a specific subsystem by comparing what the router is doing to what it should be doing.

The LEDs on the front and rear panel of the router enable you to determine router performance and operation. For a description of these LEDs, see the "Reading Front-Panel LEDs" section on page A-4 and the "Reading Rear-Panel LEDs" section on page A-8.

When problem solving, consider the following router subsystems:

- Power and cooling systems—External power source, power cable, router power supply and circuit breaker, and router blower and fan. Also consider inadequate ventilation or air circulation.

- Modules—LEDs on the modules can help identify a failure.

- Cables—External cables that connect the router to the network.

Troubleshooting the Power and Cooling Systems

Both the system LED and the fans can help you troubleshoot a power problem. Check the following items to help isolate the problem:

- With the power switch on, does the system LED stay on or blink?

    - If the LED is green, the router is receiving power and is functional.

    - If the LED is off, check the power source and power cable.

- With the power switch on and the system LED on, do the fans operate?

    - If no, check the fans.

- With the power switch on and the system LED off, do the fans operate?

    - If yes, the router is receiving power. The fans are connected directly to the DC outputs of the power supply.

    - If no, check the power source and power cable.

- Does the router shut down after being on a short time?

    - Check for an environmentally induced shutdown. See the next section, "Environmental Reporting Features."

    - Check the environmental site requirements in the "General Site Requirements" section on page 2-3.

    - Check for a power supply failure in the Cisco 3620 and Cisco 3640 routers by inspecting the system LED on the front panel. If the system LED is on or blinking, the power supply should be functional.

    - Check for a power supply failure in the Cisco 3631 router by inspecting the system LED on the front panel. If the system LED is on, the power supply is functional.

    - Check for a power supply failure in the Cisco 3660 router by inspecting the system, PS1, and PS2 LEDs on the front panel. If they are green, the power supplies are functional.

- Router partially boots, but LEDs do not come on.

    - Check for a power supply failure by inspecting the system LED on the front panel of the router. If the system LED is on, the power supply is functional.

    - Check for a power supply failure in the Cisco 3660 router by inspecting the PS1 and PS2 power supply LEDs on the front panel. For an explanation of these LEDs, see Table A-3.

    - If the system LED is not on, refer to the warranty information in the quick start guide that shipped with your router, or contact customer service. The quick start guide is also available both on the Documentation CD-ROM and online.

Environmental Reporting Features

If the router is operating at an abnormally high temperature, you see the following message on the console screen:

```
%SYS-1-OVERTEMP: System detected OVERTEMPERATURE condition. Please resolve cooling
problem immediately!
```

Some causes of abnormally high router temperature are:

- Fan failure
- Air conditioner failure in the room
- Air blockage to cooling vents

Take steps to correct the problem. See also the "Site Environment" section on page 2-4, and the "Equipment Racks" section on page 2-5.

Troubleshooting Modules, Cables, and Connections

Network problems can be caused by a module; cables or cable connections; or external devices such as a modem, transceiver, hub, wall jack, WAN interface, or terminal. Check for the following symptoms to help isolate the problem:

Tip   All of the documents mentioned in this section are available both on the Documentation CD-ROM and online.

- Module is not recognized by the router.
  - On the Cisco 3660 router, check front-panel Active and Ready LEDs for the slot in which the module is installed. For information on these LEDs, see the "Reading Front-Panel LEDs" section on page A-4.
  - Make sure that the module is firmly seated in its slot.
  - Check the LEDs on the module. Each module has its own set of LEDs. For information on these LEDs, refer to the online publication *Cisco Network Modules Hardware Installation Guide*.
  - Make sure that you have a version of Cisco IOS software that supports the network module. Check the *Cisco Network Modules Hardware Installation Guide* or accompanying configuration note for the affected module's software requirements.
- Module is recognized, but interface ports do not initialize.
  - Make sure that the module and interface card are firmly seated in their slots.
  - Check external cable connections.
  - Make sure that you have a version of Cisco IOS software that supports the network module and interface card. Check the *Cisco Network Modules Hardware Installation Guide* and the *Cisco Interface Cards Hardware Installation Guide* or accompanying configuration notes for the affected network module's and interface card's software requirements.
- Router does not boot properly, or constantly or intermittently reboots.
  - Make sure that all modules are firmly seated in their slots.
  - Check the router chassis or software. Refer to the warranty information in the quick start guide that shipped with your router, or contact customer service.

- Router boots, but the console screen is frozen.

  - Check the external console connection.

  - Verify that the parameters for your terminal are set as follows:

    (a) The same data rate as configured for the router (9600 bps is the default)

    (b) 8 data bits

    (c) No parity generated or checked

    (d) 2 stop bits

- Router powers on and boots only when a particular module is removed.

  - Check the module. Refer to the warranty information in the quick start guide that shipped with your router, or contact customer service.

- Router powers on and boots only when a particular cable is disconnected.

  - There may be a problem with the module or cable. Refer to the warranty information in the quick start guide that shipped with your router, or contact customer service.

Reading Front-Panel LEDs

Front-Panel LEDs on Cisco 3620, Cisco 3640, and Cisco 3660 Routers

The LEDs on the front panel of the router enable you to determine router performance and operation. Figure A-1 through Figure A-3 show the LEDs on the front panel of the router. For an explanation of these LEDs see:

- Table A-1—Describes the system LED

- Table A-2—Describes the Redundant Power System (RPS) LED

- Table A-3—Describes the power supply LEDs (PS1 and PS2)

- Table A-4—Describes the Active, Ready, and PCMCIA LEDs

Figure A-1   Cisco 3620 Router Front-Panel LEDs
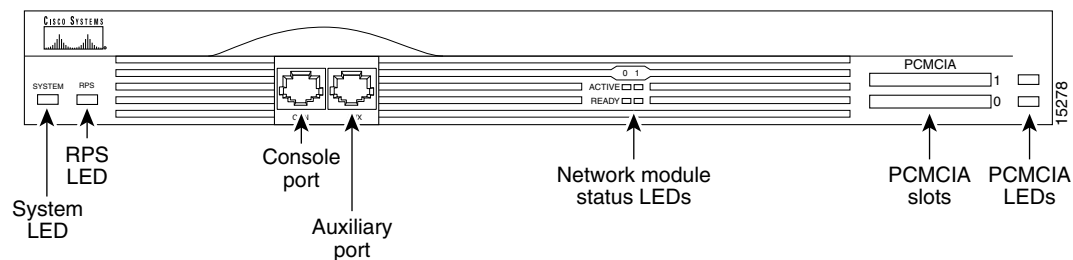
Figure A-2   Cisco 3640 Router Front-Panel LEDs
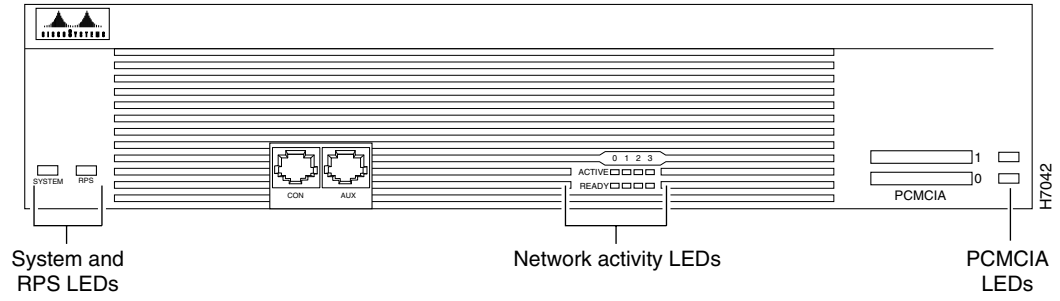
Figure A-3   Cisco 3660 Router Front Panel LEDs
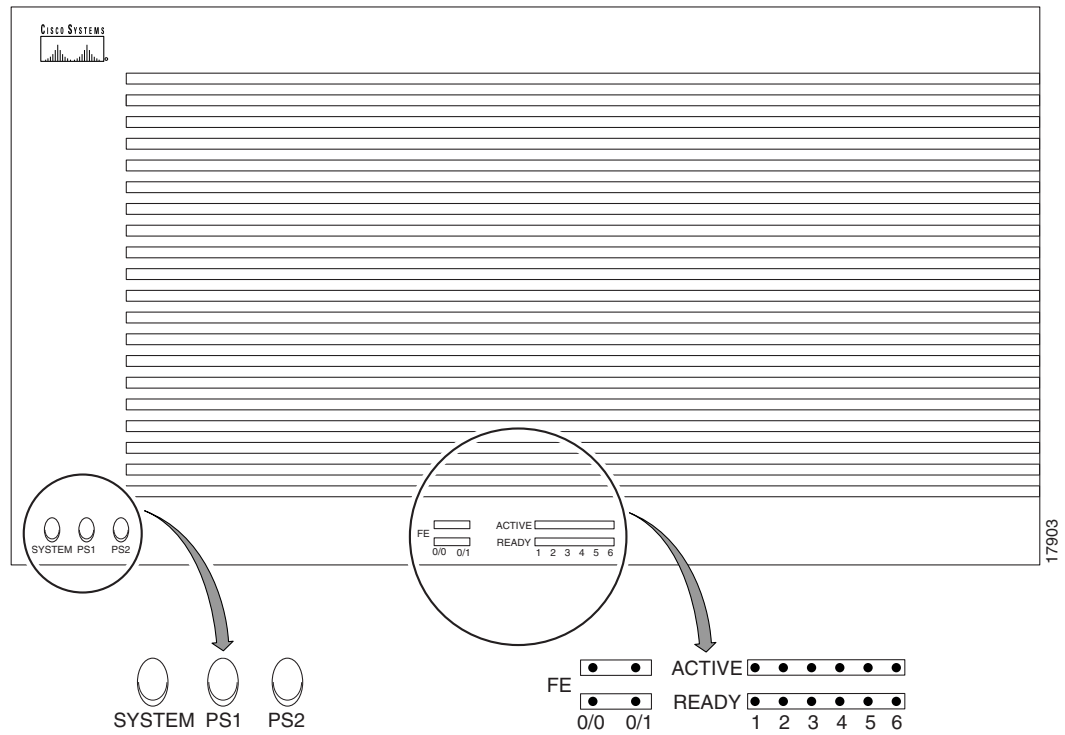
✎
Note   The Cisco 3660 router has system LEDs on the front and rear panels. Both system LEDs function as described in Table A-1.

✎
Note   In this guide, references to Cisco 3660 routers include both Cisco 3661 and Cisco 3662 routers.

Table A-1   SYSTEM LED in Cisco 3620, Cisco 3640, and Cisco 3660 Routers

Color	Description
Off	Router is not receiving power.
Blinking green	Router is running the ROM monitor. No errors detected.
Solid green	Router is operating normally. No errors detected.
Amber	Router is receiving power but not functioning properly. Possible power-on self-test error or over-temperature condition detected.
Alternating amber and green	Power-on self-test detected. The router is attempting to reload the ROM monitor.

Note   The Cisco 3660 router does not have the RPS LED described in Table A-2.

Table A-2   RPS LED in Cisco 3620, Cisco 3640, and Cisco 3660 Routers

Color	RPS Status
Off	Not installed.
Blinking green	RPS and the power supply are both operational. Because the router can accept power from only one source, you can do either of the following: • Unplug the power supply and use the RPS. • Turn off the RPS and use the power supply. The RPS can remain connected.
Solid green	Operational.
Amber	Installed but not operational.

Note   The power supply LEDs (PS1 and PS2) described in Table A-3 are found only on the Cisco 3660 router's front panel.

Table A-3   Power Supply LEDs in Cisco 3620, Cisco 3640, and Cisco 3660 Routers

Color	Power Supply Status
Green	Installed and operating correctly.
Amber	Installed with fault conditions detected.
Blinking amber	Thermal or out-of-range voltage protection shutdown.
Off	Powered off or failed.

> ✎ **Note**   Your router's front or rear panel shows ACTIVE *slot#* and READY *slot#* LEDs corresponding to the number of network module slots in the router. (See Table A-4.)
>
> The Cisco 3620 router has two slots numbered 0 and 1; the Cisco 3640 router has four slots numbered 0, 1, 2, and 3; and the Cisco 3660 router has six slots numbered 1, 2, 3, 4, 5, and 6.

> ✎ **Note**   The Cisco 3660 router has PCMCIA slots located on its rear panel. (See Figure A-6.)

Table A-4   ACTIVE, READY, and PCMCIA LEDs in Cisco 3620, Cisco 3640, and Cisco 3660 Routers

LED	Description
ACTIVE 0, 1, 2, 3, 4, 5, 6	Blinks to indicate network activity on the module installed in the indicated slot.
READY 0, 1, 2, 3, 4, 5, 6	Functional module has been installed in the indicated slot. If the LED is off, the slot is empty or the module is not functional.
PCMCIA 0, 1	Data activity on the indicated PCMCIA slot.

Front-Panel LEDs on Cisco 3631 Routers

The LEDs on the front panel of the router enable you to determine router performance and operation. Figure A-4 shows the LEDs on the front panel of the Cisco 3631 router. For an explanation of these LEDs see Table A-5.

Figure A-4   Cisco 3631 Front-Panel LEDs
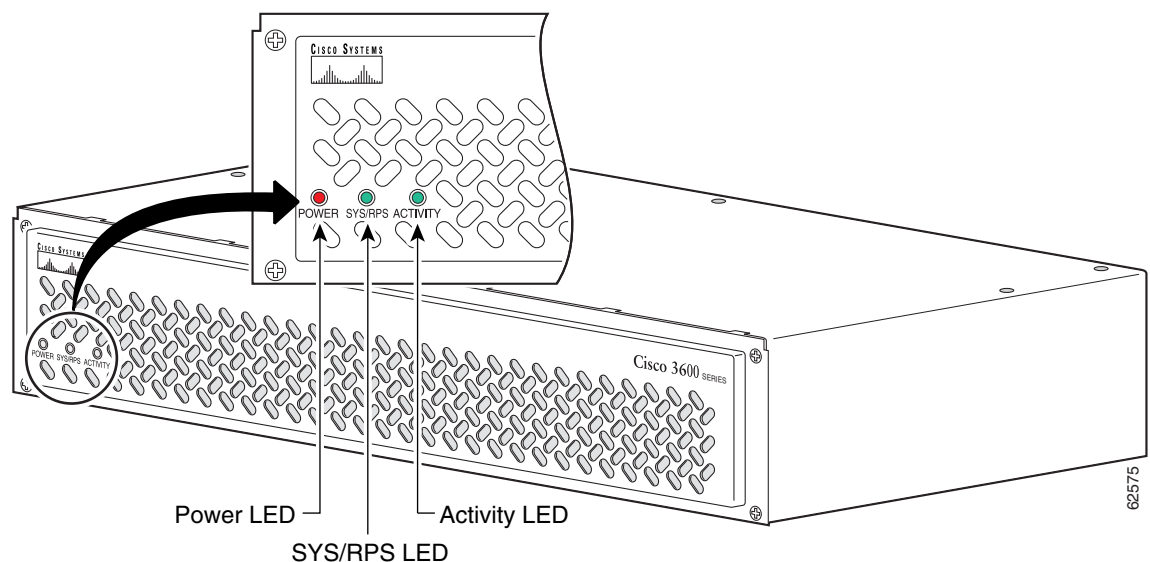
Table A-5   Cisco 3631 Front-Panel LEDs

LED	Color	Power Supply Status
POWER	Off	No power to system.
	Green	Power to the system.
SYS/RPS	Slow blinking green	System initialization in progress.
	Solid green	System software running. No RPS failure.
	Fast blinking green	RPS failure after system software is running.
ACTIVITY	Blinking green	Blinking indicates network activity.

Reading Rear-Panel LEDs

Rear-Panel LEDs on Cisco 3631 Routers

For an explanation of the Cisco 3631 rear-panel LEDs, see Table A-6.

Figure A-5   Cisco 3631 Router Rear-Panel LEDs
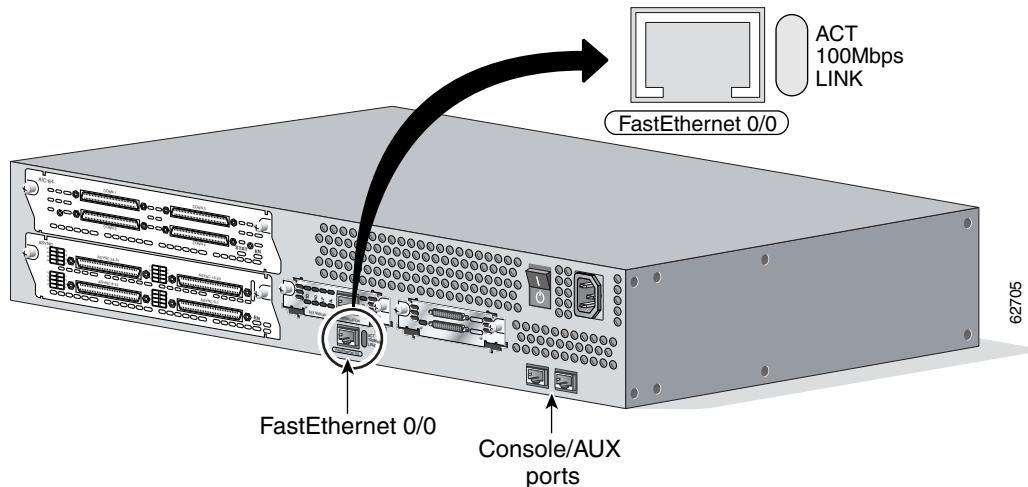
Table A-6   Cisco 3631 Fast Ethernet Connector LEDs

LED	Color	Status
ACT	Green	Blinking indicates network activity.
	Off	No network activity.
LINK	Green	Ethernet link is established.
	Off	No established link.
100Mbps	Green	100 Mbps communication speed attained.
	Off	10 Mbps communication speed attained, or no link established.

Rear-Panel LEDs on Cisco 3660 Routers

For an explanation of the Cisco 3660 rear-panel LEDs, see:

- SYSTEM LED (see Table A-1)
- Power LED (see Table A-7)
- Fast Ethernet connector LEDs (see Table A-8)
- PCMCIA card LEDs (see Table A-4)
- Power supply LEDs (see Table A-3)

See Figure A-6 for the locations of these LEDs.

Note   The system LED on the rear panel of the Cisco 3660 router has the same function as the system LED on the front panel. (See Table A-1.)

The power LED communicates the status of the Cisco 3660 mainboard.

The LED on each Cisco 3660 router power supply has the same function as the PS1 and PS2 LEDs on the Cisco 3660 router front panel. (See Table A-3.)

The PCMCIA LEDs on the Cisco 3660 router rear panel are the same as those on the Cisco 3620 and Cisco 3640 router front panels. (See Table A-4.)

Figure A-6   Cisco 3660 Router Rear-Panel LEDs
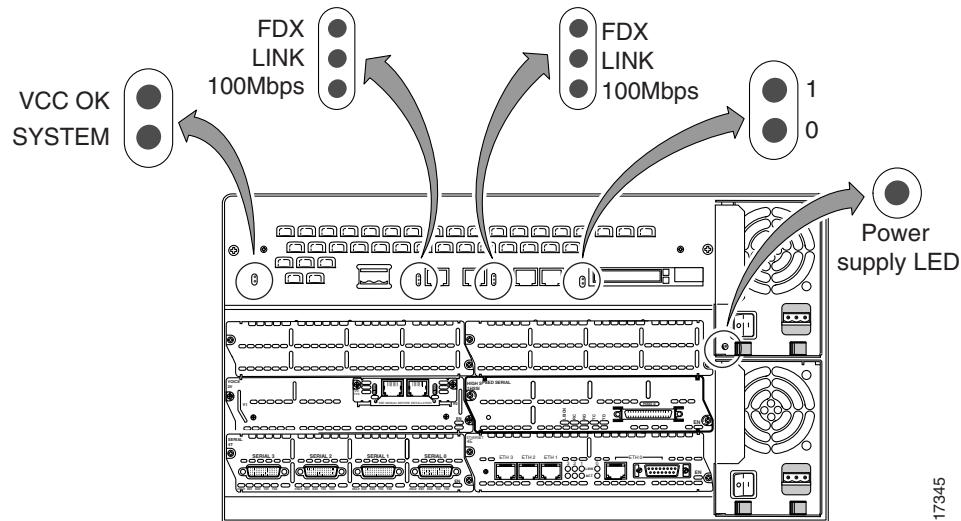
Table A-7   Power LED

Color	Status
Green	Operating voltages on the mainboard are within acceptable ranges.
Off	An error condition is detected in the operating voltages.

Table A-8   Fast Ethernet Connector LEDs

LED	Color	Status
FDX	Green	Data transmission is in full-duplex mode.
	Off	Data transmission is in half-duplex mode.
LINK	Green	Ethernet link is established.
	Off	No established link.
100Mbps	Green	100-Mbps communication speed attained.
	Off	10-Mbps communication speed attained, or no link established.

Error Messages

Cisco 3600 Series Error Messages

This section describes error and recovery messages that may appear when operating a Cisco 3600 series router. Error messages for Cisco 3620 and Cisco 3640 routers powered by the Cisco RPS redundant power system are described in the publication *Cisco RPS Hardware Installation Guide*. Additional error messages for the Cisco 3660 router are described in the "Cisco 3660 Error Messages" section on page A-12.

The Cisco IOS software displays system error and recovery messages on an external device console terminal screen. (For more information, see the "Connecting to a Console Terminal or Modem" section on page 3-43.)

The terminal should display one of the following prompts:

`Router>` (indicates the user EXEC mode)

or

`Router#` (indicates the privileged EXEC mode)

The Cisco IOS software checks the system condition once every 30 seconds. If the condition still exists, the error message reappears; if the error condition has cleared, a recovery message appears.

Table A-9 describes system error and recovery messages and LED conditions that might accompany them.

Note Table A-9 does not provide a complete list of system LED conditions. (For all LED conditions that can occur in your router, see "Reading Front-Panel LEDs" section on page A-4 and "Reading Rear-Panel LEDs" section on page A-8.)

Descriptions of the system error messages, recovery messages, and LED conditions that might accompany them are also described in the *Cisco IOS System Error Messages* online document at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122sup/122sems/semsvol1/emfbgp.htm#xtocid10

Table A-9   Cisco 3600 Series Error Messages

Message
Error:
%C3600-3-NOMAC: Can't allocate MAC address for interface 1/1
Explanation:
MAC address allocation failed because the specified slot and port combination exceeds the hardware configuration.
Recovery:
Reallocate the MAC address.
Error:
%C3600-3-BADPLAT: Unknown platform type
Explanation:
The Cisco IOS software image does not recognize the revision level of the router's mainboard. This might indicate either a hardware failure or the need for a software upgrade to recognize newer hardware.
Recovery:
Verify that you are using a recommended release of Cisco IOS software for your hardware. Upgrade if necessary.
Error:
%C3600-3-BADNV: Detected invalid NVRAM size: xx bytes
Explanation:
The NVRAM detected is not 128 bytes, or the NVRAM may be corrupted.
Recovery:
Copy the error message exactly as it appears, and report it to your technical support representative. (See the "Obtaining Technical Assistance" section on page xviii.)
Error:
%C3600-3-NVERASEFAIL: Failed to erase config due to internal error.
Explanation:
An internal error prevented the password protection feature from erasing the configuration.
Recovery:
Copy the error message exactly as it appears, and report it to your technical support representative. (See the "Obtaining Technical Assistance" section on page xviii.)
Error:
%C3600-4-MACBLKSIZE: Unknown MAC address block size.
Explanation:
Data stored in the backplane is either corrupt or incomplete.
Recovery:
Contact your technical support representative to upgrade your system. (See the "Obtaining Technical Assistance" section on page xviii.)

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Table A-9   Cisco 3600 Series Error Messages (continued)

Message
Error:
%C3600-3-SLOTS: Number of slots in chassis is undefined.
Explanation:
The number of slots is undefined in the cookie.
Recovery:
Contact your technical support representative to upgrade your system. (See the "Obtaining Technical Assistance" section on page xviii.)
Error:
%C3600-4-COOKIE: Corrupt or missing MAC address cookie/n using random base xxx.
Explanation:
The cookie is corrupt.
Recovery:
Contact your technical support representative to upgrade your system. (See the "Obtaining Technical Assistance" section on page xviii.)

Cisco 3660 Error Messages

This section describes LED conditions and additional error and recovery messages that may be displayed when operating a Cisco 3660 router only. (See Table A-10.)

Note Table A-10 does not provide a complete list of system LED conditions. (For all LED conditions that can occur in your router, see "Reading Front-Panel LEDs" section on page A-4 and "Reading Rear-Panel LEDs" section on page A-8.)

Table A-10   Cisco 3660 System Error and Status Messages

LED Type	LED Color	Message
—	—	Error:
		%INITSYS-1-PS:
		Explanation:
		The router failed to establish the environmental monitor process. This is probably because of insufficient memory available in the router.
		Recovery:
		Add memory to the router.

Table A-10   Cisco 3660 System Error and Status Messages (continued)

LED Type	LED Color	Message

System	Amber	Error:
		
		`%SYS-1-OVERTEMP: System detected OVERTEMPERATURE condition. Please resolve cooling problem immediately!`
		
		Explanation:
		
		The router is operating at an abnormally high temperature, possibly caused by one or more of the following:
		
		• Fan failure
		
		• Air conditioner failure in the room
		
		• Air blockage to cooling vents
		
		Recovery:
		
		Check the possible causes. See also the "Site Environment" section on page 2-4 and the "Equipment Racks" section on page 2-5.
		
		When the error condition is resolved, the following informational message appears:
		
		`%OVERTEMP_OK, PS, LOG_ERR, 0: System temperature is now normal.`

System	Amber	Error:
		
		`%THERMAL-3-PS: System detected Power System # THERMAL FAIL condition.`
		
		Explanation:
		
		The operating temperature of the specified power supply (1 or 2) exceeded the acceptable range possibly caused by one or more of the following:
		
		• Fan failure
		
		• Air conditioner failure in the room
		
		• Air blockage to cooling vents
		
		Recovery:
		
		Check the possible causes. If the fan has failed, replace the fan cage. Refer to the *Replacing the Fan Cage in Cisco 3660 Routers* hardware configuration note.
		
		When the error condition is resolved, the following informational message appears:
		
		`%THERMOK-3-PS: Power System THERMAL condition is now normal.`

Table A-10   Cisco 3660 System Error and Status Messages (continued)

LED Type	LED Color	Message

PS1, PS2, LED on power supply rear panel	Amber	Error:
		
		`%PS-3-DCOUTPUTVOLTFAIL: System detected Power System # DC FAIL condition.`
		
		Explanation:
		
		The cable connected to the specified DC power supply (1 or 2) is loose or the DC power supply has failed.
		
		Recovery:
		
		1. Check the power supply LEDs to identify the faulty unit.
		2. Power off the faulty power supply and circuit breaker.
		3. Check that cables are seated properly and terminal blocks are wired correctly.
		4. Power on the circuit breaker and the power supply.
		5. If the error condition persists, replace the DC power supply. Refer to the *Installing Universal DC Power Supplies in Cisco 3660 Routers* or to the *Installing Power Supplies in Cisco 3600 Series Routers* hardware configuration note.
		
		When the error condition is resolved, the following informational message appears:
		
		`%PS-3-DCOUTPUTVOLTOK: Power System DC condition is now normal.`

PS1, PS2, LED on power supply rear panel	Amber	Error:
		
		`%PS-3-INPUTVOLTFAIL: System detected Power System # AC FAIL condition.`
		
		Explanation:
		
		The cable connected to the specified AC power supply (1 or 2) is loose or the AC power supply has failed.
		
		Recovery:
		
		1. Check the power supply LEDs to identify the faulty unit.
		2. Power off the faulty power supply.
		3. Check that cables are seated properly and terminal blocks are wired correctly.
		4. Power on the power supply.
		5. If the error condition persists, replace the AC power supply. Refer to the *Installing Power Supplies in Cisco 3600 Series Routers* hardware configuration note.
		
		When the error condition is resolved, the following informational message appears:
		
		`%PS-3-INPUTVOLTOK: Power System AC condition is now normal.`

Table A-10   Cisco 3660 System Error and Status Messages (continued)

LED Type	LED Color	Message

System
 	
PS1, PS2, LED on power supply rear panel
	Amber
	
	Amber
		Error:
		
		`%PS-3-MULTFAIL: There is more than one failure with the Power System #; please resolve problems immediately.`
		Explanation:
		
		The specified power supply (1 or 2) has experienced multiple failures. This is a critical condition that must be resolved immediately.
		Recovery:
		1. Check the power supply LEDs to identify the faulty unit.
		2. Power off the faulty power supply and circuit breaker (for a DC power supply).
		3. Check that cables are seated properly and terminal blocks are wired correctly.
		4. Power on the circuit breaker (for a DC power supply), and the power supply.
		5. If the error condition persists, replace the power supply. Refer to the *Installing Universal DC Power Supplies in Cisco 3660 Routers* or to the *Installing Power Supplies in Cisco 3600 Series Routers* hardware configuration note.
		When the error condition is resolved, the following informational message appears:
		`%PS-3-PSOK: Power System is now normal.`

—	—	Error:
		
		`%FAN-3-FAN_FAILED: Fan # had a rotation error reported.`
		Explanation:
		
		The specified fan (1 through 6) is not rotating at the desired speed.
		Recovery:
		
		Replace the fan cage. Refer to the *Replacing the Fan Cage in Cisco 3660 Routers* hardware configuration note.
		When the error condition is resolved, the following informational message appears:
		`%FAN-3-FAN_OK: Fan # had earlier reported a rotation error. It is ok now.`

—	—	Error: `%OIR-6-REMCARD: Card removed from slot x, interfaces disabled.` Explanation: The online-insertion-and-removal (OIR) function detected the removal of a network module processor from the specified chassis slot (1 through 6). The interfaces on that processor are administratively shut down and removed. In addition, the routing table is flushed of any routes through the removed interfaces. For more information, refer to the *Cisco Network Modules Hardware Installation Guide*. This is an informational message that does not require any recovery procedure.

Table A-10   Cisco 3660 System Error and Status Messages (continued)

LED Type	LED Color	Message
—	—	Error: `%OIR-6-INSCARD: Card inserted in slot x, interfaces administratively shut down.` Explanation: The online-insertion-and-removal (OIR) function detected the insertion of a network module processor in the specified chassis slot (1 through 6). The interfaces on that processor are shut down until configured, or if an interface of that type was previously configured, it is restored to its previous state. For more information, refer to the *Cisco Network Modules Hardware Installation Guide*. This is an informational message that does not require any recovery procedure.
—	—	Error: `%OIR-3-SEATED: Insert/removal failed for slot x, check card seating.` Explanation: The online-insertion-and-removal (OIR) function detected an incorrectly seated network module in the specified chassis slot (1 through 6). For more information, refer to the *Cisco Network Modules Hardware Installation Guide*. Recovery: Remove and reinstall the network module in the indicated slot.
—	—	Error: `%CIRRUS-4-DOWNREV_NM: Network Module card in slot x is incompatible with the system.` Explanation: The network module card in the specified slot (1 through 6) is incompatible and must be upgraded to operate in the Cisco 3660 router. For more information, refer to the *Cisco Network Modules Hardware Installation Guide*. Recovery: Contact your technical support representative to upgrade your network module. (See the "Obtaining Technical Assistance" section on page xviii.)

Recovering a Lost Password

You can recover a lost enable password, but an enable secret password is encrypted and is not recoverable. If you lose an enable secret password that is configured on your router, you can replace it with a new enable secret password.

For password recovery and replacement procedures for the Cisco 2600 series routers, refer to the *Password Recovery Procedure for the Cisco 3600 Series Routers* document at the following URL:

http://www.cisco.com/warp/public/474/pswdrec_3600.shtml

Using the ROM Monitor

This appendix describes the use of the ROM monitor (also called the bootstrap program), which is the firmware that runs when you power up or restart a Cisco router. During normal operation, the ROM monitor helps to initialize the processor hardware and boot the operating system software. You can also use the ROM monitor to:

- Help isolate hardware problems encountered when installing your router.
- Copy a new Cisco IOS image from a console PC if the operating image is corrupted.

This appendix contains the following sections:

- Entering ROM Monitor Mode, page B-1
- ROM Monitor Commands, page B-2
- ROM Monitor Syntax Conventions, page B-3
- ROM Monitor Command Descriptions, page B-4
- Recovering Cisco IOS Software Images, page B-9

Entering ROM Monitor Mode

To use the ROM monitor, you must have access to the console port. Refer to the "Connecting to a Console Terminal or Modem" section on page 3-43 for information on connecting the console cable.

There are two ways of entering the ROM monitor mode:

- Use the **reload** command and the Break key to enter the ROM monitor mode for one-time use.

  Break (system interrupt) is always enabled for 60 seconds after the router reboots, regardless of whether Break is configured on or off in the configuration register (see Appendix C, "Configuration Register"). During this 60-second period, you can break to the ROM monitor prompt by pressing the Break key.

> **Note** If your console terminal does not have a Break key, refer to the terminal emulator documentation for instructions on generating a break (system interrupt).

- Set the configuration register so that the router enters the ROM monitor mode whenever it boots.

  The new configuration register value, 0x0, is effective after the router is rebooted with the **reload** command. The router remains in the ROM monitor and does not boot the operating system.

As long as the configuration register value remains 0x0, you must manually boot the operating system from the console. Refer to the **boot** command in the "ROM Monitor Command Descriptions" section on page B-4.

The two methods of entering the ROM monitor mode are as follows:

Enter ROM Monitor Mode by Using the reload Command

Connect to the router from a console, and follow these steps:

Step 1   Restart the router with the **reload** command.

```
Router# reload
```

Step 2   Press the Break key during the first 60 seconds of the system booting.

This forces the router into ROM monitor mode, and the ROM monitor prompt is displayed:

```
rommon 1>
```

Enter ROM Monitor Mode by Resetting the Configuration Register

Connect to the router from a console, and follow these steps:

Step 1   Set the bits 3, 2, 1, and 0 of the configuration register to zero.

```
Router# configuration-register 0x0
```

Step 2   Restart the router with the **reload** command.

Step 3   `Router# reload`

The router boots into the ROM monitor mode, and the ROM monitor prompt is displayed:

```
rommon 1>
```

Note   The number that appears in the ROM monitor prompt (1>, 2>, and so forth) is the line number. It increments each time you enter a ROM monitor command.

ROM Monitor Commands

Showing ROM Monitor Commands

Enter **?** or **help** at the ROM monitor prompt to see a list of available commands. For example:

```
rommon 1> ?
alias       set and display aliases command
boot        boot up an external process
break       set/show/clear the breakpoint
confreg     configuration register utility
cont        continue executing a downloaded image
context     display the context of a loaded image
cookie      display contents of cookie PROM in hex
```

```
dev        list the device table
dir        list files in the file system
dis        display instruction stream
dnld       serial download a program module
frame      print out a selected stack frame
help       monitor builtin command help
history    monitor command history
iomemdef    set IO mem to a default 25%
meminfo    main memory information
repeat     repeat a monitor command
reset      system reset
rommon-pref  select ROMMON
set        display the monitor variables
stack      produce a stack trace
sync       write monitor environment to NVRAM
sysret     print out info from last system return
tftpdnld   tftp image download
unalias    unset an alias
unset      unset a monitor variable
xmodem     x/ymodem image download
rommon 2>
```

![Note icon]

Note   Not all ROM monitor commands are available on all platforms.

Displaying Information About ROM Monitor Command Syntax

To display information about command syntax, enter the command name followed by **-?**.

Entering ROM Monitor Commands

ROM monitor commands are case-sensitive. Enter commands exactly as shown.

Interrupting ROM Monitor Commands

You can end any command by generating a Break (system interrupt) at the console.

ROM Monitor Syntax Conventions

ROM monitor syntax in this appendix uses the following conventions:

- Square brackets [ ] denote an optional element. In the following example, the element **abc** is not required, but you can specify it if you choose:

    command [**abc**]

- If a minus option is followed by a colon (for example, [**-s:**]) you must provide an argument for the option.

- A term in italics means that you must fill in the appropriate information. In the following example, you replace the term in italics with the interface type you are using:

    command *interface-type*

ROM Monitor Command Descriptions

Router Management Commands

This section lists some useful ROM monitor commands. Refer to the Cisco IOS configuration guides and command references for more information on ROM monitor commands.

Boot Commands in the ROM Monitor

Functions of Boot Commands

The router always boots first from a Cisco IOS image in the Flash memory, because there is no separate, dedicated boothelper image ([rx]boot). The first image in Flash memory functions as the boothelper image, but you can override this by setting the BOOTLDR Monitor environment variable to point to another image. The first image in Flash memory is invoked if the ROM monitor does not recognize a device ID specified in the **boot** command. The router cannot boot if there is no Cisco IOS image in Flash memory.

To boot a router from a Cisco IOS image on a TFTP server (netboot), the installed DRAM must be adequate to hold two uncompressed Cisco IOS images: the image from Flash memory and the image downloaded from the TFTP server.

If the router is configured to boot from a TFTP server (boot bits in the configuration register are set from 2 to 15), the router first boots from the image in Flash memory. It decompresses that image in DRAM, parses the boot system commands, downloads the Cisco IOS image from the TFTP server, and decompresses it in DRAM. After the Cisco IOS image from the TFTP server is in DRAM, the DRAM memory occupied by the boothelper image is released.

Note   Booting from a TFTP server is useful if the router does not have enough Flash memory to hold large images. With a small image in Flash memory (just large enough to support the necessary interfaces), the router boots from Flash, and then the larger image is downloaded from the TFTP server.

Entering Boot Commands

The **boot** command syntax is as follows, where:

- *partition* is a partition number in the Flash memory
- *filename* is the Cisco IOS image file name
- *tftpserver* is the IP address of the TFTP server
- **-x** directs the router to load the image but not execute the boot process
- **-v** (Verbose) specifies that progress print setting messages and error information be displayed

boot [**flash:** [*partition***:** [*filename*]] | **slot0:** [*partition***:** [*filename*]] | **slot1:** [*partition***:** [*filename*]] | *filename tftpserver*] [**-x**] [**-v**]

Some examples of **boot** commands are as follows:

Note   In all **boot** commands, **boot** can be entered as **b**.

- **boot**—Boots from the first Cisco IOS image in the internal Flash memory.
- **boot flash:**—Boots from the first Cisco IOS image in the internal Flash memory.
- **boot flash:** *partition***:**—Boots from the first Cisco IOS image in the specified partition in the internal Flash memory.
- **boot flash:** *filename*—Boots from the specified IOS image in the internal Flash memory.
- **boot flash:** *partition***:** *filename*—Boots from the specified Cisco IOS image in the specified partition in the internal Flash memory.
- **boot slot0:**—Boots from the first Cisco IOS image in the first partition in the PCMCIA Flash memory in slot 0.
- **boot slot0:2:**—Boots from the first Cisco IOS image in the second partition in the PCMCIA Flash memory in slot 0.
- **boot slot0:** *filename*— Boots from the specified Cisco IOS image in the PCMCIA Flash memory in slot 0.
- **boot slot1:3:** *filename*—Boots from the specified Cisco IOS image in the third partition in the PCMCIA Flash memory in slot 1.
- **boot** *filename tftpserver*— Boots from the specified Cisco IOS image on the specified TFTP server (after first booting from Flash). For example:

    boot c3660-is-mz 172.15.19.11

Note   Use the CLI commands **show version** and **show hardware** to see the source of the currently running Cisco IOS image.

Informational Commands in the ROM Monitor

dev—List boot device identifications on the router, for example:

```
rommon 10 > dev

Devices in device table:
      id  name
   flash: flash
   slot0: PCMCIA slot 0
   slot1: PCMCIA slot 1
   eprom: eprom
```

dir *device:*[*partition:*]—Lists the files on the named device. For example:

```
rommon 8> dir flash:

      File size              Checksum    File name
     2229799 bytes (0x220627)   0x469e    C3660-is-mz.122-13T
```

help—Shows a summary of ROM monitor commands (equivalent to **?**).

meminfo—Displays main memory size, starting address, and available range; size of packet memory; and size of NVRAM. The following example shows the **meminfo** command:

```
rommon 9 > meminfo

Main memory size: 16 MB in 32-bit mode.
Available main memory starts at 0xa000e000, size 16328KB
IO (packet) memory size: 25 percent of main memory.
NVRAM size: 128KB
```

meminfo [**-l**]—The **meminfo** command with the **-l** option shows supported DRAM configurations. The following example shows an example of the **meminfo -l** command:

```
rommon 1> meminfo -l

The following 64 bit memory configs are supported:
-------------------------------------------------
DIMM SOCKET 0          DIMM SOCKET 1          TOTAL MEMORY
-------------          -------------          ------------
 16 MB                    0 MB                  16 MB
 16 MB                   16 MB                  32 MB
 32 MB                    0 MB                  32 MB
 32 MB                   16 MB                  48 MB
 32 MB                   32 MB                  64 MB
 64 MB                    0 MB                  64 MB
 64 MB                   16 MB                  80 MB
 64 MB                   32 MB                  96 MB
 64 MB                   64 MB                 128 MB
128 MB                    0 MB                 128 MB
128 MB                   16 MB                 144 MB
128 MB                   32 MB                 160 MB
128 MB                   64 MB                 192 MB
128 MB                  128 MB                 256 MB
rommon 2>
```

Other Useful ROM Monitor Commands

reset or **i**—Resets and initializes the router, similar to power on.

Debugging Commands

Most debugging commands are functional only when Cisco IOS software has crashed or failed to initialize (boot). Debugging commands should normally be entered only under the direction of a Cisco engineer. If you enter a debugging command and Cisco IOS crash information is not available, the following error message appears:

```
"xxx: kernel context state is invalid, cannot proceed."
```

The following ROM monitor debugging commands provide information about software failures:

- **stack** or **k**—Produce a stack trace.
- **context**—View processor context.
- **frame**—View an individual stack frame.
- **sysret**—View return information from the last booted system image. This information includes the reason for terminating the image, a stack dump of up to eight frames, and, if an exception is involved, the address where the exception occurred. For example:

```
rommon 8> sysret

System Return Info:
count: 19,  reason: a SegV exception
pc:0x802b1040,  error address: 0x802b1040
Stack Trace:
FP: 0x80908398, PC: 0x802b102c
FP: 0x809083b0, PC: 0x802b0b88
FP: 0x809083d8, PC: 0x8017039c
FP: 0x809083e8, PC: 0x8016f764
```

Configuration Register Commands

The configuration register resides in NVRAM. You can view or modify the configuration register from either the ROM monitor or the operating system software.

For procedures used to change the configuration register from the operating system, and for information about configuration register settings, see Appendix C, "Configuration Register."

To modify the configuration register from the ROM monitor, you can:

- Enter the **confreg** command by itself for menu mode. See the "Modifying the Configuration Register in Menu Mode" section below.
- Enter the **confreg** command plus the new hexidecimal value of the configuration register. See the "Modifying the Configuration Register by Hexidecimal Entry" section on page B-8.

In either case, the new configuration register value is written into NVRAM, but is not effective until you reboot (using the ROM monitor **reset** command) or power cycle the router.

Modifying the Configuration Register in Menu Mode

Entering the **confreg** command without an argument displays the contents of the configuration register, and prompts you to alter the contents by describing the meaning of each bit.

The following display shows an example of menu mode:

```
rommon 7> confreg


    Configuration Summary
enabled are:
break/abort has effect
console baud: 9600
boot: the ROM Monitor

do you wish to change the configuration? y/n  [n]:  y
enable  "diagnostic mode"? y/n  [n]:  y
enable  "use net in IP bcast address"? y/n  [n]:
enable  "load rom after netboot fails"? y/n  [n]:
enable  "use all zero broadcast"? y/n  [n]:
disable  "break/abort has effect"? y/n  [n]:
enable  "ignore system config info"? y/n  [n]:
change console baud rate? y/n  [n]:  y
enter rate: 0 = 9600,  1 = 4800,  2 = 1200,  3 = 2400
            4 = 19200, 5 = 38400, 6 = 57600, 7 = 115200  [0]:  0
change the boot characteristics? y/n  [n]:  y
enter to boot:
 0 = ROM Monitor
 1 = the boot helper image
 2-15 = boot system
    [0]:  0


    Configuration Summary
enabled are:
diagnostic mode
console baud: 9600
boot: the ROM Monitor

do you wish to change the configuration? y/n  [n]:


You must reset or power cycle for new config to take effect
```

Modifying the Configuration Register by Hexidecimal Entry

Entering the **confreg** command plus a hexidecimal value changes the contents of the configuration register. The syntax is **confreg** [*hexnum*]; values entered are always interpreted as hexadecimal. The following example changes the value of the configuration register to the factory default:

```
rommon 7> confreg 0x2102
```

You must reset or power cycle the router for new configuration to take effect.

Recovering Cisco IOS Software Images

If both the boot and system images have been erased and only the ROM monitor is available, you can use the ROM monitor **xmodem** command to copy a Cisco IOS image to Flash memory from the console. The console can be connected directly to the router through the console port, or remotely through a modem connected to the auxiliary port.

> **Note**   Copying a Cisco IOS image from the console is very slow. This procedure should be used only in an emergency and is not recommended for normal Cisco IOS image upgrades.
>
> For the fastest possible download from a console, set the console speed to 115200 bps by using the **confreg** ROM monitor command. See the "Configuration Register Commands" procedure on page B-7.

> **Note**   Using a PCMCIA card to update the Cisco IOS image is much faster than using the console port and, when available, is the recommended method of recovering a software image.

Description and Options of the xmodem Command

The **xmodem** command establishes a connection between a console and the router console port for disaster recovery, if both the boot and system images are erased from Flash memory.

xmodem [*filename*]—Establishes an Xmodem connection between the console and the router. The optional argument *filename* specifies the source file containing the Cisco IOS image.

Other options include the following:

- **c**—Use cyclic redundancy check (CRC-16).
- **y**—Use Ymodem transfer protocol.
- **r**—Copy the image to dynamic random-access memory (DRAM) for launch.
- **x**—Do not launch image on completion of download.

Console Requirements

The console computer (PC) must have the following files to use this procedure:

- Terminal emulation application program supporting one of the following file transfer protocols:
  - Xmodem
  - Xmodem–CRC
  - Xmodem–1K
  - Ymodem
- Cisco IOS image file

Procedure for the xmodem Command

To copy a Cisco IOS image from a console to Flash memory, perform the following procedure.

Note   File transfer from a console is slow and will take many minutes.

Step 1   Connect the console using the instructions in the "Connecting to a Console Terminal or Modem" section on page 3-43.

Step 2   Power on the router. The power-on self-test diagnostics run and the boot ROM searches for a valid boot image and Cisco IOS image in Flash memory. If the boot image and Cisco IOS image are not found, the ROM monitor prompt is displayed:

```
rommon 1>
```

Step 3   Enter the **xmodem** command and the name of the source file containing the Cisco IOS image:

```
rommon 1> xmodem filename
```

Step 4   The source file is searched for and found. Messages similar to the following appear:

```
Do not start upload program yet...
File size          Checksum   File name
2537948 bytes      (0x26b9dc)  3640-boot-l

WARN: This operation will ERASE bootflash. If the xmodem
download to bootflash fails, you will lose any good image
you may already have in bootflash.
Invoke this application only for disaster recovery.

Do you wish to continue? [yes/no]:
```

Step 5   Enter **yes** to copy the Cisco IOS image into Flash memory. Messages similar to the following appear:

```
Ready to receive file prog ...

Erasing flash at 0x3000000

program flash location 0x3000000

Transfer complete!
```

The router is now ready to boot from the Cisco IOS image. Enter the `reset` ROM monitor command to reboot the router.

Note   If you have set the console speed to 115200, you may wish to reset it to the previous speed or to the factory default speed (typically 9600 bps). See the "Configuration Register Commands" procedure on page B-7.

Configuration Register

This appendix describes the factory default settings of the configuration register, and procedures for changing those settings.

This appendix has the following sections:

- Configuration Register Settings, page C-1
- Changing Configuration Register Settings, page C-2
- Configuring the Boot Field, page C-4
- Enabling Booting from Flash Memory, page C-6

Configuration Register Settings

The router has a 16-bit configuration register in NVRAM. You can use the configuration register to perform the following tasks:

- Set and display the configuration register value
- Force the router into the ROM monitor (bootstrap program)
- Select a boot source and default boot filename
- Enable or disable the Break function
- Control broadcast addresses
- Load operating software from ROM

Table C-1 describes each configuration register bit.

Table C-1   Configuration Register Bit Meanings

Bit Number	Hexadecimal	Meaning
00–03	0x0000-0x000F	Boot field. (See Table C-2.)
06	0x0040	Causes the system software to ignore the contents of NVRAM.
07	0x0080	OEM bit enabled.
08	0x0100	Break disabled.
09	0x0200	Causes the system to use the secondary bootstrap. This is typically not used (set to 0).
10	0x0400	IP broadcast with all zeros.
5, 11, 12	0x0020, 0x0800, 0x1000	Console line speed.
13	0x2000	Boots default ROM software if the network boot fails.
14	0x4000	IP broadcasts do not have net numbers.
15	0x8000	Enables diagnostic messages and ignores the contents of NVRAM.

Changing Configuration Register Settings

You might want to modify the value in the configuration register to perform the following tasks:

- Recover a lost password

- Change the console data rate

- Enable or disable the Break function

- Manually boot the operating system using the **b** command at the ROM monitor prompt

- Force the router to automatically boot its system image in Flash memory, or boot in accordance with any **boot system** commands stored in the router's configuration file in NVRAM

You can change the configuration register from either the ROM monitor or the operating system software. To change the configuration register from the ROM monitor, see the "Configuration Register Commands" section on page B-7. To change the configuration register from the system software, do the following:

Step 1   Connect a console terminal to the console port of the router as described in the "Connecting to the Console Port" section on page 3-44, using the blue RJ-45 to DB-9 console adapter cable.

Note   If you have a terminal with a DB-25 port, use an RJ-45 rollover cable and DB-25 adapter. The RJ-45-to-DB-25 adapter (Cisco part number 29-0810-01) can be purchased from Cisco.

For information about cable pinouts, refer to the online document *Cisco Modular Access Router Cable Specifications*. This document is available online and on the Cisco Documentation CD-ROM.

Note   In this publication, references to Cisco 3660 routers include both Cisco 3661 and Cisco 3662 models.

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

Step 3   Power on the router.

Step 4   When asked if you would like to enter the initial dialog, answer **no**:

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

Your router is now in the normal operating mode.

Step 5   After a few seconds, you see the user EXEC prompt (Router>). Enter the **enable** command and your password to enter privileged EXEC mode:

```
Router> enable
```

```
Password: password
```

Step 6   At the privileged EXEC prompt (Router#), enter the **configure terminal** command:

```
Router# configure terminal
```

```
Enter configuration commands, one per line.
Edit with DELETE, CTRL/W, and CTRL/U; end with CTRL/Z
```

Step 7   Enter the **config-register** *value* command, where *value* is a hexadecimal number preceded by 0x (see Table C-2), to set the contents of the configuration register:

```
Router# config-register 0xvalue
```

Note   Cisco IOS software does not allow you to change the console speed bits directly with the **config-register** command. To change the console speed, complete this sequence:
```
Router# configure terminal
Router(config)# line console 0
Router(config-line)# speed 9600
```

Step 8   Press **Ctrl-z** to exit configuration mode.

Step 9   Copy the new console speed to NVRAM:

```
Router> copy run start
```

The new settings are saved to NVRAM, but they are not effective until the router restarts; for example, when you switch the power off and on or when you enter a **reload** command from the console.

Step 10   Enter the **show version** command to display the configuration register value currently in effect and the value that will be used at the next reload. The value is shown on the last line of the display:

```
Configuration register is 0x142 (will be 0x142 at next reload)
```

Step 11   Reboot the router. The new value is effective after the router reboots.

Configuring the Boot Field

The lowest four bits of the configuration register (bits 3, 2, 1, and 0) form the boot field. (See Table C-2.)

Table C-2   Explanation of Boot Field Configuration Register Bits (00-03)

Boot Field	Meaning
00	Stays at the ROM monitor on a reload or power cycle
01	Boots the first image in Flash image as a system image
02-F	Enables default booting from Flash memory Enables **boot system** commands that override default booting from Flash memory

The boot field specifies a number in binary form. If you set the boot field value to 0, you must have console port access to boot the operating system manually. Refer to the **boot** command in the "ROM Monitor Command Descriptions" section on page B-4.

If you set the boot field to a value of 2 to F, and there is a valid **boot system** command stored in the configuration file, the router software processes each **boot** command in sequence until the process is successful or the end of the list is reached. If there are no **boot** commands in the configuration file, the router attempts to boot the first file in Flash memory.

In the following example, the configuration register is set to boot the router automatically from Flash memory and to ignore Break at the next reboot of the router:

```
Router# configure terminal

Enter configuration commands, one per line.
Edit with DELETE, CTRL/W, and CTRL/U; end with CTRL/Z
config-register 0x102
Ctrl-z
```

> **Note**   A **boot system** command in the router configuration in NVRAM overrides booting from Flash memory.

Bit 8 controls the console Break key. Setting bit 8 (the factory default) causes the processor to ignore the console Break key. Clearing bit 8 causes the processor to interpret Break as a command to force the router into the bootstrap monitor, halting normal operation. Break can always be sent in the first 60 seconds while the router is rebooting, regardless of the configuration settings.

Bit 9 controls the system boot. Clearing bit 9 (the factory default) causes the system to boot from Flash memory. Clearing bit 9 causes the system to use the secondary bootstrap (netbooting). This is typically not used.

Bit 10 controls the host portion of the IP broadcast address. Setting bit 10 causes the processor to use all zeros; clearing bit 10 (the factory default) causes the processor to use all ones. Bit 10 interacts with bit 14, which controls the network and subnet portions of the broadcast address. Table C-3 shows the combined effect of bits 10 and 14.

Table C-3   Configuration Register Settings for Broadcast Address Destination

Bit 10	Bit 14	Address (<net> <host>)
Off	Off	<ones> <ones>
On	Off	<zeros> <zeros>
On	On	<net> <zeros>
Off	On	<net> <ones>

Bit 13 determines the router's response to a bootload failure. Setting bit 13 causes the router to load operating software from ROM after six unsuccessful attempts to load a boot file. Clearing bit 13 causes the router to continue indefinitely to attempt loading a boot file. By factory default, bit 13 is set to 0.

Bits 5, 11, and 12 of the configuration register determine the baud rate of the console terminal. Table C-4 shows the bit settings for the eight available rates. (The default baud rate is 9600 bps.)

Table C-4   Console Terminal Baud Rate Settings

Baud	Bit 5	Bit 12	Bit 11
115200	1	1	1
57600	1	1	0
38400	1	0	1
19200	1	0	0
9600	0	0	0
4800	0	0	1
2400	0	1	1
1200	0	1	0

Enabling Booting from Flash Memory

To enable booting from Flash memory, set bits 3, 2, 1, and 0 to a value between 2 to 15. To specify a filename to boot, enter the system software configuration command **boot system flash** [*device***:**] [*partition***:**] [*filename*] in the configuration file.

By specifying the device and partition in the command, you can configure the router to boot from the PCMCIA cards. If you specify only the filename, the router is configured to boot from Flash memory.

To enter configuration mode while in the system software image, enter the **configure** command at the enable prompt as in the following example:

```
Router# configure

Configuring from terminal, memory, or network [terminal]? terminal

Enter configuration commands, one per line.
Edit with DELETE, CTRL/W, and CTRL/U; end with CTRL/Z
boot system flash filename
```

To disable Break and enable the **boot system flash** command, enter the **config-register** command with a value as follows:

```
config-reg 0x102
Ctrl-z
```

If you set the configuration register value to 0x102, as in this example, you do not need to enter the **boot system flash** command unless there is more than one image in Flash memory.

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