



Cisco 7201 Installation and Configuration Guide

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CONTENTS

Preface ix

Document Revision History	i-ix
Document Objectives	i-ix
Audience	i-x
Document Organization	i-x
Safety Warnings and Cautions	i-x
Warning Definition	i-xi
Lithium Battery Caution	i-xvi
Related Documentation	i-xvii
Obtaining Documentation, Obtaining Support, and Security Guidelines	i-xviii

CHAPTER 1

Cisco 7201 Features	1-2
Cisco 7201 Hardware Overview	1-3
Front View	1-3
Faceplate LEDs	1-4
SFP Module Information	1-5
USB Port Information	1-6
CompactFlash Disk Information	1-7
Rear View	1-7
Power Supply LEDs	1-8
Interior View	1-9
System Board	1-9
System Management Functions	1-10
Checking the Shipping Container Contents	1-11
Cisco 7201 Router Installation Checklist	1-11

CHAPTER 2

Preparing to Install the Cisco 7201 Router	2-1
Site Preparation and Unpacking	2-2
Tools and Parts Required	2-3
Electrical Equipment Guidelines	2-4
Preventing Electrostatic Discharge Damage	2-4
Site Requirement Guidelines	2-4
Installing the Router	2-5
General Tabletop or Workbench Installation	2-5

- Rack-Mounting a Cisco 7201 Router 2-6
- Attaching the Chassis Rack-Mount and Cable-Management Brackets 2-7
 - Installing Rack-Mount Brackets on the Front of the Chassis 2-7
 - Attaching the Cable-Management Bracket 2-8
 - Installing Rack-Mount Brackets on the Rear of the Chassis 2-8
- Installing the Chassis in the Rack 2-9
 - Two-Post Rack Installation 2-10
 - Four-Post Rack Installation 2-11
- Attaching a Chassis Ground Connection 2-12
- Installing a Port Adapter, USB Flash Memory Module, or SFP Module That Did Not Ship in the System 2-14
- Connecting Port Adapter Cables 2-14
- Connecting I/O Cables 2-14
 - Connecting Console and Auxiliary Port Cables 2-15
 - Connecting the Fast Ethernet Management Port Cable 2-17
 - Connecting Native Gigabit Ethernet Cables 2-18
 - Gigabit Ethernet SFP Connection Equipment 2-18
 - Installing the SFP Module Optical Fiber Cables 2-19
 - Mode-Conditioning Patch Cord Description 2-21
 - Attaching the Mode-Conditioning Patch Cord 2-22
 - Attaching the Gigabit Ethernet RJ-45 Cables 2-22
- Using the Cable-Management Bracket 2-23
- Connecting Power 2-24
 - Connecting AC-Input Power 2-24
 - Connecting DC-Input Power 2-26
 - Installing the DC Grounding Leads 2-27
 - Wiring the DC-Input Power Source 2-29

CHAPTER 3

- Functional Overview 3-1
 - Chassis Slot and Logical Interface Numbering 3-2
 - MAC Address 3-3
 - Online Insertion and Removal 3-4
 - Environmental Monitoring and Reporting Functions 3-4
 - Environmental Monitoring 3-5
 - Reporting Functions 3-6
 - Fan Failures 3-8
- Checking Conditions Prior to System Startup 3-8
- Starting the System and Observing Initial Conditions 3-8

Configuring a Cisco 7201 Router	3-9
Performing a Basic Configuration Using AutoInstall	3-10
Performing a Basic Configuration Using the Setup Facility	3-10
Configuring Global Parameters	3-11
Configuring the Native Gigabit Ethernet Interfaces	3-15
Configuring Port Adapter Interfaces	3-17
Performing a Basic Configuration Using Global Configuration Mode	3-20
Checking the Running Configuration Settings	3-21
Saving the Running Configuration to NVRAM	3-21
Performing Other Configuration Tasks	3-22
Upgrading ROMmon on the Cisco 7201	3-22
Using the show rom-monitor Command and showmon Command	3-23
Using the upgrade rom-monitor Command	3-23
Changing Preferences to Change the ROMmon Image	3-24
Troubleshooting the Upgrade	3-24
ROMmon Upgrade Error Messages	3-24
Upgrading FPGA	3-25
Replacing or Recovering a Lost Password	3-26
Overview of the Password Recovery Procedure	3-26
Details of the Password Recovery Procedure	3-27
Viewing Your System Configuration	3-29
Performing Complex Configurations	3-30
CHAPTER 4	
Removing and Installing an SFP Module	4-2
Removing an SFP Module	4-2
Installing an SFP Module	4-2
Removing and Installing the CompactFlash Disk	4-3
Removing and Installing a USB Flash Memory Module or USB eToken Pro Key	4-4
Removing and Installing a Port Adapter or Service Adapter	4-5
Removing and Installing an AC Power Supply	4-7
Removing the AC Power Supply	4-7
Installing the AC Power Supply	4-9
Removing and Installing a DC Power Supply	4-10
Removing the DC Power Supply	4-10
Installing the DC Power Supply	4-11
Installing the DC Grounding Leads	4-12
Wiring the DC-Input Power Source	4-13

Removing and Installing a DIMM 4-15

 Powering Off the Router and Removing the Cover 4-15

 Removing and Installing the DIMM 4-16

 Replacing the Cover and Powering On the Router 4-18

CHAPTER 5

Troubleshooting Overview 5-1

Online Troubleshooting Resources 5-2

Problem Solving Using a Subsystems Approach 5-3

 Identifying Startup Problems 5-3

 Troubleshooting the Power Subsystem 5-4

 Troubleshooting the Cooling Subsystem 5-6

 Troubleshooting the I/O Subsystem 5-7

 Troubleshooting the Processor Subsystem 5-7

 Troubleshooting the Port Adapter or Service Adapter 5-8

Upgrading the Boot Helper (Boot Loader) Image 5-8

Boot Prompt: (boot)# 5-9

ROMmon Prompt: rommon > 5-10

 Complete Boot Prompt and ROMmon Prompt Example 5-11

Cleaning the Fiber-Optic Connections 5-14

APPENDIX A

Specifications A-1

Cisco 7201 Router Specifications A-1

Power Supply Product Numbers A-2

Software Requirements A-3

Processor and Memory Specifications A-3

SFP Module Specifications and Configurations A-4

Gigabit Ethernet RJ-45 Port Pinouts A-6

Gigabit Ethernet Flow Control Information A-9

Console Port and Auxiliary Port Signals and Pinouts A-10

APPENDIX B

Using the CompactFlash Disk B-1

Product Description B-1

Hardware and Software Requirements B-2

Tools and Parts Required B-2

Compatibility Requirements B-2

 System Memory and Software Image Functions and Interactions B-3

Boot Environment Variables B-3

Sample Upgrade Process	B-5
Working with a CompactFlash Disk	B-5
Software Command Overview	B-6
Using Software Commands	B-7
Using the cd Command	B-8
Using the show Command	B-8
Using the pwd Command	B-9
Using the dir Command	B-9
Using the format Command	B-9
Using the mkdir Command	B-10
Using the rmdir Command	B-11
Using the delete Command	B-11
Enabling Booting from a CompactFlash Disk	B-12
Making a CompactFlash Disk-Based Software Image the Bootable Software Image	B-13

 APPENDIX C

Configuration Register Information C-1

Configuration Bit Meanings	C-1
Bits 0–3	C-2
Bit 6	C-3
Bit 7	C-3
Bit 8	C-4
Bit 10 and Bit 14	C-4
Bit 11 and Bit 12	C-4
Bit 13	C-4
Bit 15	C-5
Displaying the Configuration Register While Running Cisco IOS	C-5
Displaying the Configuration Register While Running ROM Monitor	C-5
Setting the Configuration Register While Running Cisco IOS	C-6
Setting the Configuration Register While Running ROM Monitor	C-6

 INDEX



Preface

This preface discusses the objectives, audience, and organization of this publication. The following sections are in this preface:

- [Document Revision History, page ix](#)
- [Document Objectives, page ix](#)
- [Audience, page x](#)
- [Document Organization, page x](#)
- [Safety Warnings and Cautions, page x](#)
- [Related Documentation, page xvii](#)
- [Obtaining Documentation, Obtaining Support, and Security Guidelines, page xviii](#)

Document Revision History

The Document Revision History table below records technical changes to this document.

Document Version	Date	Change Summary
OL-11364-04	November, 2008	Revised rack-mount bracket installation instructions.
OL-11364-03	August, 2008	Added information about SFP-GE-F module.
OL-11364-02	June, 2007	Added additional software support information.
OL-11364-01	April, 2007	This is the first version of this document.

Document Objectives

This publication describes the installation and configuration of the Cisco 7201 router, replacement or upgrading of field replaceable units (FRUs), and troubleshooting of the Cisco 7201 hardware. The purpose of this guide is to enable the safe and efficient installation of the Cisco 7201 router.

Audience

This publication is primarily designed for the person responsible for installing, maintaining, and troubleshooting the Cisco 7201 router. The users of this guide should be familiar with electronic circuitry and wiring practices and have experience as electronic or electromechanical technicians. Users of this guide should also have experience in installing high-end networking equipment. Certain procedures described in this guide require a certified electrician.

For configuration applications, refer to the Cisco IOS configuration guides and command references and to the documents listed in the [“Related Documentation”](#) section on page xvii.

Document Organization

The major sections of this installation and configuration guide are as follows:

Chapter and Appendix Number and Title	Description
Chapter 1, “Overview”	This chapter provides an overview of the Cisco 7201.
Chapter 2, “Installing the Cisco 7201 Router”	This chapter provides preparation and installation instructions for installing the chassis in a rack and for attaching cables.
Chapter 3, “Starting and Configuring the Router”	This chapter provides a functional overview of the system as well as startup and configuration instructions.
Chapter 4, “Replacing Cisco 7201 Field-Replaceable Units”	This chapter provides instructions for removing and replacing power supplies, SDRAM, CompactFlash disks, USB memory, SFP modules, and port adapters and service adapters.
Chapter 5, “Troubleshooting Initial Startup Problems”	This chapter provides basic system startup troubleshooting information.
Appendix A, “Specifications”	This appendix provides system specifications as well as port and cabling pinouts and specifications.
Appendix B, “Using the CompactFlash Disk”	This appendix provides instructions for using the CompactFlash Disk.
Appendix C, “Configuration Register Information”	This appendix provides configuration register information.

Safety Warnings and Cautions

Most safety warnings for the Cisco 7201 router are placed in relevant sections throughout the document. For translated safety warnings, see the [Regulatory Compliance and Safety Information for Cisco 7200 Series Routers](#). Below is Statement 1071, the Warning Definition statement, complete with translated warnings.

Translated warning statement numbers are listed at the end of each warning. They correspond to the translated safety warning statement numbers found in translated warning statement headings in the [Regulatory Compliance and Safety Information for Cisco 7200 Series Routers](#) document.

Warning Definition



Warning

IMPORTANT SAFETY INSTRUCTIONS

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. 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**FONTOS BIZTONSÁGI ELOÍRÁSOK**

Ez a figyelmeztető jel veszélyre utal. Sérülésveszélyt rejtő helyzetben van. Mielőtt bármely berendezésen munkát végezte, legyen figyelemmel az elektromos áramkörök okozta kockázatokra, és ismerkedjen meg a szokásos balesetvédelmi eljárásokkal. A kiadványban szereplő figyelmeztetések fordítása a készülékhez mellékelt biztonsági figyelmeztetések között található; a fordítás az egyes figyelmeztetések végén látható szám alapján kereshető 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 legemeskade. 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 للصدمة الكهربائية وكن على علم بالإجراءات القياسية للحيلولة دون وقوع أي حوادث. استخدم رقم البيان الموجود في آخر كل تحذير لتحديد مكان ترجمته داخل تحذيرات الأمان المترجمة التي تأتي مع الجهاز. قم بحفظ هذه الإرشادات

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**Προειδοποίηση 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 במגלים חשמליים ולהכיר את הנהלים המקובלים למניעת תאונות. השתמש במספר ההוראה המסופק בסופה של כל אזהרה כדי לאתר את התרגום באזהרות הבטיחות המתורגמות שמצורפות להתקן.

שמור הוראות אלה**Opomena ВАЖНИ БЕЗБЕДНОСНИ НАПАТСТВИЈА**

Симболот за предупредување значи опасност. Се наоѓате во ситуација што може да предизвика телесни повреди. Пред да работите со опремата, бидете свесни за ризикот што 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 ОБИЕ 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**Upozornenie DŮLEŽITÉ BEZPEČNOSTNÉ POKYNY**

Tento varovný symbol označuje nebezpečenstvo. Nachádzate sa v situácii s nebezpečenstvom úrazu. Pred prácou na akomkoľvek vybavení si uvedomte nebezpečenstvo súvisiace s elektrickými obvodmi a oboznámte sa so štandardnými opatreniami na predchádzanie úrazom. Podľa čísla na konci každého upozornenia vyhľadajte jeho preklad v preložených bezpečnostných upozorneniach, ktoré sú priložené k zariadeniu.

USCHOVAJTE SI TENTO NÁVOD**Warning**

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

**Warning**

Ultimate disposal of this product should be handled according to all national laws and regulations. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied the equipment. Statement 1040

Lithium Battery Caution

**Caution**

Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturers instructions.

ADVARSEL! Lithiumbatteri - Eksplosionsfare ved fejlagtig håndtering. Udskiftning må kun ske med batteri af samme fabrikat og type. Levér det brugte batteri tilbage tilleverandøren.

VAROITUS Paristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan valmistajan suosittellemaan tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

- ADVARSEL** Eksplosjonsfare ved feilaktig skifte av batteri. Benytt samme batteritype eller en tilsvarende type anbefalt av apparatfabrikanten. Brukte batterier kasseres i henhold til fabrikantens instruksjoner.
- WARNING** Eksplosjonsfara vid felaktigt batteribyte. Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren. Kassera använt batteri enligt fabrikantens instruktion.
-

Related Documentation

Your Cisco 7201 router and the Cisco IOS software running on it contain extensive features and functionality, which are documented in the following resources:

- All documentation related to the Cisco 7201 router is listed in the online [Cisco 7201 Router Documentation Roadmap](#). Information in this master index includes troubleshooting tools and documentation, regulatory compliance and safety information, and installation and replacement information. Also see the [Cisco 7201 Port Adapter Documentation Roadmap](#) for specific port adapters supported on the Cisco 7201 and the [Cisco 7201 Troubleshooting Documentation Roadmap](#).

Some of the Cisco 7201 documentation that is listed on the [Cisco 7201 Router Documentation Roadmap](#) includes:

- The [Cisco 7201 Router Quick Start Guide](#) contains installation and configuration information and is online. It contains quick reference information about chassis or parts installation.
 - The [Regulatory Compliance and Safety Information for Cisco 7200 Series Routers](#) document provides international agency compliance, safety, and statutory information for wide-area network (WAN) interfaces for the Cisco 7201 router.
 - The [Cisco 7201 Port Adapter Documentation Roadmap](#) contains listings and links to port adapter and service adapter documentation. See the documentation guide that ships with the port adapter or service adapter for the customer order number.
 - The [Cisco 7201 Troubleshooting Documentation Roadmap](#) document contains a link to the [Cisco 7201 Troubleshooting Module](#), and other troubleshooting documentation to help you troubleshoot problems with the Cisco 7201 router.
- Cisco IOS software documentation contains Cisco IOS software configuration information and support. See the modular configuration and modular command reference publications in the set that corresponds to the software release installed on your Cisco hardware.
 - To check the minimum software requirements of Cisco IOS software with the hardware installed on your router, Cisco maintains the [Software Advisor](#) tool on Cisco.com. This tool does not verify whether modules within a system are compatible, but it does provide the minimum Cisco IOS requirements for individual hardware modules or components.

To access Software Advisor, go to [Cisco.com](#). From the top of the page, choose Support. From the support drop-down menu, choose Tools & Resources, and then click the Software Advisor link.



Note Access to this tool is limited to users with Cisco.com login accounts.

- Cisco Documentation DVD (See the “[Obtaining Documentation, Obtaining Support, and Security Guidelines](#)” section on page xviii.)

Obtaining Documentation, Obtaining Support, and Security Guidelines

For information on obtaining documentation, obtaining support, providing documentation feedback, security guidelines, and also recommended aliases and general Cisco documents, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised technical documentation at: <http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html>.



CHAPTER 1

Overview

The Cisco 7201 router provides application-specific features for broadband subscriber aggregation and network application services with high processing performance.

This chapter provides a quick hardware and features overview and options installation instructions for the Cisco 7201 router. For functional information, see [Chapter 3, “Starting and Configuring the Router,”](#) the “[Functional Overview](#)” section on page 3-1. For system specifications and port and cabling specifications, see [Appendix A, “Specifications.”](#)

This chapter includes the following sections:

- [Cisco 7201 Features, page 1-2](#)
- [Cisco 7201 Hardware Overview, page 1-3](#)
- [Checking the Shipping Container Contents, page 1-11](#)
- [Cisco 7201 Router Installation Checklist, page 1-11](#)



Warning

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



Warning

Before you install, operate, or service the system, read the [Regulatory Compliance and Safety Information for Cisco 7200 Series Routers](#) publication. This document provides important safety information you should know before working with the system. Statement 200

Cisco 7201 Features

The Cisco 7201 router consists of the following features:

- Small form-factor—One rack-unit (RU) high with stacking capability: 1.73 in. x 17.3 in. x 16.2 in. (4.39 cm x 43.94 cm x 41.20 cm) (H x W x D). The weight is approximately 16.5 lb (7.48 kg).
- Four native Gigabit Ethernet interfaces—Six physical access ports:
 - Four optical fiber Gigabit Ethernet (1000 Mbps) ports that use small form-factor pluggable (SFP) modules with LC connectors. Gigabit Ethernet ports 0, 1, and 2 support 10/100/1000 Mbps, and ports 2 and 3 support only 1000 Mbps.
 - Two Gigabit Ethernet (10/100/1000 Mbps) ports with RJ-45 connectors (The use of an RJ-45 port or SFP port on a common Gigabit Ethernet interface is mutually exclusive at any one time.)
- One 10/100-Mbps Fast Ethernet Management port—To be used only as a management port; not to be used as a Fast Ethernet interface port
- Both 25-MHz and 50-MHz port adapter operation
- A 256-MB CompactFlash Disk
- One USB port for data storage, supporting 64-, 128-, and 256-MB data storage modules, and supporting the 32-Kb Aladdin USB eToken Pro Key for VPN applications
- SFP modules: Four Gigabit Ethernet SX, LH/LX, ZX, and FX module options supported on all four Gigabit Ethernet ports, and one 1000BASE-T SFP (copper) module supported only on ports GE 0/2 and GE 0/3
- Dual AC power or dual DC power supplies
- Freescale 7448 processor that operates at an internal clock speed of 1.67 GHz
- Two levels of cache memory: primary and secondary cache that are internal to the microprocessor with secondary unified cache for data and instruction
- One system controller that provides the connectivity between the processor and surrounding subsystems, including PCI busses, the DDR-SDRAM DIMM, the native Gigabit Ethernet interfaces, and the local bus with the various slow speed control and interface logic
- 3-MB Boot ROM for storing the ROMmon images
- Internal flash memory for storing the boot helper (boot loader) image and the Cisco IOS image
- Two SDRAM memory options: 1 GB and 2 GB
- 2-MB NVRAM for storing the system configuration and environmental monitoring logs
- Auxiliary port with full data terminal equipment (DTE) functionality
- Console port with full data communications equipment (DCE) functionality
- Online insertion and removal (OIR)—Allows you to add, replace, or remove port adapters with minimal interruption of the system
- Software support: Cisco IOS Release 12.4(4)XD7, Cisco IOS Release 12.2(31)SB5, and Cisco IOS Release 12.4(15)T1
- Environmental monitoring and reporting functions—Allow you to maintain normal system operation by resolving adverse environmental conditions prior to loss of operation

- Downloadable software—Allows you to load new images into flash memory remotely, without having to physically access the router, for fast, reliable upgrades
- Front-to-back airflow—Allows you to mount the router from either front or back into 19-inch equipment racks and 23-inch equipment racks

Cisco 7201 Hardware Overview

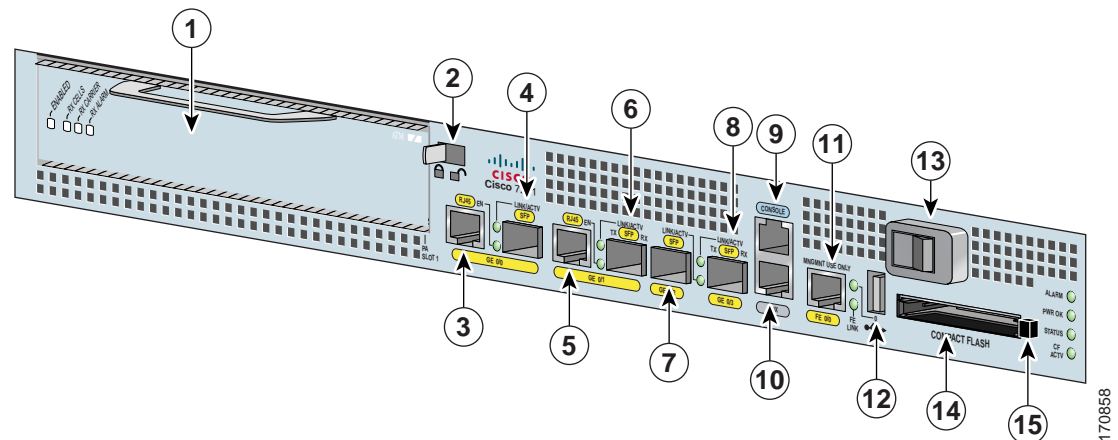
This section provides an overview of the hardware, including LEDs, front and rear views, and interior component identification.

- [Front View, page 1-3](#)
- [Rear View, page 1-7](#)
- [Interior View, page 1-9](#)

Front View

The faceplate of the Cisco 7201 router is described in this section.

Figure 1-1 Cisco 7201 Router—Front View

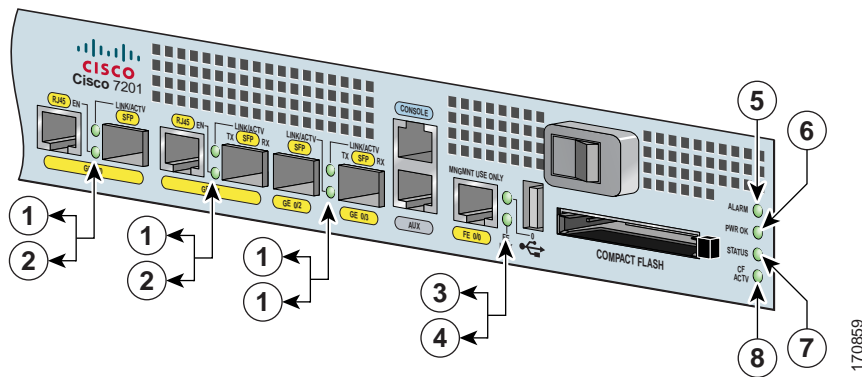


1	Port adapter slot (with installed port adapter)	9	Console port
2	Port adapter lever	10	Auxiliary port
3	Gigabit Ethernet 0/0—RJ-45 port	11	Fast Ethernet 0/0—Fast Ethernet Management port
4	Gigabit Ethernet 0/0—SFP port	12	USB port
5	Gigabit Ethernet 0/1—RJ-45 port	13	Power switch
6	Gigabit Ethernet 0/1—SFP port	14	CompactFlash Disk slot
7	Gigabit Ethernet 0/2—SFP port	15	CompactFlash Disk ejector button
8	Gigabit Ethernet 0/3—SFP port		

Faceplate LEDs

The Cisco 7201 router LEDs and behaviors are described in this section.

Figure 1-2 Cisco 7201 Router—Faceplate LEDs



No.	LED Label	LED	In the Power Up State	
			Color—Activity	Behavior Description
1	LINK/ACTV (Link/Active) (0/0, 0/1, 0/2, 0/3)	SFP and RJ-45 ports	Solid green	Link with no activity
			Flashing green	Link with activity
			Off	No link
2	EN (Enable) (0/0, 0/1)	RJ-45 ports only	Solid green	RJ-45 port is selected.
			Off	SFP port is selected.
3	USB	USB port	Flashing green	Activity
			Off	No activity
4	FE 0/0	Fast Ethernet Management port	Solid green	Link with no activity
			Flashing green	Link with activity
			Off	No link
5	ALARM	Alarm port	Solid red	On if Cisco IOS has crashed, and a reset has happened, and remains on until Cisco IOS is reloaded.
			Off	Off, the system is normal.
6	PWR OK	Power	Solid green	The power-on is successful and the system is attempting to boot software, or has booted software.
			Off	Off, the router is in standby mode.
7	STATUS	System status	Solid green	Cisco IOS has successfully booted.
			Blinking amber	ROMmon is loading.
			Blinking green	Cisco IOS is loading.
8	CF ACTV	CompactFlash Disk	Flashing green	Activity
			Off	No activity

SFP Module Information

You may have ordered a small form-factor pluggable (SFP) module with your Cisco 7201 router. You must install the SFP module. It is shipped separately to prevent damage during shipment. After reading this section, use the installation instructions in the “[Removing and Installing an SFP Module](#)” section on [page 4-2](#) to install the SFP modules.

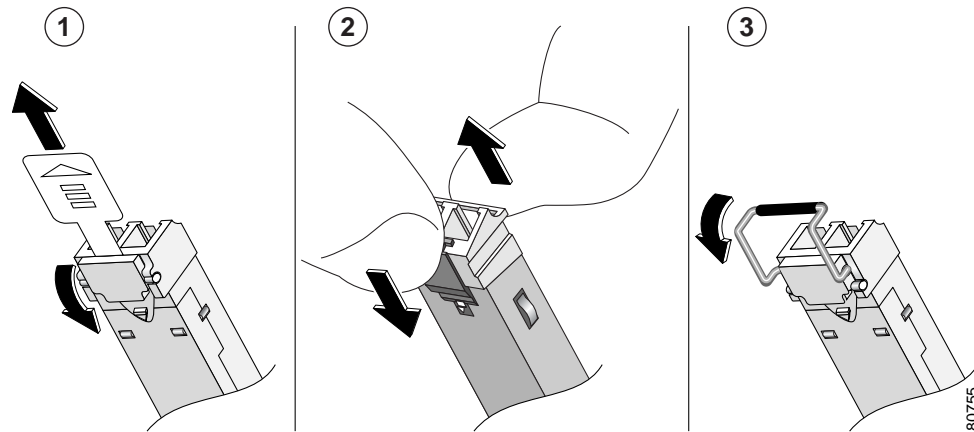
For ease of installation, insert the SFP module in the router while it is powered down and before placing it in a rack.

The SFP port is a 1000-Mbps optical interface in the form of an LC-type duplex port that supports IEEE 802.3z interfaces compliant with the 1000BASEX standard. Gigabit Ethernet SFP models SFP-GE-S, SFP-GE-L, SFP-GE-Z, and SFP-GE-F are supported in the Cisco 7201 router, as well as the SFP-GE-T. The cabling information is the same for all optical SFP modules.

Also see the “[SFP Module Specifications and Configurations](#)” section on [page A-4](#), and the *Gigabit Interface Converter (GBIC) Module and Small Form-Factor Pluggable (SFP) GBIC Module Installation Information and Specifications* document.

For optical connection cleaning information, see the *Inspection and Cleaning Procedures for Fiber-Optic Connections* document and the *Compressed Air Cleaning Issues for Fiber-Optic Connections* document.

Figure 1-3 Types of SFP Module Latches



1	Sliding latch	3	Swing latch
2	Swing and slide latch		



Note

The SFP module must be installed before you connect the cables to it.

- The SFP module has three types of latches, which are also the removal mechanism. See [Figure 1-3](#). There is no correlation of the type of latch to the model (such as SX or LH/LX) or technology type (such as Gigabit Ethernet) of SFP modules. Always read the label on the SFP module to determine the technology type and model.
- You can install and remove Gigabit Ethernet SFP modules with power on to the system.

**Warning**

Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments. Statement 1051

**Warning**

Class 1 laser product. Statement 1008

**Warning**

Class 1 LED product. Statement 1027

- Disconnect all cables before removing or installing a Gigabit Ethernet SFP module. We strongly recommend that you do *not* install or remove the SFP module with optical fiber cables attached to it.
- SFP modules are keyed to prevent incorrect insertion.

USB Port Information

The Cisco 7201 provides a USB port that can be used with a USB Flash memory module as secondary storage, and can be used to store Cisco IOS images, data, and configuration files. The Cisco 7201 USB port can also be used with the Aladdin USB eToken Pro key. This USB device can be used for the following functions:

- The Cisco USB Flash memory module can be used to store an image or configuration file like a CompactFlash Disk. Unlike the Aladdin USB eToken Pro key, the Cisco USB Flash memory module is nonsecure. See [Table A-5 on page A-4](#) for available USB token configurations and product numbers.
- The USB eToken Pro key by Aladdin Knowledge Systems provides a secure means to store and deploy information, such as a bootstrap configuration or VPN credentials, separate from the router chassis. The Aladdin USB eToken Pro key uses smart card technology to protect a small area of memory and grants access using a personal identification number (PIN). When IP Security (IPSec) VPN credentials are stored on the Aladdin USB eToken Pro key, they are safely external to the router. When the USB eToken is inserted in a USB port, the router can pass the PIN and unlock it, retrieving the credentials and copying them into running memory. When the Aladdin USB eToken Pro key is removed, the router erases the credentials from running memory, ensuring that they cannot be retrieved from the router itself.

**Note**

For more information about the eToken Pro key by Aladdin Knowledge Systems, see the Aladdin website at www.aladdin.com/etoken/cisco.

**Note**

The Cisco USB Flash memory module cannot be used to boot the router. The USB drivers exist only in Cisco IOS software, not ROM Monitor mode (ROMmon). As a result, a Cisco IOS image must be booted to load the drivers; only then can files be copied to and from the USB Flash memory module.

CompactFlash Disk Information

The Cisco 7201 router has one CompactFlash Disk slot that uses CompactFlash Disks. The device in this slot is always addressed as **disk0:** when using Cisco IOS command-line interface (CLI) commands.

CompactFlash Disks are smaller in size than Type 2 Flash Disks but provide the same AT Attachment (ATA) interface and equivalent functionality. This interface complies with the ANSI ATA Interface Document X3T13.1153 D Rev. 9 specification. CompactFlash Disks provide from 256 MB of storage.

The CompactFlash Disk has controller circuitry that allows it to emulate a hard disk and automatically maps out bad blocks and performs automatic block erasure. The CompactFlash Disk also provides the capability to allocate noncontiguous sectors, which eliminates the need for the **squeeze** command (which was required with older-style linear flash memory cards to recover the space used by deleted files).

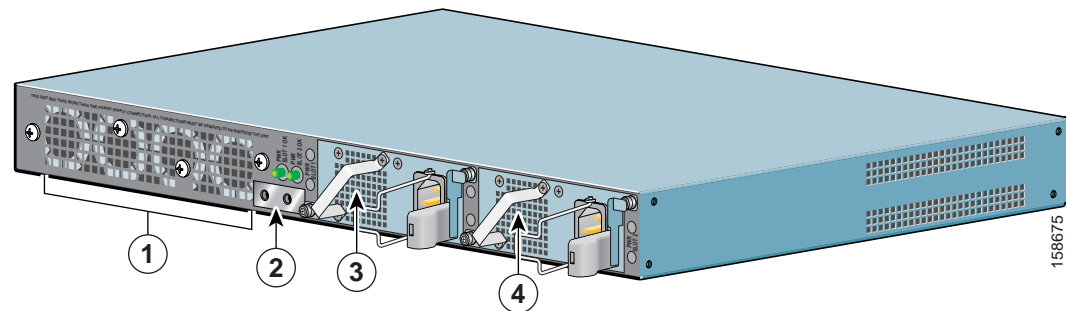
The CompactFlash Disk also supports the Cisco IOS File System feature, which provides a single interface to all of the router's file systems, including the Flash Disks and flash memory, as well as network file systems such as File Transfer Protocol (FTP) and Trivial FTP (TFTP) servers.

Table A-4 on page A-3 lists the CompactFlash Disk options. Also see Appendix B, "Using the CompactFlash Disk."

Rear View

This section provides information about the power supplies and fans on the rear of the Cisco 7201 router.

Figure 1-4 Cisco 7201—Rear View



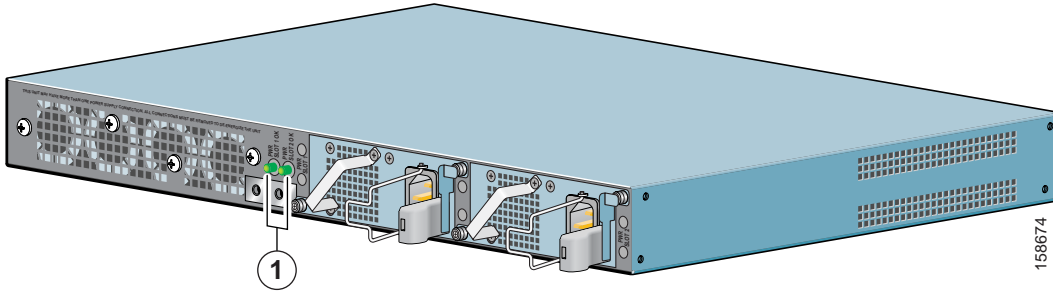
1	Fans	3	Power supply slot 1
2	Chassis ground connector	4	Power supply slot 2

Four internal fans draw cooling air into the chassis and across internal components to maintain an acceptable operating temperature. (See Figure 1-4.) The four fans are located at the rear of the chassis, as is the chassis grounding connector that provides a chassis ground connection for ESD equipment or a two-hole grounding lug. Two power supplies, either two AC power supplies or two DC power supplies, are accessed from the rear of the router.

Power Supply LEDs

The power supply LEDs are to the left of the power supplies on the rear of the chassis.

Figure 1-5 Power Supply LEDs

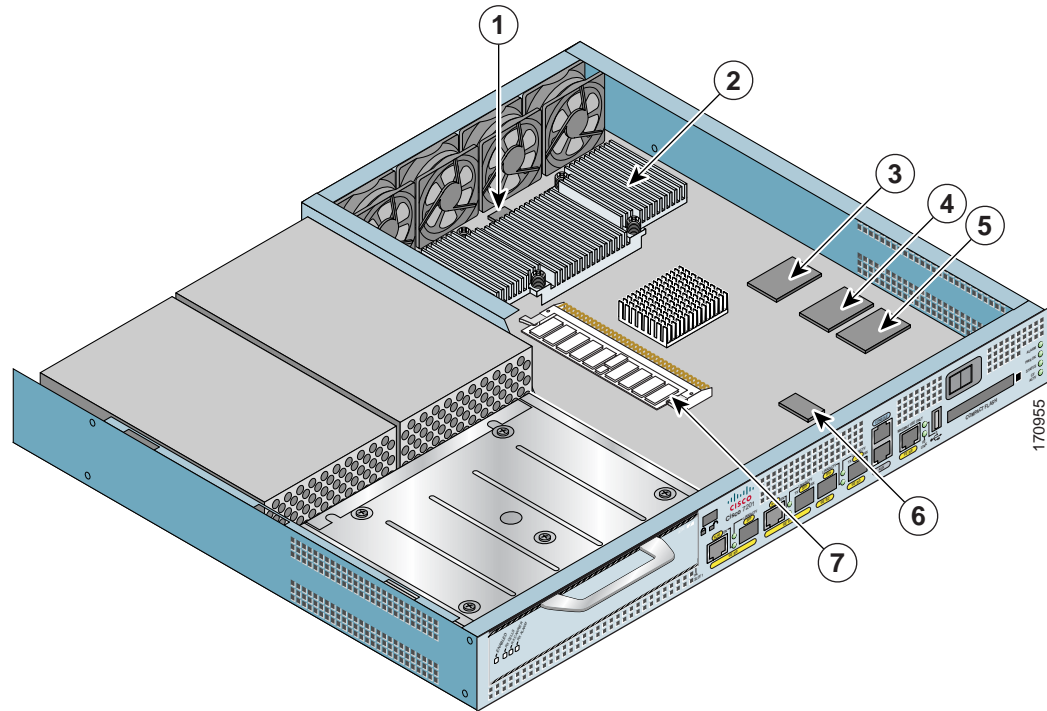


No.	LED Label	LED	In the Power Up State	
			Color—Activity	Behavior Description
1	PWR Slot 1	Power supply activity	Green	Active
			Off	Off; the router is in standby mode.
	PWR Slot 2	Power supply activity	Green	Active
			Off	Off; the router is in standby mode.

Interior View

This section describes the Cisco 7201 interior components and their locations.

Figure 1-6 Cisco 7201 Router—Interior View



1	Temperature sensor (outlet—U20)	5	Flash memory (U13)
2	Freescale 7448 processor	6	Temperature sensor (inlet—U12)
3	Boot ROM (U24)	7	DIMM (U16)
4	Flash memory (U19)		

On the underside of the board is NVRAM (U77) and flash memory (U67, U70).

System Board

Internally, the system board contains the following components:

- One DDR-SDRAM memory module (DIMM) for providing code, data, and packet storage
- The Freescale 7448 processor
- Marvel Discovery III—Hardware logic to interconnect the processor, double data rate synchronous dynamic random-access memory (DDR-SDRAM), dual PCI /PCI-X buses, three direct-interface Gigabit Ethernet interfaces, and a generic device bus

- Cache memory
The processor system has two levels of cache: primary and secondary cache that are internal to the microprocessor with secondary unified cache for data and instruction.
- Four Gigabit Ethernet interfaces (six ports: four SFP [optical] and two RJ-45s [copper]). Only four ports are available at the same time.
- One Fast Ethernet Management port
- A CompactFlash Disk for storing the default Cisco IOS software image
- Auxiliary port with full data terminal equipment (DTE) functionality
- Console port with full data communications equipment (DCE) functionality
- Boot ROM for storing sufficient code for booting the Cisco IOS software
- Flash memory for storing the boot helper (boot loader) image
- NVRAM for storing the system configuration and environmental monitoring logs. NVRAM uses lithium batteries to maintain its contents when disconnected from power.
- Two environmental sensors for monitoring the internal temperature of the chassis

System Management Functions

The Cisco 7201 processor system performs the following system management functions:

- Sending and receiving routing protocol updates
- Managing tables, caches, and buffers
- Monitoring interface and environmental status
- Providing Simple Network Management Protocol (SNMP) management through the console and Telnet interface
- Accounting for and switching of data traffic
- Booting and reloading images
- Managing the port adapter (including recognition and initialization during online insertion and removal)

The Cisco 7201 router supports multiprotocol, multimedia routing and bridging with a wide variety of protocols and port adapters.

Checking the Shipping Container Contents

Use the Cisco 7201 components list to check the contents of the Cisco 7201 router shipping container. Do not discard the shipping container. You need the container if you move or ship the Cisco 7201 router in the future.

Table 1-1 Cisco 7201 Components List

Component	Description	Received
Chassis	Cisco 7201 chassis configured with dual AC or dual DC power supplies and a port adapter blank panel if a port adapter has not been ordered.	
Accessories:	The following accessories might arrive in separate shipping containers or might ship installed:	
<ul style="list-style-type: none"> • Rack-mount and cable-management kit 	Two rack-mount brackets, one cable-management bracket, four 6-32 x 0.25-in. screws to secure the rack-mount brackets to the chassis, four 10-32 or 12-24 screws to secure the rack-mount brackets to a 19-inch rack, or a 21–23-inch rack, and one M4 x 20-mm screw to attach the cable-management bracket to the rack-mount bracket	
<ul style="list-style-type: none"> • Power cables 	An AC power cable, if an AC power supply was ordered	
<ul style="list-style-type: none"> • Documentation 	Router hardware and software documentation and the Cisco Documentation DVD package	
	An optional Cisco USB Flash memory module, if ordered	
Optional Equipment	Examples: Port adapter, SFP modules, CompactFlash Disk, network interface cables, USB memory modules, transceivers, special connectors, and so on	



Note

Most Cisco documentation is online or on the Cisco Documentation DVD. Documentation that ships with your Cisco 7201 router includes the *Regulatory Compliance and Safety Information for Cisco 7200 Series Routers* document, and the *Cisco 7201 Router Documentation Roadmap* that contains documentation titles and the URLs to them online. See also the “[Related Documentation](#)” section on [page xvii](#).

Cisco 7201 Router Installation Checklist

To assist you with your installation and to provide a historical record of what was done by whom, photocopy the Cisco 7201 Router Installation Checklist, [Table 1-2 on page 1-12](#). Indicate when each procedure or verification is completed. When the checklist is completed, place it in your site log along with the other records for your new router.

Information on replacing internal field-replaceable units (FRUs) is found in [Chapter 4, “Replacing Cisco 7201 Field-Replaceable Units.”](#)

Table 1-2 Cisco 7201 Router Installation Checklist

Task	Verified By	Date
Date router received		
Router and all accessories unpacked		
Types and numbers of interfaces verified		
Safety recommendations and guidelines reviewed		
Installation Checklist copied		
Site log established and background information entered		
Site power voltages verified		
Site environmental specifications verified		
Required passwords, IP addresses, device names, and so on, available		
Required tools available		
Network connection equipment available		
Router mounted in rack (optional)		
Cable-management bracket installed (optional but recommended)		
AC power cable(s) connected to AC source(s) and router; AC cable-retention clip secured		
DC power cable(s) connected to DC source(s) and router		
Network interface cables and devices connected		
ASCII terminal attached to console port		
Console port set for 9600 baud, 8 data bits, no parity, and 1 stop bits (9600 8N1)		
System power turned on		
System boot complete (STATUS LED is on)		
I/O ports and port adapter are operational (see Figure 1-2 for specific LED information)		
Correct hardware configuration displayed after system banner appears		



CHAPTER 2

Installing the Cisco 7201 Router

This chapter explains how to install a Cisco 7201 router in a rack in a general tabletop or workbench installation, how to attach cables, and how to power on the router.

This chapter contains the following sections:

- [Preparing to Install the Cisco 7201 Router, page 2-1](#)
- [Installing the Router, page 2-5](#)
- [Attaching a Chassis Ground Connection, page 2-12](#)
- [Installing a Port Adapter, USB Flash Memory Module, or SFP Module That Did Not Ship in the System, page 2-14](#)
- [Connecting Port Adapter Cables, page 2-14](#)
- [Connecting I/O Cables, page 2-14](#)
- [Using the Cable-Management Bracket, page 2-23](#)
- [Connecting Power, page 2-24](#)

The Cisco 7201 router operates as either a tabletop or a rack-mounted unit. A rack-mount kit is standard equipment included with the Cisco 7201 router when it is shipped from the factory. The kit provides the hardware needed to mount the router in a 19-inch equipment rack or a 23-inch equipment rack.

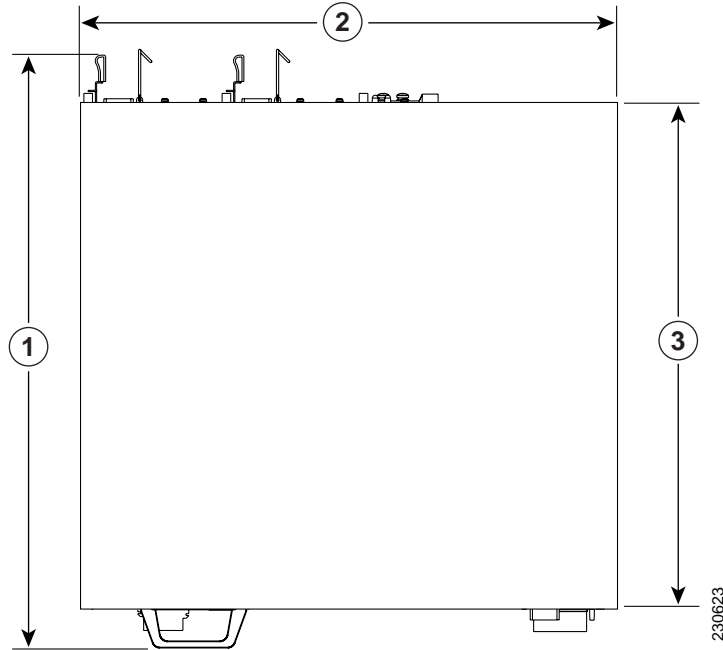
If you are not rack-mounting your Cisco 7201 router, place it on a sturdy tabletop or platform.

Preparing to Install the Cisco 7201 Router

Before installing your Cisco 7201 router, you should consider the power and cabling requirements that must be in place at your installation site, the equipment you need to install the router, and the environmental conditions your installation site must meet to maintain normal operation. This section guides you through the process of preparing for your router installation and the installation in a rack.

This section contains the following topics:

- [Site Preparation and Unpacking, page 2-2](#)
- [Tools and Parts Required, page 2-3](#)
- [Electrical Equipment Guidelines, page 2-4](#)
- [Preventing Electrostatic Discharge Damage, page 2-4](#)
- [Site Requirement Guidelines, page 2-4](#)

Figure 2-1 Dimensions of Cisco 7201 Router

1	19.17 in. (48.69 cm)	3	16.2 in. (41.20 cm)
2	17.3 in. (43.94 cm)		

Table 2-1 provides dimensions and weight information.

Table 2-1 Cisco 7201 Router Dimensions and Weight

Cisco 7201	
Dimensions	Height—1.73 in. (4.39 cm)
	Width—17.3 in. (43.94 cm)
	Depth—16.2 in. (41.20 cm)
Weight	Chassis fully configured with a port adapter ~ 16.5 lb (7.48 kg)

Site Preparation and Unpacking

- Lift the router safely out of the packing container.
- Ensure the power service at the site is suitable for the router you are installing.
- Check the packing slip to ensure that all the proper components are present.
- Locate and have accessible the Site Log for recording information about this installation.

Tools and Parts Required

Your Cisco 7201 chassis is fully assembled at the factory; no assembly is required. However, you need the following tools and equipment to install the chassis and the rack-mount and cable-management kit, and the DC power supplies:

- Number 2 Phillips screwdriver
- A 3/16-inch flat-blade screwdriver
- Tape measure (optional)
- Level (optional)
- Chassis grounding lug and wires:
 - A grounding lug with two number-10 screw holes with a 0.63-inch (16.002-mm) spacing between them
 - A wire receptacle large enough to accept a 6-AWG multistrand, copper wire
 - Two Phillips machine screws with locking washers—M5 (metric), 0.031-inch (.08-mm) pitch, 0.315-inch (8-mm) length
 - A crimping tool to fit the grounding lug wire receptacle
 - A wire stripper
 - One grounding wire—6-AWG, 0.162-inch (4.115-mm) diameter, with approximately 0.108-inch (2.743-mm) insulation, for a total wire diameter of approximately 0.27 inches (6.858 mm). The wire length depends on your router location and site environment.
- The rack-mount and cable-management kit (RCKMNT-7201) includes the following parts:
 - Two rack-mount brackets for mounting the chassis in the rack
 - One cable-management bracket
 - Four 6-32 x 0.25-in. screws to secure the rack-mount brackets to the chassis
 - Two M3 x 8-mm screws to secure the rack-mount brackets to the chassis
 - Four 10-32 or 12-24 screws to secure the rack-mount brackets to a 19-inch or 21–23-inch rack
 - One M4 x 20-mm screw to attach the cable-management bracket to the rack-mount bracket
- For DC power supplies installation, the following parts:
 - Ratcheting torque screwdriver with a Phillips head that exerts up to 15 pound force-inches (lbf in.) or 240 ounce force-inches (ozf in.) of pressure
 - Panduit crimping tool with optional controlled cycle mechanism
 - 18-gauge copper ground wire (insulated or noninsulated)
 - Four leads of 18-gauge copper wire
 - Wire-stripping tool for stripping 18-gauge wire

In addition, you might need the following external equipment:

- Ethernet transceiver
- Token Ring multistation access unit (MSAU)
- ESD-preventative wrist strap
- Power cords
- Appropriate cables to connect the router to the network, console, and auxiliary ports

- Optional Cisco USB Flash memory module or Aladdin USB eToken Pro key
- Straight-through or roll-over cable for use with Fast Ethernet Management port

Electrical Equipment Guidelines

The port adapter is designed to be removed and replaced while the system is operating without presenting an electrical hazard or damage to the system.

Preventing Electrostatic Discharge Damage

Electrostatic discharge (ESD) damage, which occurs when electronic cards or components are improperly handled, can result in complete or intermittent system failures. Each port adapter consists of a printed circuit board that is fixed in a metal carrier. Electromagnetic interference (EMI) shielding, connectors, and a handle are integral components of the carrier. Although the carrier helps protect the boards, use an antistatic strap whenever handling the port adapter. Handle the carriers by the handle and the carrier edges only; never touch the boards or connector pins.

Site Requirement Guidelines



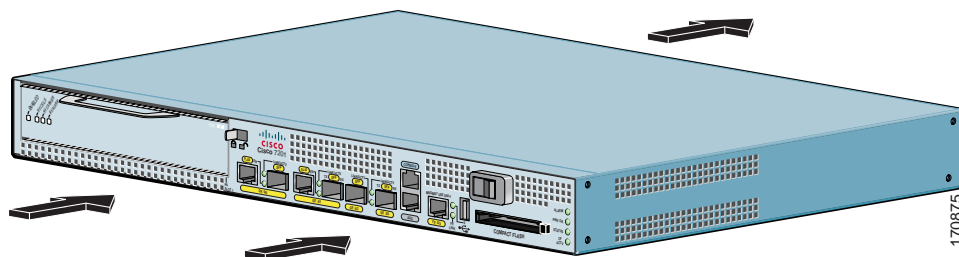
Warning

Before you install, operate, or service the system, read the *Regulatory Compliance and Safety Information for Cisco 7200 Series Routers* publication. This document provides important safety information you should know before working with the system. Statement 200

The environmental monitoring functionality in the Cisco 7201 router protects the system and components from potential damage from overvoltage and overtemperature conditions. To ensure normal operation and avoid unnecessary maintenance, plan your site configuration and prepare your site *before* installation. After installation, make sure the site maintains an ambient temperature of 32°F through 104°F (0°C through 40°C), and keep the area around the chassis as free from dust as is practical.

Planning a proper location for the Cisco 7201 router and the layout of your equipment rack or wiring closet is essential for successful system operation. Equipment placed too close together or inadequately ventilated can cause system overtemperature conditions. In addition, chassis panels made inaccessible by poor equipment placement can make system maintenance difficult. Following are precautions that can help avoid problems during installation and ongoing operation.

Figure 2-2 Airflow Through the Chassis



When you plan the location and layout of your equipment rack or wiring closet, you need to consider how air flows through your router. The Cisco 7201 router draws cooling air in through the intake vents on the front of the chassis and moves the air across the internal components and out the exhaust vents on the rear of the chassis. [Figure 2-2](#) shows airflow through the router.

Temperature sensors on the system board monitor the internal air temperature and send warning messages when the internal air temperature approaches a specified threshold. If the internal temperature exceeds the specified threshold, the system environmental monitor shuts down all internal power to prevent equipment damage from excessive heat. (See the [“Environmental Monitoring and Reporting Functions”](#) section on page 3-4 for temperature threshold information.)

Installing the Router

This section explains how to install a Cisco 7201 router in a general tabletop or workbench installation and in a rack, and how to attach I/O, port adapter, and power cables. This section contains the following topics:

- [General Tabletop or Workbench Installation, page 2-5](#)
- [Rack-Mounting a Cisco 7201 Router, page 2-6](#)
- [Attaching the Chassis Rack-Mount and Cable-Management Brackets, page 2-7](#)
- [Installing the Chassis in the Rack, page 2-9](#)

General Tabletop or Workbench Installation

The router should already be in the area where you will install it, and your installation location should already be determined. If not, see the [“Preparing to Install the Cisco 7201 Router”](#) section on page 2-1, and the [“Site Requirement Guidelines”](#) section on page 2-4.

When installing a Cisco 7201 router on a workbench or tabletop, ensure that the surface is clean and in a safe location and that you have considered the following:

- The router requires at least 3 inches (7.62 cm) of clearance at the inlet and exhaust vents (the front and back sides of the router).
- The router should be installed off the floor. (Dust that accumulates on the floor is drawn into the interior of the router by the cooling fans. Excessive dust inside the router can cause overtemperature conditions and component failures.)
- There must be approximately 19 inches (48.26 cm) of clearance at the front and rear of the router for installing and replacing router parts—such as the port adapter, SFP module, USB module, or CompactFlash Disk—or accessing network cables or equipment.
- A port adapter blank panel is installed if a port adapter or service adapter is not in place.
- The router will receive adequate ventilation (it is not being installed in an enclosed cabinet where ventilation is inadequate).
- If you plan to install the cable-management bracket, unpack and have handy the cable-management bracket and one M4 x 20-mm screw.
- An adequate chassis ground (earth) connection exists for your router chassis.

**Warning**

This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 120 VAC, 20A U.S. (240 VAC, 10A international).

Statement 1005

Following are the steps for installing a Cisco 7201 router on a workbench or tabletop:

-
- Step 1** Remove any debris and dust from the tabletop or workbench, as well as the surrounding area. Also make sure your path between the router and its new location is unobstructed.
 - Step 2** On the chassis, ensure that the port adapter lever is in the locked position.
 - Step 3** Lift the chassis by placing your hands around the chassis sides and lifting the chassis from underneath. To prevent injury, avoid sudden twists or moves.
 - Step 4** Place the router on the tabletop or workbench.
 - Step 5** Ensure that there is at least 3 inches (7.62 cm) of clearance at the inlet and exhaust vents of the router and no exhaust air from other equipment will be drawn into the chassis. Also, ensure that there is approximately 19 inches (48.26 cm) of clearance at the front and rear of the chassis.
-

This completes the general tabletop or workbench installation. Go to the [“Attaching a Chassis Ground Connection” section on page 2-12](#) for the next step in installing the Cisco 7201 router.

Rack-Mounting a Cisco 7201 Router

The chassis mounts to two rack posts with brackets that attach to either the front or the rear sides of the chassis. The inside width between the two posts or mounting strips (left and right) must be at least 19 inches (48.26 cm).

Some equipment racks provide a power strip along the length of one of the mounting strips. [Figure 2-7](#) shows a typical four-post equipment rack with a power strip along one of the back posts. If your rack has this feature, consider the position of the strip when planning fastener points to ensure that you will be able to pull the port adapter, SFP module, USB module, or CompactFlash Disk straight out of their respective slots.

The inlet and exhaust ports for cooling air are located on the front and rear of the chassis, respectively, so multiple routers can be stacked in a rack with little or no vertical clearance.

Before beginning the installation, determine the type of rack you are using and whether or not you want the chassis front- or rear-mounted.

**Note**

To use the cable-management bracket with the Cisco 7201 router rear-mounted, you must purchase a second rack-mount kit, attach a rack-mount bracket to the left front of the chassis, and attach the cable-management bracket to it. See the [“Attaching the Cable-Management Bracket” section on page 2-8](#) for cable-management bracket installation instructions.

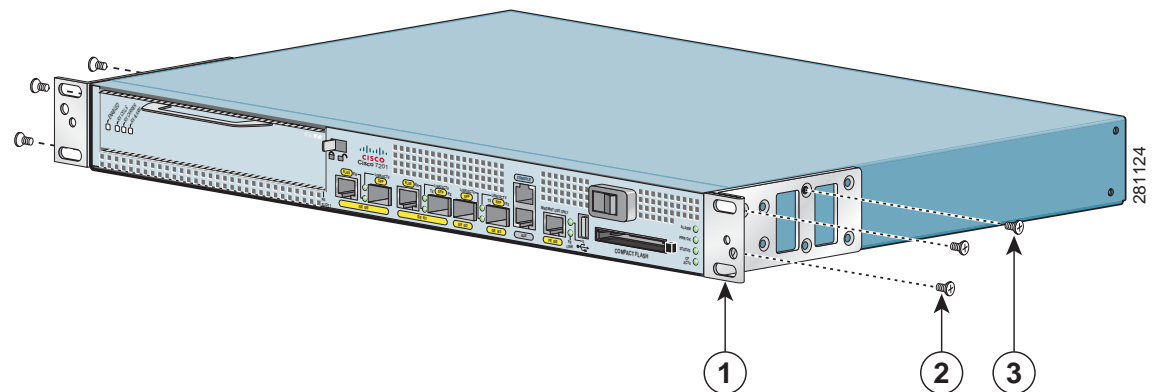
Attaching the Chassis Rack-Mount and Cable-Management Brackets

This section explains how to install the rack-mount and cable-management brackets at the front and the rear of a Cisco 7201 router. Before installing the chassis in the rack, you must install a rack-mount bracket on each side of the front or rear of the chassis.

The parts and tools required for installing the rack-mount brackets and cable-management bracket are listed in the “Tools and Parts Required” section on page 2-3.

Installing Rack-Mount Brackets on the Front of the Chassis

Figure 2-3 Attaching the Rack-Mount Brackets to the Front of the Chassis



1	Rack-mount bracket	3	Two M3 x 8-mm screws
2	Four 6-32 x 0.25-in. screws		

Figure 2-3 shows the brackets being attached for a front rack-mount.

To install the rack-mount and cable-management brackets on a Cisco 7201 router for a front rack-mount configuration, complete the following steps:

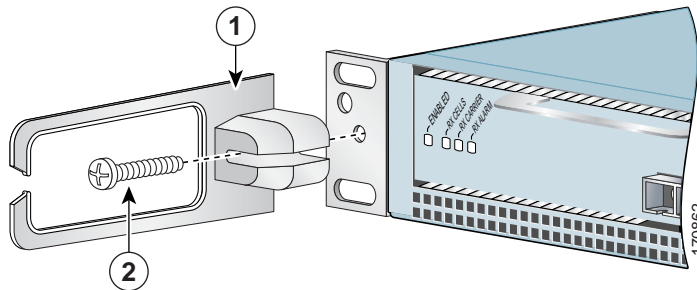
-
- Step 1** Locate the threaded holes in the front sides of the chassis.
 - Step 2** Align the rack-mount bracket to the rack-mount bracket holes on the side of the router.
 - Step 3** Remove any existing cover screws from the front sides of the chassis that align with the rack-mount bracket holes and then realign the bracket. (You should have to remove one cover screw from each side of the chassis.)
 - Step 4** Insert and tighten two 6-32 x 0.25-in. screws in the two holes nearest the front of the chassis.
 - Step 5** Insert and tighten the longer M3 x 8-mm screw in the hole nearest the rear of the chassis. (This screw replaces the cover screw that you removed in Step 3.)
 - Step 6** Repeat Step 1 through Step 5 on the other side of the router.
-

This completes the steps for attaching the rack-mount brackets to the Cisco 7201 router.

To install the cable-management bracket, go to the [“Attaching the Cable-Management Bracket”](#) section on page 2-8. If you are not installing the cable-management bracket, go to the [“Installing the Chassis in the Rack”](#) section on page 2-9.

Attaching the Cable-Management Bracket

Figure 2-4 Installing the Cable-Management Bracket



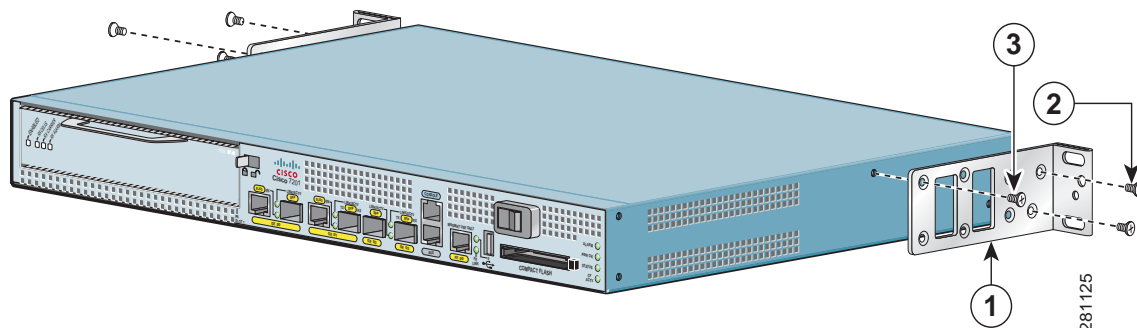
1	Cable-management bracket	2	M4 x 20-mm screw
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- Step 1** Align the cable-management bracket to the rack-mount bracket on the left side of the Cisco 7201 router.
- Step 2** Using a Phillips screwdriver and the M4 x 20-mm screw, thread and tighten the screw to the cable-management bracket.

This completes the procedure for installing the cable-management bracket on a Cisco 7201 router for a front rack-mount configuration. Go to the [“Installing the Chassis in the Rack”](#) section on page 2-9.

Installing Rack-Mount Brackets on the Rear of the Chassis

Figure 2-5 Attaching the Rack-Mount Brackets to the Rear of the Chassis



1	Rack-mount bracket	3	Two M3 x 8-mm screws
2	Four 6-32 x 0.25-in. screws		

To install the rack-mount and cable-management brackets on a Cisco 7201 router for a rear rack-mount configuration, complete the following steps:

-
- Step 1** Locate the threaded holes in the rear sides of the chassis.
 - Step 2** Align the rack-mount bracket to the rack-mount bracket holes on the side of the router.
 - Step 3** Remove any existing cover screws from the front sides of the chassis that align with the rack-mount bracket holes and then realign the bracket. (You should have to remove one cover screw from each side of the chassis.)
 - Step 4** Insert and tighten two 6-32 x 0.25-in. screws in the two holes nearest the rear of the chassis.
 - Step 5** Insert and tighten the longer M3 x 8-mm screw in the hole nearest the front of the chassis. (This screw replaces the cover screw that you removed in Step 3.)
 - Step 6** Repeat Step 1 through Step 5 on the other side of the router.
-

**Note**

To use the cable-management bracket with the Cisco 7201 router rear-mounted, you must purchase a second rack-mount kit, attach a rack-mount bracket to the left front of the chassis, and attach the cable-management bracket to it. See the [“Attaching the Cable-Management Bracket”](#) section on page 2-8 for cable-management bracket installation instructions.

This completes the procedure for installing the rack-mount brackets and cable-management brackets on a Cisco 7201 router for a rear rack-mount configuration. Go to the [“Installing the Chassis in the Rack”](#) section on page 2-9.

Installing the Chassis in the Rack

After installing the brackets on the chassis, you mount the router by securing the rack-mount brackets to two posts or mounting strips in the rack using the four screws provided. Because the brackets support the weight of the entire chassis, be sure to use all four screws to fasten the two rack-mount brackets to the rack posts. [Figure 2-6 on page 2-10](#) and [Figure 2-7 on page 2-11](#) show typical installations in two-post and four-post equipment racks.

We recommend that you allow at least 1 or 2 inches (2.54 or 5.08 cm) of vertical clearance between the router and any equipment directly above and below it.

To install the chassis in the rack, complete the following steps:

-
- Step 1** On the chassis, ensure that the port adapter lever is in the locked position, and that the CompactFlash Disk, USB module, and any SFP modules are installed.
 - Step 2** Make sure that your path to the rack is unobstructed. If the rack is on wheels, ensure that the brakes are engaged or that the rack is otherwise stabilized.
 - Step 3** Position the chassis so that the front end is closest to you. Lift the chassis and move it to the rack. To prevent injury, avoid sudden twists or moves.
 - Step 4** Slide the chassis into the rack, pushing it back until the brackets (installed at the front or rear of the chassis) meet the mounting strips or posts on both sides of the equipment rack.
-

For two-post rack installation, go to the [“Two-Post Rack Installation”](#) section on page 2-10.

For four-post rack installation, go to the [“Four-Post Rack Installation”](#) section on page 2-11.

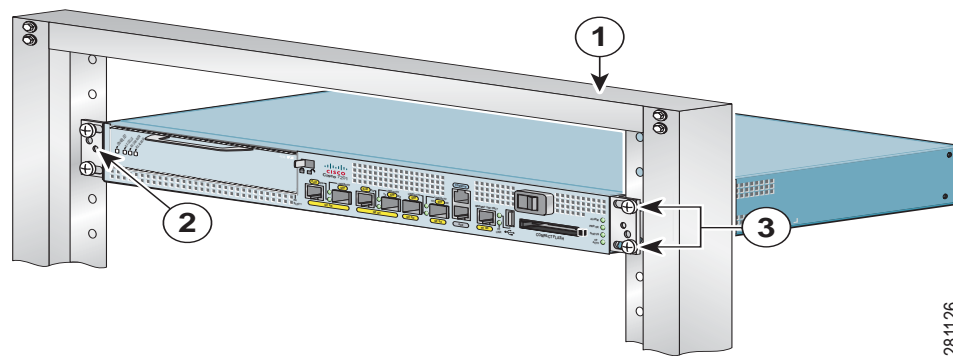
Two-Post Rack Installation



Note

Inner clearance (the width between the inner sides of the two posts or rails) must be at least 19 inches (48.26 cm). The height of the chassis is 1.73 inches (4.39 cm). Airflow through the chassis is from front to back.

Figure 2-6 Installing the Cisco 7201 Router in a Two-Post Rack



1	Two-post rack	3	Four 10-32 or 12-24 screws
2	Screw hole for the cable-management bracket		

- Step 1** Make sure that the port adapter lever is in the locked position.
- Step 2** Make sure the rack brakes are locked or the rack is stabilized.
- Step 3** Position the router so the front is closest to you and lift it carefully into the rack. To prevent injury, avoid any sudden twists or moves.
- Step 4** Slide the chassis into the rack, pushing it back until the brackets meet the mounting strips or posts on both sides of the rack.
- Step 5** Keeping the brackets flush against the posts or mounting strips, align the holes in the brackets with the holes on the rack or mounting strip.
- Step 6** For each bracket, insert and tighten two 10-32 or 12-24 screws to the rack.

This completes the procedure for installing the chassis in the rack. Proceed to the [“Attaching a Chassis Ground Connection”](#) section on page 2-12 to continue the installation.

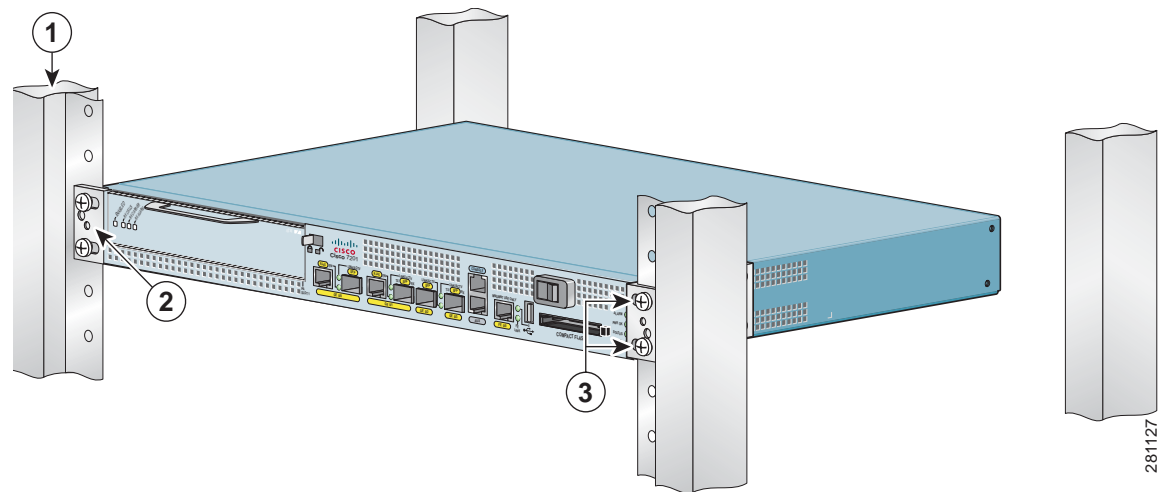
Four-Post Rack Installation



Note

Inner clearance (the width between the inner sides of the two posts or rails) must be at least 19 inches (48.26 cm). The height of the chassis is 1.73 inches (4.39 cm). Airflow through the chassis is from front to back.

Figure 2-7 Installing the Cisco 7201 Router in a Four-Post Rack



1	Four-post rack	3	Four 10-32 or 12-24 screws
2	Screw hole for the cable-management bracket		

- Step 1** Make sure that the port adapter lever is in the locked position.
- Step 2** Make sure the rack brakes are locked or the rack is stabilized.
- Step 3** Position the router so the front is closest to you and lift it carefully into the rack. To prevent injury, avoid any sudden twists or moves.
- Step 4** Slide the chassis into the rack, pushing it back until the brackets meet the mounting strips or posts on both sides of the rack.
- Step 5** Keeping the brackets flush against the posts or mounting strips, align the holes in the brackets with the holes on the rack or mounting strip.
- Step 6** For each bracket, insert and tighten two 10-32 or 12-24 screws to the rack.

This completes the procedure for installing the chassis in the rack. Proceed to the [“Attaching a Chassis Ground Connection”](#) section on page 2-12 to continue the installation.

Attaching a Chassis Ground Connection



Warning

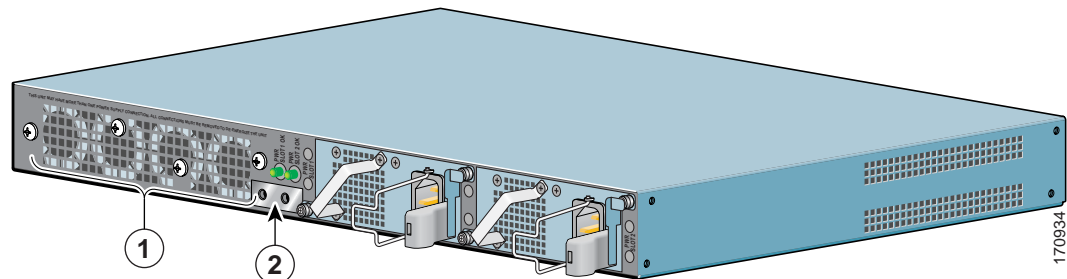
This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024

Before you connect power or turn on power to your router, you must provide an adequate chassis ground (earth) connection for the router chassis. A chassis ground connector is provided on each Cisco 7201 router chassis. (See [Figure 2-8](#).)

To ensure the chassis ground connection that you provide is adequate, you will need the following parts and tools:

- One grounding lug—Ships on the chassis along with two M5 grounding screws
- One grounding wire—6-AWG, 0.162-inch (4.115-mm) diameter multistrand, copper wire, with approximately 0.108-inch (2.743-mm) insulation, for a total wire diameter of approximately 0.27 inches (6.858 mm). The wire length is dependent on your router location and site environment. This wire is not available from Cisco; it is available from a commercial cable vendor.
- Number 2 Phillips screwdriver
- Crimping tool large enough to accommodate the diameter of the wire receptacle on your grounding lug
- Wire stripper

Figure 2-8 Locating the Chassis Ground Connector

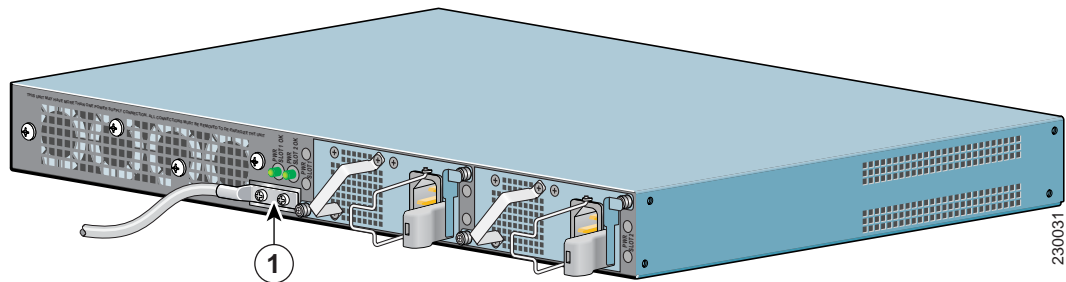


1	Fan vents	2	Chassis ground connector
---	-----------	---	--------------------------

Use the following procedure to attach the grounding lug to the chassis ground connector on your router chassis:

- Step 1** Use the wire stripper to strip one end of the 6-AWG wire approximately 0.75 inches (19.05 mm).
- Step 2** Insert the 6-AWG wire into the wire receptacle on the grounding lug.
- Step 3** Use the crimping tool to carefully crimp the wire receptacle around the wire; this step is required to ensure a proper mechanical connection.

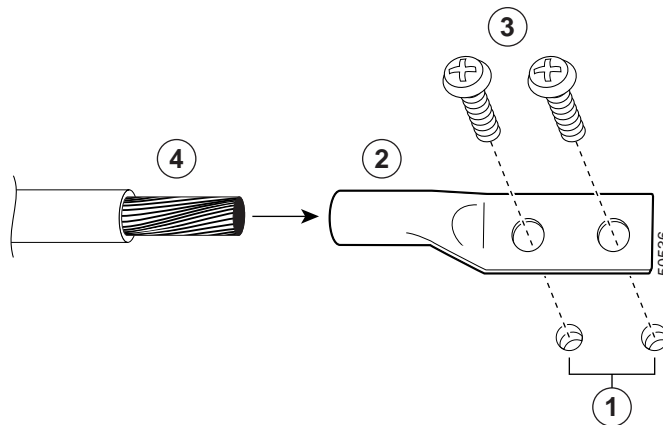
Figure 2-9 Attaching the Grounding Lug



1	Grounding lug
---	---------------

- Step 4** Attach the grounding lug with the wire on the left to avoid having the grounding wire overlapping the power supply. See [Figure 2-9](#).

Figure 2-10 Attaching a Grounding Lug to the Chassis Ground Connector



1	Chassis ground connector	3	Screws
2	Grounding lug	4	Wire

- Step 5** Locate the chassis ground connector on the rear of your router chassis.
- Step 6** Insert the two screws through the holes in the grounding lug.

- Step 7** Use the Number 2 Phillips screwdriver to carefully tighten the screws until the grounding lug is held firmly to the chassis. Do not overtighten the screws.
- Step 8** Connect the opposite end of the grounding wire to the appropriate grounding point at your site to ensure an adequate chassis ground.
-

This completes the procedure for attaching a chassis ground connection. Go to the following cabling sections for information on attaching cables.

Installing a Port Adapter, USB Flash Memory Module, or SFP Module That Did Not Ship in the System

For information on installing a port adapter that did not ship in the system, see the [“Removing and Installing a Port Adapter or Service Adapter”](#) section on page 4-5. Also see the *Cisco 7201 Port Adapter Documentation Roadmap* for a linked listing to all online port adapter documentation.

For information on installing a USB Flash memory module that did not ship in the system, see the [“Removing and Installing a USB Flash Memory Module or USB eToken Pro Key”](#) section on page 4-4.

For information on installing an SFP module that did not ship in the system, see the [“Removing and Installing an SFP Module”](#) section on page 4-2.

Connecting Port Adapter Cables

The instructions for connecting the cables for the port adapter installed in the Cisco 7201 router are contained in the respective configuration notes for each port adapter. For example, if you are connecting the optical fiber cables for the PA-POS-OC3 port adapter, refer to the *PA-POS-OC3 Packet OC-3 Port Adapter Installation and Configuration* guide at

http://www.cisco.com/en/US/docs/interfaces_modules/port_adapters/install_upgrade/pos/pa-pos-oc3_install_config/paposoc3.html.

Port adapter documents are also available on the Cisco Documentation DVD.

Connecting I/O Cables

This section contains input/output (I/O) connection equipment information for the native Gigabit Ethernet, Fast Ethernet Management, console, and auxiliary ports.



Warning

The ports labeled “Ethernet,” “10BaseT,” “Token Ring,” “Console,” and “AUX” are safety extra-low voltage (SELV) circuits. SELV circuits should only be connected to other SELV circuits. Because the BRI circuits are treated like telephone-network voltage, avoid connecting the SELV circuit to the telephone network voltage (TNV) circuits. Statement 22

Connecting Console and Auxiliary Port Cables



Note The console cable kit product number is ACS-2500ASYN.

The Cisco 7201 router has a DCE-mode console port for connecting a console terminal, and a DTE-mode auxiliary port for connecting a modem or other DCE device (such as a CSU/DSU or other router) to your router.



Note Both the console and the auxiliary ports are asynchronous serial ports; any devices connected to these ports must be capable of asynchronous transmission. (Asynchronous is the most common type of serial device; for example, most modems are asynchronous devices.)

The Cisco 7201 router uses RJ-45 ports for both the auxiliary port and the console port.

For console and auxiliary port pinouts for the RJ-45 connector, see [Appendix A, “Specifications.”](#)

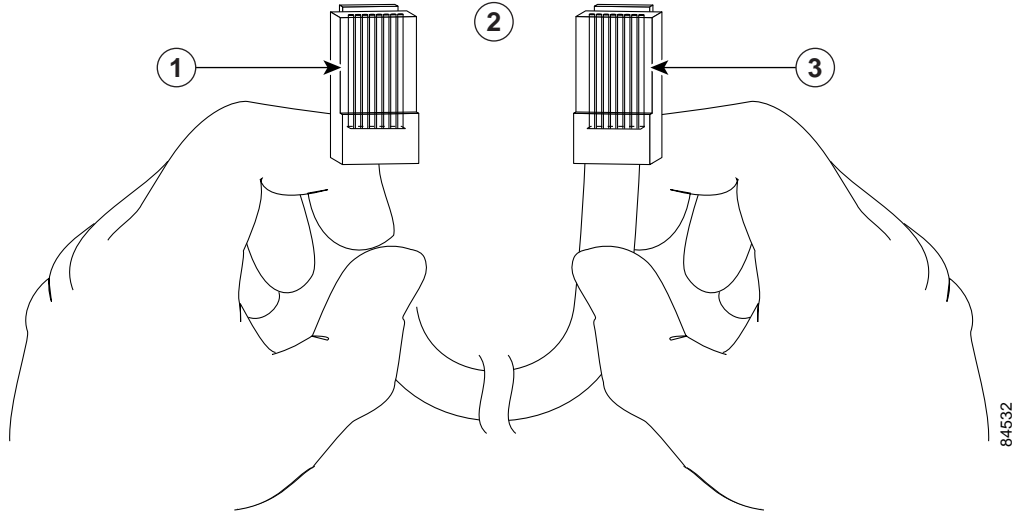
Table 2-2 Pinouts for the RJ-45-to-DB-25 Adapters

Adapter	DTE M/F Pins ¹	DCE M/F Pins	MMOD Pins ²
1	4	5	5
2	20	6	8
3	2	3	3
4	7	7	7
5	7	7	7
6	3	2	2
7	6	20	20
8	5	4	4

1. The female data terminal equipment (FDTE) adapter that is available from Cisco is labeled “Terminal”.
2. The MMOD adapter that is available from Cisco is labeled “Modem”.

Refer to [Table 2-2](#) for a list of the pins used on the RJ-45-to-DB-25 adapters, used with an RJ-45 cable, to connect terminals and modems to the Cisco 7201 router. The cable you use may be a roll-over cable or a straight-through cable.

A roll-over cable can be detected by comparing the two modular ends of the cable. Holding the cables in your hand, 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 pin on the outside of the right plug. If your cable was purchased from Cisco, pin 1 will be white on one connector, and pin 8 will be white on the other (a roll-over cable reverses pins 1 and 8, 2 and 7, 3 and 6, and 4 and 5). (See [Figure 2-11.](#))

Figure 2-11 Identifying a Roll-Over Cable

1	Pin 1	3	Pin 8
2	Pin 1 and pin 8 should be the same color		

The Cisco 7201 router ships with a roll-over cable. Connection to a terminal or a modem will require an RJ-45-to-DB-25 adapter, and possibly a DB-25-to-DB9 adapter. Refer to [Table 2-3](#) for the cable and adapter configurations that can be used to connect terminals and modems to the Cisco 7201 router.

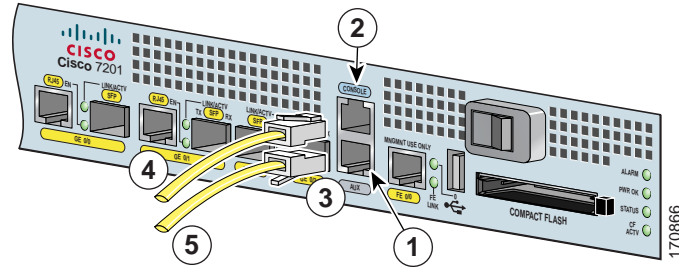
Table 2-3 Asynchronous Device Cabling Options

Access Server Port	RJ-45 Cable Type	DB-25 Adapter	End Device
Console or auxiliary	Roll-over	FDTE ¹	Terminal
Console or auxiliary	Straight-through	FDCE	Terminal
Auxiliary or console	Roll-over	MMOD ²	Modem

1. The FDTE RJ-45-to-DB-25 adapter is labeled "Terminal".
2. The MMOD RJ-45-to-DB-25 adapter is labeled "Modem".

Both ports are configured as asynchronous serial ports. [Figure 2-12](#) shows the RJ-45 console and auxiliary port connections.

Figure 2-12 Console and Auxiliary Port RJ-45 Connectors

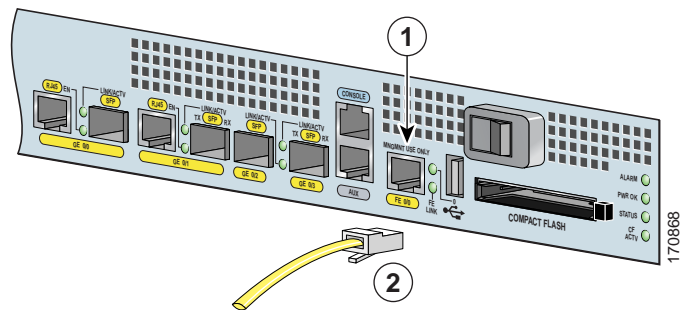


1	Auxiliary port	4	Cable to console terminal or DTE
2	Console port	5	Cable to modem or DCE
3	RJ-45 connector		

- Step 1** Before connecting a terminal to the console port, configure the terminal to match the router console port as follows: 9600 baud, 8 data bits, no parity, 1 stop bits (9600 8N1).
- Step 2** After you establish normal router operation, you can disconnect the terminal.

Connecting the Fast Ethernet Management Port Cable

Figure 2-13 Installing the Fast Ethernet Management Port Cable



1	Fast Ethernet Management port	2	Fast Ethernet RJ-45 cable
---	-------------------------------	---	---------------------------

When using the Fast Ethernet Management port in the default mode (speed-auto and duplex-auto) the port operates in auto-MDI/MDI-X mode. The port automatically provides the correct signal connectivity through the Auto-MDI/MDI-X feature. The port automatically senses a crossover or straight-through cable and adapts to it.

However, when the Fast Ethernet Management port is configured to a fixed speed (10 or 100 Mbps) through command-line interface (CLI) commands, the port is forced to MDI mode.

When in a fixed-speed configuration and MDI mode:

- Use a crossover cable to connect to an MDI port
- Use a straight-through cable to connect to an MDI-X port

Connecting Native Gigabit Ethernet Cables

The Cisco 7201 router has four native Gigabit Ethernet interfaces and six physical Gigabit Ethernet ports, four SFP ports (optical) and two RJ-45 ports (copper). The use of an RJ-45 port or SFP port on a common Gigabit Ethernet interface is mutually exclusive at any one time.

Gigabit Ethernet SFP Connection Equipment

The SFP port is a 1000-Mbps optical interface in the form of an LC-type duplex port that supports IEEE 802.3z interfaces compliant with the 1000BASEX standard. (See [Figure 2-16](#).)

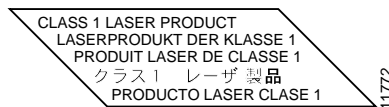


Warning

Because invisible laser radiation may be emitted from the aperture of the port when no cable is connected, avoid exposure to laser radiation and do not stare into open apertures. Statement 70

[Figure 2-14](#) shows the Class 1 warning label that appears on the Gigabit Ethernet optical ports.

Figure 2-14 Laser Class 1 Warning Label



[Figure 2-16](#) shows the duplex LC-type connectors on your multimode or single-mode optical fiber cables. For simplex connectors, two cables are required, one cable for transmit (TX) and a second cable for receive (RX). For duplex connectors, only one cable that has both TX and RX connectors is required. You can use either simplex or duplex connectors to the SFP ports on the Cisco 7201 router.

[Appendix A, “Specifications,”](#) provides cabling specifications and configuration information for the SFP modules that you install in the Gigabit Ethernet SFP ports.

The following SFP modules are supported on the Cisco 7201:

- 100BASE-FX SFP—The SFP-GE-F=, 100BASE-FX SFP module is a hot-swappable device that plugs into a Gigabit Ethernet SFP port. It provides full-duplex 100-Mbps connectivity over multimode fiber (MMF) infrastructures. The 100BASE-FX SFP operates on ordinary MMF optical link spans of up to 2 kilometers (km) in length.
- 1000BASE-LH/LX SFP module—The SFP-GE-L= (1000BASE-LH/LX SFP module) operates on ordinary single-mode fiber-optic link spans of up to 32,808 feet (10,000 meters) in length.
- 1000BASE-SX SFP module—The SFP-GE-S= (1000BASE-SX SFP module) operates on ordinary multimode fiber-optic link spans of up to 1804 feet (550 meters) in length.

1000BASE-ZX SFP module—The SFP-GE-Z= (1000BASE-ZX SFP module) operates on ordinary single-mode fiber-optic link spans of up to 43 miles (70 kilometers) in length. Link spans of up to 100 km are possible using premium single-mode fiber or dispersion-shifted single-mode fiber. The SFP module provides an optical link budget of 23 dB—the precise link span length depends on multiple factors, such as fiber quality, number of splices, and connectors.

When shorter distances of single-mode fiber are used, it may be necessary to insert an inline optical attenuator in the link to avoid overloading the receiver. A 5-decibel (dB) or 10-dB inline optical attenuator should be inserted between the fiber-optic cable plant and the receiving port on the SFP-GE-Z= at each end of the link whenever the fiber-optic cable span is less than 25 km.

- 1000 BASE-T SFP module—The SFP-GE-T (1000BASE-T copper SFP module) provides full-duplex Gigabit Ethernet connectivity to high-end workstations and between wiring closets over an existing copper network infrastructure. The SFP-GE-T maximum cabling distance is 328 feet (100 m).



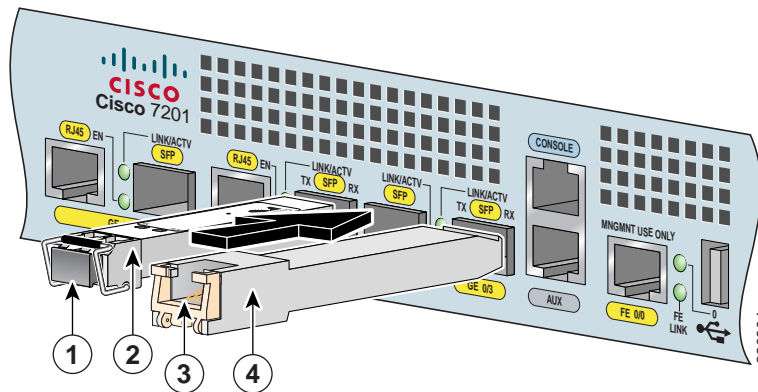
Note

Optical fiber cables are commercially available; they are not available from Cisco.

Installing the SFP Module Optical Fiber Cables

SFP modules ordered with the Cisco 7201 router come installed in the system. Optical fiber cables are commercially available; they are not available from Cisco

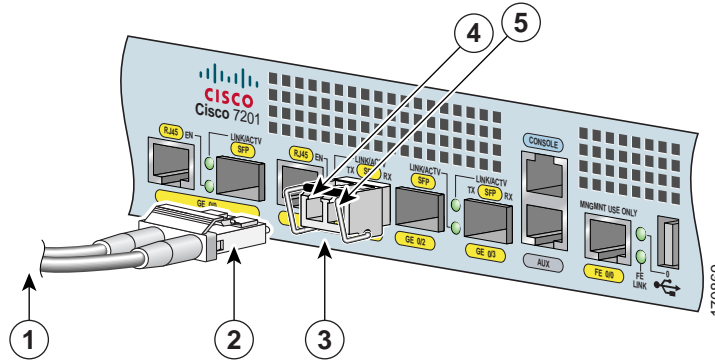
Figure 2-15 Optical SFP Module and Copper SFP Modules



1	Optical SFP module plug	3	Copper SFP module RJ-45 connector
2	Optical SFP module	4	Copper SFP module

The optical SFP modules can occupy any of the four optical Gigabit Ethernet ports, 0/0 through 0/3. However, the copper SFP modules can occupy only optical Gigabit Ethernet ports 0/2 and 0/3.

Figure 2-16 SFP Port Connections



1	To external 1000BASEX network	4	TX (SFP port 0/1)
2	Duplex connector (TX and RX)	5	RX (SFP port 0/1)
3	SFP module		

**Note**

We strongly recommend cleaning optical fiber connections before attaching cables to equipment. See the “Cleaning the Fiber-Optic Connections” section on page 5-14 for information.

**Warning**

Class 1 laser product. Statement 1008

**Warning**

Class 1 LED product. Statement 1027

Step 1 Check to be sure that either the SFP optical port or the RJ-45 port is used on ports 0/0 and 0/1. Only one of the pair can be chosen.

Step 2 Remove the plug from the SFP module so that you can insert the cables. Keep the plug for use should you ever disconnect the optical fiber cables.

**Warning**

Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments. Statement 1051

Step 3 Attach the appropriate optical fiber cable directly to the SFP module. You can use either simplex or duplex connectors for most devices. (Figure 2-16 shows an SFP module with a duplex connector being installed in SFP port 0/1.)

- For simplex connectors, two cables are required, one cable for transmit (TX) and a second cable for receive (RX).
- For duplex connectors, only one cable that has both TX and RX connectors is required.

**Caution**

If you plan to use a SFP-GE-L at distances greater than 984.25 feet (300 meters) over 50/125-micron or 62.5/125-micron multimode fiber, you must use the mode-conditioning patch cord to prevent data transmission problems.

Mode-Conditioning Patch Cord Description

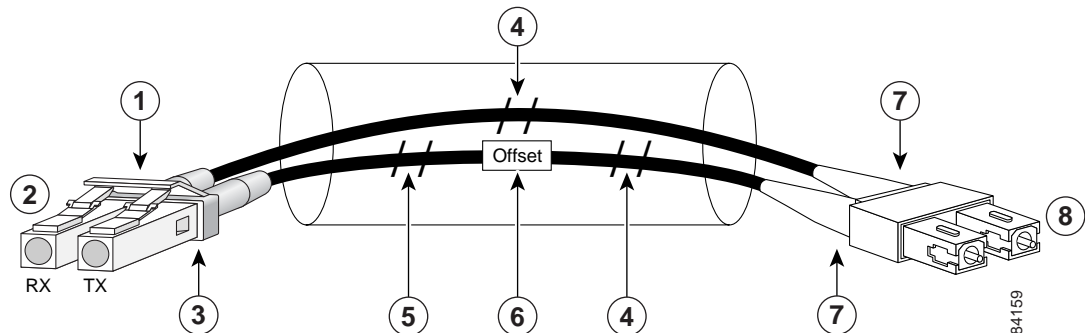
A mode-conditioning patch cord can be used with the SFP-GE-L= (SFP module) to allow reliable laser transmission between the single-mode laser source on the SFP module and a multimode optical fiber cable.

When an unconditioned laser source designed for operation on single-mode optical fiber is directly coupled to a multimode optical fiber cable, an effect known as *differential mode delay* (DMD) might result in a degradation of the modal bandwidth of the optical fiber cable.

This degradation results in a decrease in the link span (the distance between a transmitter and a receiver) that can be supported reliably. The effect of DMD can be overcome by conditioning the launch characteristics of a laser source. A practical means of performing this conditioning is to use a device called a *mode-conditioning patch cord*.

A mode-conditioning patch cord is an optical fiber cable assembly that consists of a pair of optical fibers terminated with connector hardware. Specifically, the mode-conditioning patch cord is composed of a single-mode optical fiber permanently coupled off-center (see Offset in Figure 2-17) to a graded-index multimode optical fiber. Figure 2-17 shows a diagram of the mode-conditioning patch cord assembly.

Figure 2-17 Mode-Conditioning Patch Cord Assembly for an SFP Module



1	Gray color identifier	5	Single-mode bar
2	To Gigabit Ethernet interface	6	Offset
3	Blue color identifier	7	Beige color identifier
4	Multimode bar	8	To cable plant

The mode-conditioning patch cord assembly is composed of duplex optical fibers, including a single-mode-to-multimode offset launch fiber connected to the transmitter, and a second conventional graded-index multimode optical fiber connected to the receiver. The use of a plug-to-plug patch cord maximizes the power budget of multimode 1000BASE-LX and 1000BASE-LH links.

The mode-conditioning patch cord is required to comply with IEEE standards. The IEEE found that link distances could not be met with certain types of fiber-optic cable cores. The solution is to launch light from the laser at a precise offset from the center, which is accomplished by using the mode-conditioning patch cord. At the output of the mode-conditioning patch cord, the SFP-GE-L= is compliant with the IEEE 802.3z standard for 1000BASE-LX.

**Note**

We strongly recommend cleaning optical fiber connections before attaching cables to equipment. See the [“Cleaning the Fiber-Optic Connections”](#) section on page 5-14 for information.

Attaching the Mode-Conditioning Patch Cord

To use a mode-conditioning patch cord, follow these steps:

-
- Step 1** If you have not already done so, and the mode-conditioning patch cord has been in use, we strongly recommend cleaning optical fiber connections before attaching cables to equipment. See the [“Cleaning the Fiber-Optic Connections”](#) section on page 5-14 for information.
 - Step 2** Attach a mode-conditioning patch cord to the SFP module. (See [Figure 2-17](#).)
 - Step 3** Attach the network ends of your mode-conditioning patch cord to the appropriate 1000BASEX equipment in your building cable plant.

Ensure that you connect the TX and RX ports on one end of the patch cord to the RX and TX ports (respectively) on the other end. Connect TX to RX and RX to TX.

**Note**

See [Chapter 3, “Starting and Configuring the Router,”](#) the [“Configuring the Native Gigabit Ethernet Interfaces”](#) section on page 3-15, for information on configuring and troubleshooting the Gigabit Ethernet interfaces.

Attaching the Gigabit Ethernet RJ-45 Cables

The RJ-45 ports support IEEE 802.u (Fast Ethernet) and 802.3ab (Gigabit Ethernet) twisted-pair interfaces compliant with 1000BASETX and 1000BASET specifications.

**Note**

RJ-45 ports GE/00 and GE/01 are always set to MDI mode.

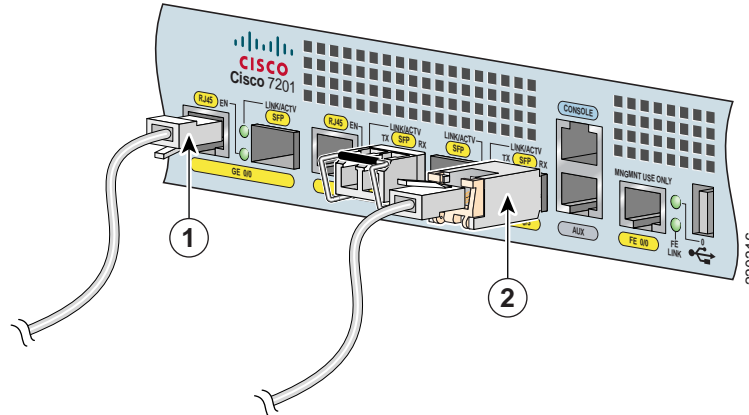
The RJ-45 ports support standard straight-through and crossover Category 5 unshielded twisted-pair (UTP) cables with RJ-45 connectors. Cisco does not supply Category 5 UTP cables; these cables are available commercially.

See [Appendix A, “Specifications,”](#) for Gigabit Ethernet RJ-45 port specifications.

Intra-Building Lightning Protection

Shielded cables, which are grounded at both ends, are required to be used on the 10/100/1000 Gigabit Ethernet RJ-45 ports in order to be in compliance with requirement R4-11 in GR-1089-Core for a Central Office environment. This is not a requirement for customer premises installations.

Figure 2-18 RJ-45 Port and Copper SFP RJ-45 Gigabit Ethernet Port Cabling



1	RJ-45 connector	2	Copper SFP module RJ-45 connector
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- Step 1** Insert an Gigabit Ethernet RJ-45 cable into Gigabit Ethernet RJ-45 ports 0/0 and 0/1 if you are not using Gigabit Ethernet SFP optical ports 0/0 and 0/1.
- Step 2** Insert an Gigabit Ethernet RJ-45 cable into a copper SFP module in Gigabit Ethernet ports 0/2 and 0/3.



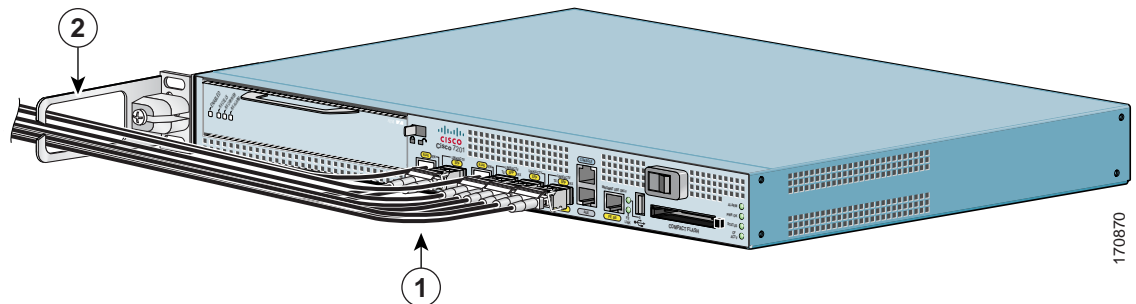
Warning

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. Use caution when connecting cables. Statement 1021

This completes the procedures for connecting the I/O cables.

Using the Cable-Management Bracket

Figure 2-19 Securing Interface Cables Through the Cable-Management Bracket



1	Input/output cables	2	Cable-management bracket
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Secure port adapter interface cables and I/O cables by placing them through the cable-management bracket.

Proceed to the [“Connecting Power” section on page 2-24](#) to complete the installation.

Connecting Power

This section provides the procedures for connecting AC-input and DC-input power to your Cisco 7201 router.

- [Connecting AC-Input Power, page 2-24](#)
- [Connecting DC-Input Power, page 2-26](#)



Warning

Installation of the equipment must comply with local and national electrical codes. Statement 1074



Warning

Never install an AC power module and a DC power module in the same chassis. Statement 1050



Warning

This unit might have more than one power supply connection. All connections must be removed to de-energize the unit. Statement 1028



Warning

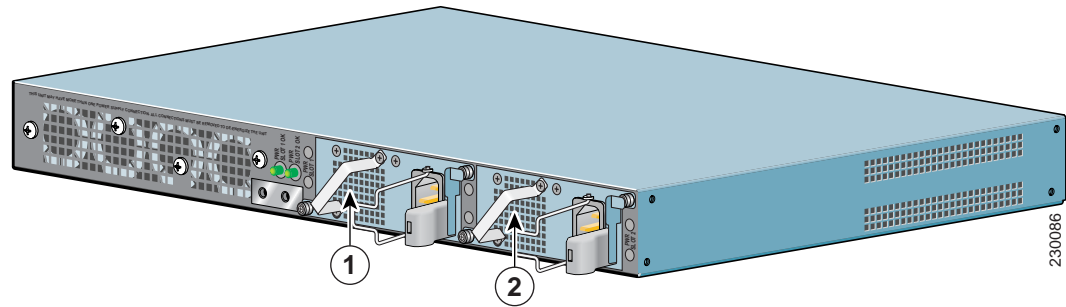
This product relies on the building’s installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 120 VAC, 20A U.S. (240 VAC, 10A international).
Statement 1005

Connecting AC-Input Power

This section provides instructions for connecting AC-input power.

The Cisco 7201 router has two of the same type of power supplies in power supply slot 1 and power supply slot 2. The power supply slot numbers are on the chassis to the left of the left power supply, and to the right of the right power supply. See [Figure 2-20](#)

Figure 2-20 Power Supply Slot 1 and Slot 2



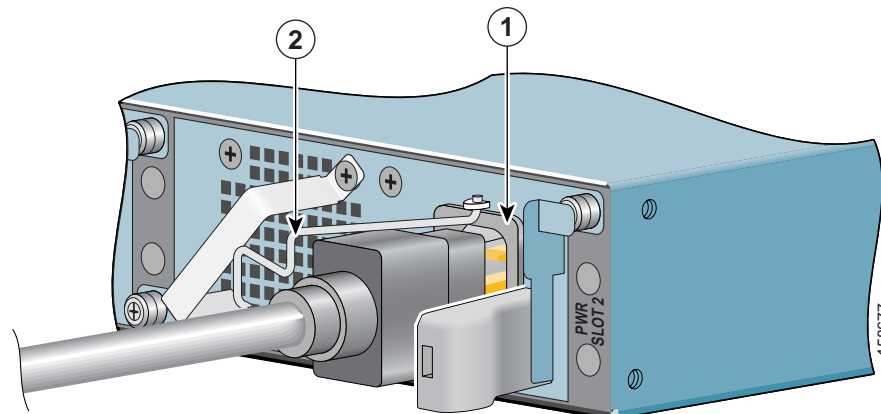
1	Power supply slot 1	2	Power supply slot 2
---	---------------------	---	---------------------

**Warning**

Never install an AC power module and a DC power module in the same chassis. Statement 1050

Connect an AC-input power supply as follows:

Figure 2-21 Connecting AC-Input Power



1	AC power receptacle	2	Adjustable AC power cable-retention clip
---	---------------------	---	--

- Step 1** At the front of the router, check that the power switch is in the standby (I) position.
- Step 2** Swing the wire cable-retention clip to the left.
- Step 3** Plug the power cable into the AC connector of one of the power supplies.
- Step 4** Slide the cable-retention clip to the right, so that the power cable is held by the cable-retention clip.
- Step 5** Plug the AC power supply cable into the AC power source. Repeat these steps for the second AC power supply.
- Step 6** On the front of the router, place the power switch in the on (O) position to turn on the router.
The power supply LEDs light when power is supplied to the router.

**Note**

After powering off the router, wait a minimum of 30 seconds before powering it on again.

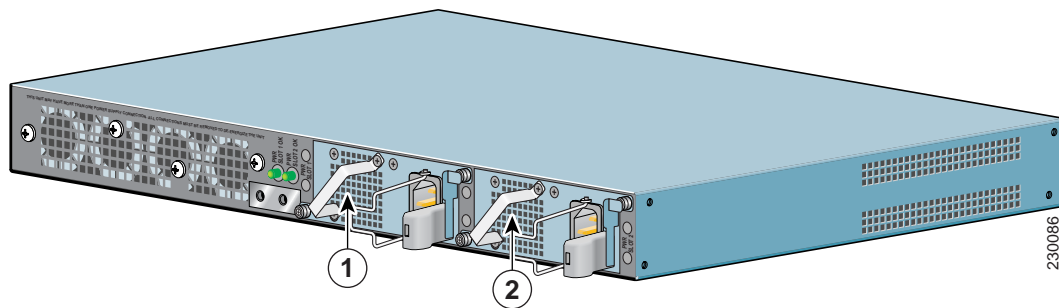
If required, use Sinewave Output UPS (uninterruptable power supply), not Ferro-resonant type UPS.

This completes the procedure for connecting AC-input power. Your installation is complete. Proceed to [Chapter 3, “Starting and Configuring the Router,”](#) to start the router and to perform a basic configuration.

Connecting DC-Input Power

This section provides instructions for installing the DC power supply ground leads and installing the DC-input power leads.

Figure 2-22 Power Supply Slot 1 and Slot 2



1	Power supply slot 1	2	Power supply slot 2
---	---------------------	---	---------------------

The Cisco 7201 has two of the same type of power supplies in power supply slot 1 and power supply slot 2. See [Figure 2-22](#). The power supply slot numbers are on the chassis to the left of the left power supply, and to the right of the right power supply.

**Warning**

Never install an AC power module and a DC power module in the same chassis. Statement 1050

**Caution**

Before you connect DC-input power, you must install the DC power ground leads to the DC power supply.

**Warning**

When installing or replacing the unit, the ground connection must always be made first and disconnected last. Statement 1046



Warning

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



Warning

This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024



Note

To make sure that the equipment is reliably connected to earth ground, follow the grounding procedure instructions, and use a UL-listed lug suitable for 6-AWG wire and two M5 screws.

Obtain these necessary tools and equipment:

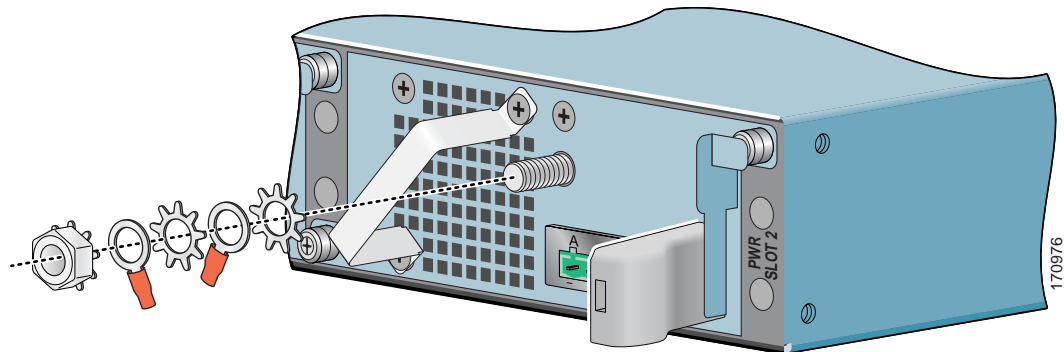
- Ratcheting torque screwdriver with a Phillips head that exerts up to 15 pound force-inches (lbf in.) or 240 ounce force-inches (ozf in.) of pressure
- Panduit crimping tool with optional controlled cycle mechanism
- 18-gauge copper ground wire (insulated or noninsulated)
- Four leads of 18-gauge copper wire
- Wire-stripping tool for stripping 18-gauge wire

Installing the DC Grounding Leads

To install the DC grounding leads on the DC power supply, follow these instructions.

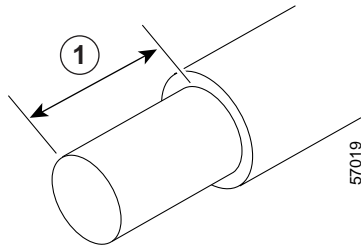
The DC power supply ships with the DC power supply ground lugs, star washers, and nut attached to the grounding stud on the DC power supply.

Figure 2-23 Locating the DC Grounding Stud and Grounding Materials



- Step 1** Locate the grounding stud on the DC power supply.
- Step 2** Remove the nut, ground lug, star washer, and the second ground lug and star washer from the grounding stud.

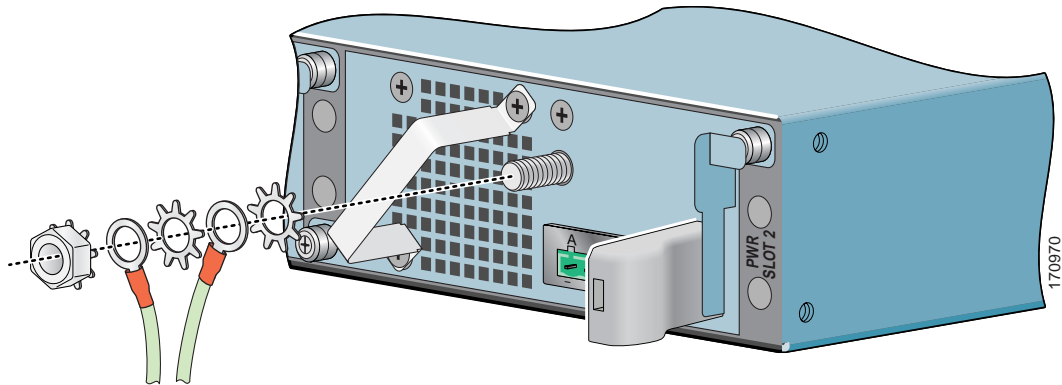
Figure 2-24 Stripping the DC-Input Power Ground Wire



1	0.5 inch (12.7 mm) ± 0.02 inch (0.5 mm)		
---	---	--	--

- Step 3** If your ground wire is insulated, use a wire stripping tool to strip the 18-gauge wire, (or 16-gauge, but not smaller than the supply conductor) ground wire to 0.5 inch (12.7 mm) ± 0.02 inch (0.5 mm) as shown in [Figure 2-24](#).
- Step 4** Slide the open end of the ground lug over the exposed area of the 18-gauge wire.
- Step 5** Use a crimping tool to crimp each ground wire to a ground lug.

Figure 2-25 Placing the Ground Lugs, Star Washers, and Nut



- Step 6** Place the ground lugs, star washers, and nut on the grounding stud in this order:
- Star washer
 - Ground lug
 - Star washer
 - Ground lug
 - Nut
- Step 7** Tighten the nut to complete the installation.

- Step 8** Attach the other end of the ground wires to an appropriate grounding point at your site.
- Step 9** Repeat Step 1 through Step 8 on the second DC power supply.

Wiring the DC-Input Power Source



Note

The color coding of the DC-input power supply leads depends on the color coding of the DC power source at your site. Make certain the lead color coding you choose for the DC-input power supply matches lead color coding used at the DC power source.



Warning

When installing or replacing the unit, the ground connection must always be made first and disconnected last. Statement 1046



Warning

StatThis product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 120 VAC, 20A U.S. (240 VAC, 10A international). Statement 1005



Warning

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



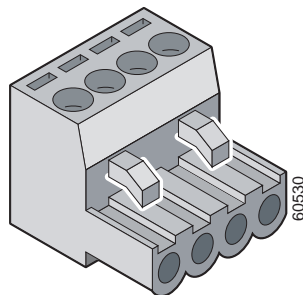
Warning

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

Use the information in this section to wire the DC-input power source.

- Step 1** At the front of the router, make sure the power switch is in the standby (I) position.
- Step 2** Move the circuit-breaker switch handle to the off position, and apply tape to hold it in the off position.
- Step 3** Check to make sure the power supply LEDs are off.

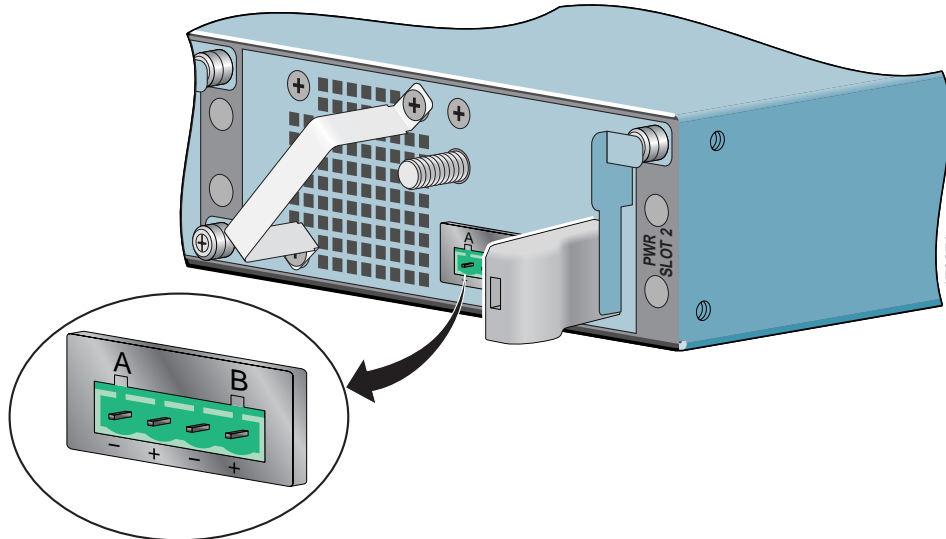
Figure 2-26 Terminal Block Plug



- Step 4** Locate and remove the terminal block plug.

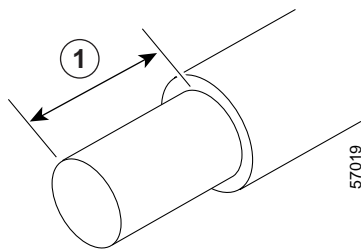
- Step 5** Identify the positive and negative feed positions for the terminal block connection. The wiring sequence is positive to positive and negative to negative for both the A and B feed wires.

Figure 2-27 Positive and Negative Positions



The rear panel of the power supply unit identifies the positive and negative positions for both the A and B feed wires. See [Figure 2-27](#).

Figure 2-28 Stripping the DC-Input Power Source Wire



1	0.25 inch (6.3 mm) ± 0.02 inch (0.5 mm)		
---	---	--	--

- Step 6** Using an 18 gauge wire-stripping tool, strip each of the four wires coming from the DC-input power source to 0.25 inch (6.3 mm) ± 0.02 inch (0.5 mm). Do not strip more than 0.29 inch (7.4 mm) of insulation from the wire. Stripping more than the recommended amount of wire can leave exposed wire from the terminal block plug after installation.

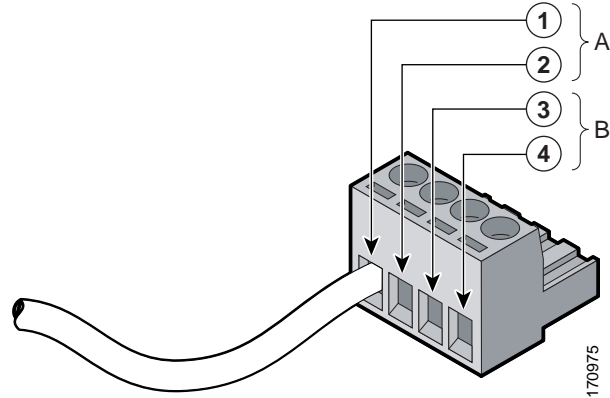


Warning

An exposed wire lead from a DC-input power source can conduct harmful levels of electricity. Be sure that no exposed portion of the DC-input power source wire extends from the terminal block plug.

Statement 122

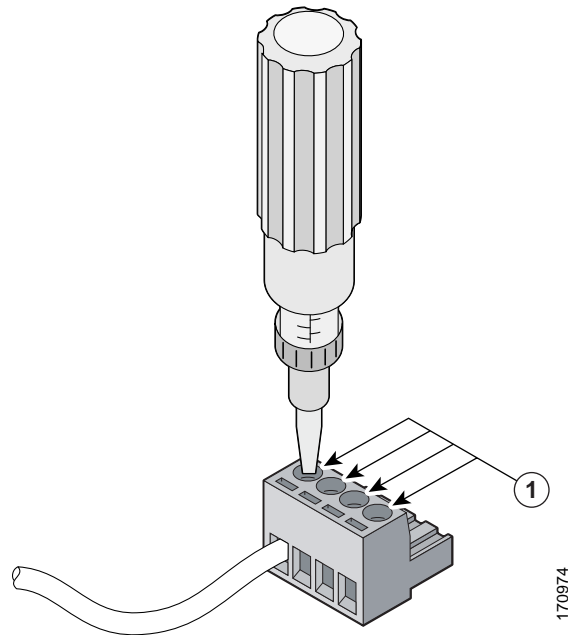
Figure 2-29 Inserting Wires into the Terminal Block Plug



1	Negative (-)	3	Negative (-)
2	Return (+)	4	Return (+)

Step 7 Insert the exposed wire of one of the four DC-input power source wires into the terminal block plug, as shown in [Figure 2-29](#). Make sure that you cannot see any wire lead. Only wire *with insulation* should extend from the terminal block.

Figure 2-30 Torquing the Terminal Block Plug Captive Screws



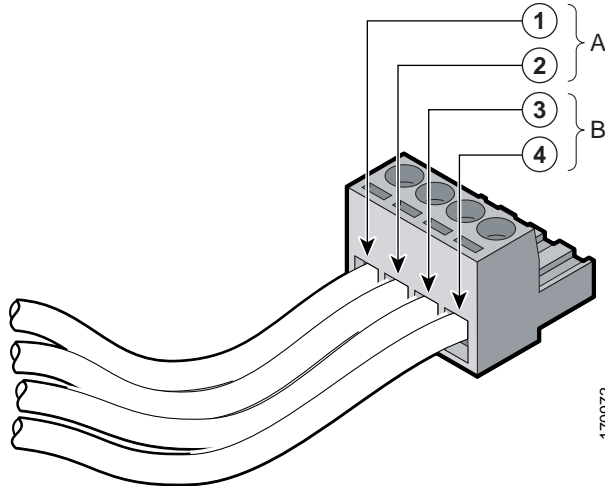
1	Torque is from 0.5 Nm (4.425 lbf in. to 0.6 Nm (5.310 lbf in.))		
---	---	--	--

Caution

Do not overtorque the terminal block plug captive screws. The recommended maximum torque is from 0.5 Nm (4.425 lbf in.) to 0.6 Nm (5.310 lbf in.).

- Step 8** Use a ratcheting torque screwdriver to torque the terminal block plug captive screw (above the installed wire lead) to from 0.5 Nm (4.425 lbf in. to 0.6 Nm (5.310 lbf in.), as shown in [Figure 2-30](#).

Figure 2-31 Completed Wiring of Terminal Block Plug



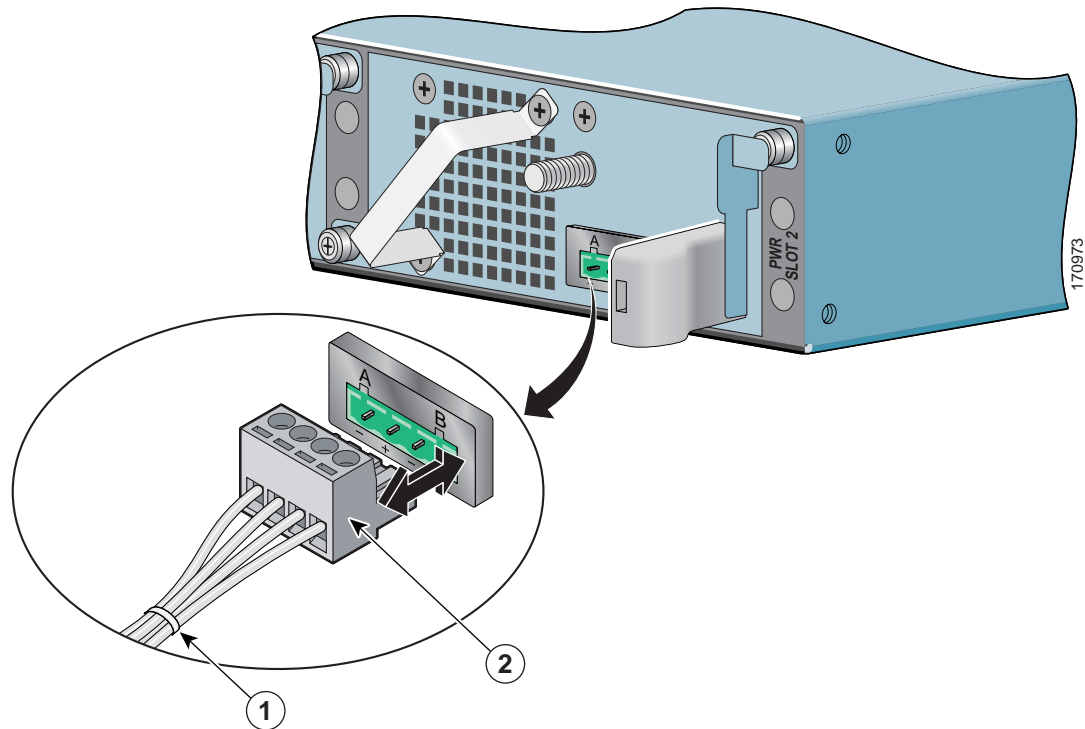
1	Negative (-)	3	Negative (-)
2	Return (+)	4	Return (+)

- Step 9** Repeat Step 6 and Step 7 for the remaining three DC-input power source wires. [Figure 2-31](#) shows the completed wiring of a terminal block plug.



Note Each DC power supply accepts two power feeds, but works with only one. You may choose to install only one power feed per power supply. For example, DC power feed A to the power supply in power supply slot 1 and DC power feed B to the power supply in power supply slot 2.

Figure 2-32 Inserting the Terminal Block Plug in the Block Header



1	Tie wrap	2	Terminal block plug
---	----------	---	---------------------

**Caution**

Secure the wires coming in from the terminal block plug so that they cannot be disturbed by casual contact.

- Step 10** Use a tie wrap to secure the wires to the rack, so that the wires are not pulled from the terminal block plug by casual contact. Make sure the tie wrap allows for some slack in the ground wire.
- Step 11** Insert the terminal block plug in the terminal block header on the DC power supply panel, as shown in [Figure 2-32](#).
- Step 12** Repeat Step 1 through Step 10 for the second DC power supply.
- Step 13** Remove the tape from the circuit-breaker switch handle, and move the circuit-breaker switch handle to the on position.
- Step 14** On the front of the router, place the power switch in the on position (O) to turn on the router. The power supply LEDs light when power is supplied to the router.

**Note**

After powering off the router, wait a minimum of 30 seconds before powering it on again.

This completes the procedure for connecting DC-input power. Your installation is complete. Proceed to [Chapter 3, “Starting and Configuring the Router,”](#) to start the router and to perform a basic configuration.



CHAPTER 3

Starting and Configuring the Router

This chapter describes how to start the system and perform a basic configuration for your Cisco 7201 router. The chapter contains the following sections:

- [Functional Overview, page 3-1](#)
- [Checking Conditions Prior to System Startup, page 3-8](#)
- [Starting the System and Observing Initial Conditions, page 3-8](#)
- [Configuring a Cisco 7201 Router, page 3-9](#)
- [Checking the Running Configuration Settings, page 3-21](#)
- [Saving the Running Configuration to NVRAM, page 3-21](#)
- [Performing Other Configuration Tasks, page 3-22](#)
- [Upgrading ROMmon on the Cisco 7201, page 3-22](#)
- [Troubleshooting the Upgrade, page 3-24](#)
- [Upgrading FPGA, page 3-25](#)
- [Replacing or Recovering a Lost Password, page 3-26](#)
- [Viewing Your System Configuration, page 3-29](#)
- [Performing Complex Configurations, page 3-30](#)

This chapter guides you through a basic router configuration, which is sufficient for you to access your network. Complex configuration procedures are beyond the scope of this publication and can be found in the modular configuration and modular command reference publications in the Cisco IOS software configuration documentation set that corresponds to the software release installed on your Cisco hardware.

To configure a Cisco 7201 router from a console, you need to connect a terminal to the router console port.

Functional Overview

This section provides a functional overview of the Cisco 7201 router. It describes the numbering and addressing scheme of the port adapter for the router, the environmental monitoring and reporting functions, and online insertion and removal (OIR). These descriptions help you become familiar with the capabilities of the Cisco 7201 router.

Chassis Slot and Logical Interface Numbering

In the Cisco 7201 router, the *port-adapter-slot-number* is the chassis slot in which a port adapter is installed, whereas the *logical-interface-number* is the physical location of the interface port on a port adapter.

The port adapter slot in the Cisco 7201 router is numbered slot 1. Port adapter slot 0 is always reserved for logical port 10/100/1000.

The Media Access Control (MAC) or hardware address is a standardized data link layer address that is required for certain network interface types. These addresses are not used by other devices in the network; they are specific and unique to each port. The Cisco 7201 router uses a specific method to assign and control the MAC addresses of its port adapters. For a description of the MAC address, see the “MAC Address” section on page 3-3.

You can identify port adapter slots by using software commands. To display information about all port adapter slots, use the **show interfaces** command. To display information about a specific port adapter slot, use the **show interfaces** command with the port adapter type and slot number in the format **show interfaces port-adapter-type slot-number/port-number**. If you abbreviate the command (**sh int**) and do not specify port adapter type and slot number (or arguments), the system interprets the command as **show interfaces** and displays the status of all port adapters and ports.

The following example shows how the **show interfaces** command, used without arguments, displays status information (including the physical port adapter number) for the port adapter in a Cisco 7201 router.

In the following example, most of the status information for each interface is omitted.

```
Router# show interfaces
GigabitEthernet0/0 is up, line protocol is up
  Hardware is MV64460 Internal MAC, address is 0019.56c5.2adb (bia
0019.56c5.2adb)
  Internet address is 209.165.200.225
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
    reliability 255/255, txload 1/255, rxload 45/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 1000Mb/s, media type is RJ45
  output flow-control is XON, input flow-control is XON
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:07:03, output 00:00:07, output hang never
  Last clearing of "show interface" counters 00:00:04
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 180240000 bits/sec, 430965 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    2222975 packets input, 133378500 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 watchdog, 0 multicast, 0 pause input
    0 input packets with dribble condition detected
    0 packets output, 0 bytes, 0 underruns
    0 output errors, 0 collisions, 0 interface resets
    0 babbles, 0 late collision, 0 deferred
    0 lost carrier, 0 no carrier, 0 pause output
    0 output buffer failures, 0 output buffers swapped out
```

You can also use arguments such as the interface type (Ethernet, Token Ring, ATM, and so forth) and the port address (*slot-number/port-number*) to display information about a specific interface only.

The following example shows the display for the first port on the Gigabit Ethernet port:

```
Router# show interfaces g0/0
GigabitEthernet0/0 is up, line protocol is up
  Hardware is MV64460 Internal MAC, address is 0019.56c5.2adb (bia0019.56c5.2adb)
  Internet address is 11.1.1.1/16
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
    reliability 255/255, txload 1/255, rxload 45/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 1000Mb/s, media type is RJ45
  output flow-control is XON, input flow-control is XON
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:07:03, output 00:00:07, output hang never
  Last clearing of "show interface" counters 00:00:04
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0

(display text omitted)
```

For complete descriptions and instructions of the commands used to configure your Cisco 7201 router, refer to the *Cisco IOS Configuration Fundamentals Configuration Guide* and *Cisco IOS Configuration Fundamentals Command Reference* publications at the following URL:

<http://www.cisco.com/web/psa/products/index.html?c=268438303>

MAC Address

All LAN interfaces (ports) require unique MAC addresses, also known as *hardware addresses*. Typically, the MAC address of an interface is stored on a memory component that resides directly on the interface circuitry; however, the OIR feature requires a different method. (For a description of OIR, see the “[Online Insertion and Removal](#)” section on page 3-4.)

Using OIR, you can remove a port adapter and replace it with another identically configured one. If the new port adapter matches the port adapter you removed, the system immediately brings it online. In order to enable OIR, an address allocator with unique MAC addresses is stored in an EEPROM on the system board. Each address is reserved for a specific port and slot in the router regardless of whether or not a port adapter resides in that slot. The MAC address for the port adapter slot in the Cisco 7201 is designated slot 0. You can remove a port adapter and insert it into another router without causing the MAC addresses to move around the network or be assigned to multiple devices.

Note that if the MAC addresses were stored on each port adapter, OIR would not function because you could never replace one port adapter with an identical one; the MAC addresses would always be different. Also, each time a port adapter was replaced, other devices on the network would have to update their data structures with the new address. If the other devices did not update quickly enough, the same MAC address could appear in more than one device at the same time.



Note

Storing the MAC addresses for every slot in one central location means the addresses stay with the memory device on which they are stored.

Online Insertion and Removal

All port adapters and service adapters in the Cisco 7201 router support online insertion and removal (OIR). However, it is wise to shut down the interface before removing a port adapter that has active traffic moving through it. Removing a port adapter while traffic is flowing through the ports can cause system disruption. Once the port adapter is inserted, the ports can be brought back up.

**Caution**

As you disengage the port adapter from the router or switch, online insertion and removal (OIR) administratively shuts down all active interfaces in the port adapter.

OIR allows you to install and replace port adapters and service adapters while the router is operating; you do not need to notify the software or shut down the system power, although you should not run traffic through the port adapter you are removing while it is being removed. OIR is a method that is seamless to end users on the network, maintains all routing information, and preserves sessions.

The following is a functional description of OIR for background information only; for specific procedures for installing and replacing a port adapter or service adapter in a Cisco 7201 router, refer to the online configuration note for each port adapter or service adapter.

Each port adapter or service adapter has a bus connector that connects it to the router. The connector has a set of tiered pins in three lengths that send specific signals to the system as they make contact with the port adapter or service adapter. The system assesses the signals it receives and the order in which it receives them to determine if a port adapter or service adapter is being removed or inserted into the system. From these signals, the system determines whether to reinitialize a new interface or shut down a removed interface.

For example, when you insert a port adapter or service adapter, the longest pins make contact with the port adapter or service adapter first, and the shortest pins make contact last. The system recognizes the signals and the sequence in which it receives them.

When you remove or insert a port adapter or service adapter in a Cisco 7201 router, the pins send signals to notify the system, which then performs as follows:

1. Rapidly scans the system for configuration changes.
2. Initializes all newly inserted port adapters or service adapters, noting any removed interfaces and placing them in the administratively shutdown state.
3. Brings all previously configured interfaces on the port adapter back to the state they were in when they were removed. Any newly inserted interface is put in the administratively shutdown state, as if it was present (but not configured) at boot time. If a similar port adapter type is reinserted into a slot, its ports are configured and brought online up to the port count of the original port adapter. (A service adapter has no configurable ports.)

Environmental Monitoring and Reporting Functions

Environmental monitoring and reporting functions allow you to maintain normal system operation by identifying and resolving adverse conditions prior to loss of operation. The environmental monitoring functions constantly monitor the internal chassis air temperature and DC supply voltages and currents. If conditions reach shutdown thresholds, the system shuts down to avoid equipment damage from excessive heat. The reporting functions periodically log the values of measured parameters so that you can retrieve them for analysis later, and the reporting functions display warnings on the console if any of the monitored parameters exceed defined thresholds.

Environmental Monitoring

The environmental monitoring functions use two sensors, Sensor 1 (U12) on the underneath front edge of the system board, and Sensor 2 (U20), near the fans. If the air temperature exceeds a defined threshold, the system controller displays warning messages on the console terminal, and if the temperature exceeds the shutdown threshold, the system controller shuts down the system. The system stores the present parameter measurements for both temperature and DC voltage in NVRAM so you can retrieve them later as a report of the last shutdown parameters.

If an internal power supply temperature or voltage reaches a critical level, the power supply shuts down without any interaction with the system processor.

The environmental monitoring functions use the following levels of status conditions to monitor the system:

- Normal—All monitored parameters are within normal tolerances.
- Warning—The system has exceeded a specified threshold. The system continues to operate, but operator action is recommended to bring the system back to a normal state.
- Critical—An out-of-tolerance temperature or voltage condition exists. The system continues to operate; however, the system is approaching shutdown. Immediate operator action is required.
- Shutdown—The processor has detected a temperature condition that could result in physical damage to system components and has disabled DC power to all internal components. This condition requires immediate operator action. All DC power remains disabled until you toggle the power switch. Before any shutdown, the system logs the status of monitored parameters in NVRAM so you can retrieve it later to help determine the cause of the problem.
- Power supply shutdown—The power supply detected an internal out-of-tolerance overvoltage, overcurrent, or temperature condition and shut itself down. All DC power remains disabled until you toggle the power switch.

[Table 3-1](#) lists the typical temperature thresholds for the Cisco 7201 router, and [Table 3-2](#) lists the DC power thresholds for the normal, warning, and critical (power supply-monitored) levels.

Table 3-1 *Typical Processor-Monitored Temperature Thresholds*

Parameter	High Warning	High Critical	Shutdown
Sensor 1: Inlet (U12, at the front edge of the board, top of the system board)	111°F (44°C)	138°F (59°C)	176°F (80°C)
Sensor 2: Outlet (U20, near the fans, top of system board)	120°F (49°C)	147°F (64°C)	183°F (84°C)
CPU die	194°F (90°C)	221°F (105°C)	230°F (110°C)

[Table 3-2](#) shows typical power supply-monitored DC-voltage thresholds.

Table 3-2 *Typical Power Supply-Monitored DC-Voltage Thresholds*

Parameter	Low Critical	Low Warning	High Warning	High Critical
+12.15V	+11.39V	+11.67V	+12.62V	+12.91V

Reporting Functions

The Cisco 7201 router displays warning messages on the console if chassis interface-monitored parameters exceed a desired threshold. You can also retrieve and display environmental status reports with the **show environment**, **show environment all**, **show environment last**, and **show environment table** commands. Parameters are measured and reporting functions are updated every 60 seconds. A brief description of each of these commands follows.



Caution

To prevent overheating the chassis, ensure that your system is drawing cool inlet air. Overtemperature conditions can occur if the system is drawing in the exhaust air of other equipment. Ensure adequate clearance around the sides of the chassis so that cooling air can flow through the chassis interior unimpeded and exhaust air exits the chassis and is not drawn into the inlet vent of another device.

The **show environment** command displays reports of the current environmental system status. The report displays parameters that are out of the normal values. No parameters are displayed if the system status is normal. The example that follows shows the display for a system in which all monitored parameters are within normal range:

```
Router# show environment

All measured values are normal
```

If the environmental status is *not* normal, the system reports the worst-case status level. Following is a sample overvoltage warning:

```
Router# show environment

Warning:+3.45 V measured at +3.27 V
```

The **show environment last** command retrieves and displays the NVRAM log, which shows the reason for the last system shutdown (if the shutdown was related to voltage or temperature) and the environmental status at that time. Air temperature is measured and displayed, and the DC voltage supplied by the power supply is also displayed.

Following is sample output of the **show environment last** command:

```
Router# show environment last
NPE Inlet           previously measured at 28C/82F
NPE Outlet          previously measured at 30C/86F
CPU Die             previously measured at 42C/107F
+3.30 V             previously measured at +3.24
+1.50 V             previously measured at +1.48
+2.50 V             previously measured at +2.46
+5.15 V             previously measured at +4.96
+1.20 V             previously measured at +1.17
VDD_CPU             previously measured at +1.25
-11.95              previously measured at -12.04
VTT                 previously measured at +1.23
last shutdown reason - power supply shutdown 7201_creg6#
```

The **show environment table** command displays the temperature and voltage thresholds for each temperature sensor and for each monitored status level. These thresholds are related to those listed in [Table 3-1](#) and [Table 3-2](#). The display also lists the shutdown threshold for the system.

Following is sample output of the **show environment table** command for a Cisco 7201 router:

```
Router# show environment table
```

```
Sample Point      LowShut  LowCrit  LowWarn  HighWarn  HighCrit  HighShut
NPE Inlet         44C/111F 59C/138F
NPE Outlet        49C/120F 64C/147F
CPU Die           90C/194F 105C/221F
System shutdown for NPE Inlet is 80C/176F System shutdown for NPE Outlet is 84C/183F
System shutdown for CPU Die is 110C/230F
+3.30 V           +2.30    +3.12                    +3.47    +4.29
+1.50 V           +1.05    +1.40                    +1.56    +1.95
+2.50 V           +1.71    +2.34                    +2.61    +3.28
+5.15 V           +3.63    +4.84                    +5.46    +6.75
+1.20 V           +0.82    +1.13                    +1.28    +1.56
VDD_CPU           +0.89    +1.21                    +1.36    +1.71
-11.95           -7.22    -9.63                    -14.45   -16.30
VTT               +0.85    +1.17                    +1.32    +1.64
```



Note

Temperature ranges and values are subject to change.

The **show environment all** command displays an extended report that includes temperature readings and voltage readings. The **show environment all** command also displays a report showing which power supply slots are occupied and which are empty.

Following is sample output of the **show environment all** command with an AC power supply installed:

```
Router# show environment all
```

```
Power Supplies:
```

```
Power Supply 1 is C7201 AC Power Supply. Unit is on.
Power Supply 2 is empty.
```

```
Temperature readings:
```

```
NPE Inlet         measured at 31C/87F
NPE Outlet        measured at 34C/93F
CPU Die           measured at 48C/118F
```

```
Voltage readings:
```

```
+3.30 V           measured at +3.28 V
+1.50 V           measured at +1.50 V
+2.50 V           measured at +2.48 V
+5.15 V           measured at +5.07 V
+1.20 V           measured at +1.20 V
VDD_CPU           measured at +1.27 V
-11.95           measured at -12.04 V
VTT               measured at +1.25 V
```

```
Fans:
```

```
Fan 1 is believed to be working
Fan 1 RPM is 10070
Fan 2 is believed to be working
Fan 2 RPM is 10600
Fan 3 is believed to be working
Fan 3 RPM is 10600
Fan 4 is believed to be working
Fan 4 RPM is 10600
```

```
Envnm stats saved 0 time(s) since reload
```

Fan Failures

When the system power is on, all five fans should be operational. The system continues to operate if a fan fails. When a fan fails, the system displays the following message:

```
router: 00:03:46:%ENVM-3-BLOWER:Fan 2 may have failed
```

If the air temperature exceeds a defined threshold, the system controller displays warning messages on the console terminal, and if the temperature exceeds the shutdown threshold, the system controller shuts down the system.

If the system does shut down because the temperature exceeded the shutdown threshold, the system displays the following message on the console screen and in the environment display when the system restarts:

```
Queued messages:
%ENVM-1-SHUTDOWN: Environmental Monitor initiated shutdown
```

For complete descriptions and instructions for the environmental monitor commands, refer to the [Cisco IOS Configuration Fundamentals Configuration Guide](#) and [Cisco IOS Configuration Fundamentals Command Reference](#) publications, which are available online.

Checking Conditions Prior to System Startup

Check the following conditions before you start your router:

- The port adapter is inserted in its slot and the port adapter lever is in the locked position.
- The network interface cable is connected to the port adapter.
- A CompactFlash Disk is installed.
- SFP modules and their optical-fiber cables are installed.
- The optional USB Flash memory module or Aladdin USB eToken Pro key is installed.
- The optional Fast Ethernet Management port cable is installed.
- The console terminal is turned on.

You are now ready to start your router. Proceed to the [“Starting the System and Observing Initial Conditions”](#) section on page 3-8.

Starting the System and Observing Initial Conditions

After installing your Cisco 7201 router and connecting cables, start the router as follows:

-
- | | |
|---------------|---|
| Step 1 | At the front of the router, place the power switch on the power supply in the on (O) position. |
| Step 2 | Listen for the fans; you should immediately hear them operating. |
| Step 3 | During the boot process, observe the system LEDs. The LEDs on the port adapter go on and off in irregular sequence. They may go on, go out, and go on again for a short time. On the router, the green STATUS LED comes on and stays on. |
| Step 4 | Observe the initialization process. When the system boot is complete (a few seconds), the processor begins to initialize the port adapter and the I/O subsystem. During this initialization, the LEDs on the port adapter probably will flash on and off. |

The ENABLED LED on the port adapter goes on when initialization is completed, and the console screen displays a script and system banner similar to the following:

```
Cisco IOS Software, 7200 Software (C7200P-ADVENTERPRISEK9-M), Version
12.4(7201XD.2006-12-03), INTERIM SOFTWARE
Copyright (c) 1986-2006 by Cisco Systems, Inc.
Compiled Sun 03-Dec-06 00:44 by biff
Image text-base: 0x0000A3F8, data-base: 0x0327A000
```

Step 5 When you start up the router for the first time, the system automatically enters the setup facility, which determines which port adapter is installed and prompts you for configuration information. On the console terminal, after the system displays the system banner and hardware configuration, you will see the following System Configuration Dialog prompt:

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

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

continue with configuration dialog? [yes]:
```

You have the option of proceeding with the setup facility to configure the interfaces, or exiting from setup and using configuration commands to configure global (system-wide) and interface-specific parameters. You do not have to configure the interfaces immediately; however, you cannot enable the interfaces or connect them to any networks until you have configured them.

Many of the port adapter LEDs do not go on until you have configured the interfaces. To verify correct operation of each interface, complete the first-time startup procedures and configuration, and then refer to the configuration note for the port adapter for LED descriptions and to check the status of the interfaces.

If the system does not complete each of the steps in the startup procedure, proceed to [Chapter 5, “Troubleshooting Initial Startup Problems”](#) for troubleshooting recommendations and procedures.

Configuring a Cisco 7201 Router

You can configure your Cisco 7201 router using one of the procedures described in the following sections:

- [Performing a Basic Configuration Using AutoInstall, page 3-10](#)
- [Performing a Basic Configuration Using the Setup Facility, page 3-10](#)
- [Performing a Basic Configuration Using Global Configuration Mode, page 3-20](#)

Follow the procedure that best fits the needs of your network configuration.



Note

You need to acquire the correct network addresses from your system administrator or consult your network plan to determine correct addresses before you can complete the router configuration.

Before continuing the configuration process, check the current state of the router by entering the **show version** command. The **show version** command displays the release of Cisco IOS software that is available on the router. Sample output of the **show version** command appears in the [“Viewing Your System Configuration”](#) section on page 3-29.

Performing a Basic Configuration Using AutoInstall

The AutoInstall process is designed to configure the Cisco 7201 router automatically after connection to your WAN. For AutoInstall to work properly, a TCP/IP host on your network must be preconfigured to provide the required configuration files. The TCP/IP host may exist anywhere on the network as long as the following two conditions are maintained:

1. The host must be on the remote side of the router synchronous serial connection to the WAN.
2. User Datagram Protocol (UDP) broadcasts to and from the router and the TCP/IP host are enabled.

This functionality is coordinated by your system administrator at the site where the TCP/IP host is located. You should not use AutoInstall unless the required files are available on the TCP/IP host. Refer to the *Cisco IOS Configuration Fundamentals Configuration Guide* and *Cisco IOS Configuration Fundamentals Command Reference* publications for information about how AutoInstall works.

Complete the following steps to prepare your Cisco 7201 router for the AutoInstall process:

-
- Step 1** Attach the appropriate synchronous serial cable to synchronous serial interface 0 on the router.
- Step 2** Turn the power switch on the power supply to the on (O) position. (This action turns on AC power to the router.)

The router loads the operating system image from flash memory. If the remote end of the WAN connection is connected and properly configured, the AutoInstall process begins.

- Step 3** Once the AutoInstall process is completed, use the **copy running-config startup-config** command to write the configuration data to the router's nonvolatile random-access memory (NVRAM). Perform the following step to complete this task.
- Step 4** At the # prompt, enter the following command:

```
Hostname# copy running-config startup-config
```

**Note**

Completing Step 3 saves the configuration settings that the AutoInstall process created to NVRAM. If you fail to do this, your configuration will be lost the next time you reload the router.

Performing a Basic Configuration Using the Setup Facility

If you do not plan to use AutoInstall, do not connect the router's serial (WAN) cable to the channel service unit/data service unit (CSU/DSU). If the WAN cable is not connected, the router boots from flash memory and goes automatically into the setup facility.

**Note**

You can run the setup facility any time you are at the enable prompt (#) by entering the **setup** command.

If the serial (WAN) cable is connected to the CSU/DSU and the router does not have a configuration stored in NVRAM, the router attempts to run AutoInstall at startup. The router may take several minutes to determine that AutoInstall is not set up to a remote TCP/IP host. Once the router determines that AutoInstall is not configured, it defaults to the setup facility.

Configuring Global Parameters

When you first start the setup program, you must configure the global parameters. These parameters are used for controlling system-wide settings. Complete the following steps to enter the global parameters:

Step 1 Connect a console terminal to the console port, and then boot the router.

The system boots from flash memory. The following information appears after about 30 seconds. When you see this information, you have successfully booted your router:

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

Cisco IOS Software, 7200 Software (C7200P-ADVENTERPRISEK9-M), Version 12.4(TAZ3XD.2006-12-03), INTERIM SOFTWARE
Copyright (c) 1986-2006 by Cisco Systems, Inc.
Compiled Sun 03-Dec-06 00:44 by
Image text-base: 0x0000A3F8, data-base: 0x0327A000

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If you require further assistance please contact us by sending email to export@cisco.com.

Cisco 7201 (c7201) processor (revision A) with 917504K/65536K bytes of memory.
Processor board ID 4294967295
MPC7448 CPU at 1666Mhz, Implementation 0, Rev 2.1
1 slot midplane, Version 2.255
Last reset from power-on
1 FastEthernet interface
4 Gigabit Ethernet interfaces
4 Channelized T1/PRI ports
2045K bytes of NVRAM.
250200K bytes of ATA PCMCIA card at slot 0 (Sector size 512 bytes).
65536K bytes of Flash internal SIMM (Sector size 512K).

Press RETURN to get started!

The first two sections of the configuration script (the banner and the installed hardware) appear only at initial system startup. On subsequent uses of the setup facility, the script begins with a System Configuration Dialog as shown in the following example.

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

Step 2 When asked if you would like to enter the initial configuration dialog, enter **yes**.

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

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

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

Step 3 When asked if you want to enter the basic management setup, enter **no**.

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

Step 4 When asked if you want to enter the initial configuration dialog and see the current interface summary, enter **yes** or press **Return**:

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

In the following example, the summary shows a Cisco 7201 router at first-time startup; that is, nothing is configured.

Interface	IP-Address	OK?	Method	Status	Protocol
FastEthernet0/0	unassigned	NO	unset	up	up
GigabitEthernet0/0	unassigned	NO	unset	up	up
GigabitEthernet0/1	unassigned	NO	unset	up	up
GigabitEthernet0/2	unassigned	NO	unset	up	up
GigabitEthernet0/3	unassigned	NO	unset	up	up

Step 5 Choose which protocols to support on your interfaces. For Internet Protocol (IP)-only installations, you can accept the default values for most of the questions. A typical configuration using IP, IPX, and AppleTalk follows and continues through [Step 10](#):

```
Configuring global parameters:
```

```
Enter host name [Router]:
```

Step 6 Enter enable secret, enable, and virtual terminal passwords:

```
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: barney
```

```
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: betty
```

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

```
Enter virtual terminal password: fred
```

Step 7 When asked whether you want to configure System Management, enter **no**.

```
Configure System Management? [yes/no]: no
```

Step 8 The Simple Network Management Protocol (SNMP) is the most widely supported open standard for network management. It provides a means to access and set configuration and run-time parameters of routers and communication servers. SNMP defines a set of functions that can be used to monitor and control network elements.

Enter **yes** or press **Return** to accept SNMP management; enter **no** to refuse it:

```
Configure SNMP Network Management? [yes]: no
Community string [public]:
```

Step 9 For the following queries, do not enable LAT, IP, RIP routing, bridging, Appletalk, DECnet, CLNS, or IPX:

```
Configure LAT? [no]:
Configure IP? [yes]:
Configure RIP routing? [no]:
Configure bridging? [no]:
Configure Appletalk? [no]:
Configure DECnet? [no]:
Configure CLNS? [no]:
Configure IPX? [no]:
```

Step 10 In most cases you use IP routing. If you are using IP routing, you must also select an interior routing protocol. You can specify only one of two interior routing protocols to operate on your system using the setup facility: Interior Gateway Routing Protocol (IGRP) or Routing Information Protocol (RIP).

To configure IP routing, enter **yes** (the default) or press **Return**, and then select an interior routing protocol:

```
Do you want to configure FastEthernet0/0 interface? [yes]:
Use the 100 Base-TX (RJ-45) connector? [yes]:
Operate in full-duplex mode? [no]: yes
Configure IP on this interface? [yes]:
IP address for this interface: 10.2.2.1
Subnet mask for this interface [255.0.0.0] : 255.255.255.0
Class A network is 10.0.0.0, 24 subnet bits; mask is /24
```

```
Do you want to configure GigabitEthernet0/0 interface? [yes]:
Configure IP on this interface? [yes]:
IP address for this interface: 25.2.4.10
Subnet mask for this interface [255.0.0.0] : 255.255.0.0
Class A network is 25.0.0.0, 16 subnet bits; mask is /16
```

```
Do you want to configure GigabitEthernet0/1 interface? [yes]:
Configure IP on this interface? [yes]:
IP address for this interface: 70.1.1.2
Subnet mask for this interface [255.0.0.0] : 255.255.255.0
Class A network is 70.0.0.0, 24 subnet bits; mask is /24
```

```
Do you want to configure GigabitEthernet0/2 interface? [yes]: no
```

Do you want to configure GigabitEthernet0/3 interface? [yes]: no

Would you like to go through AutoSecure configuration? [yes]: no
AutoSecure dialog can be started later using "auto secure" CLI

The following sample display includes a listing of configuration parameters selected in [Step 5](#) through [Step 10](#). Only IP is the selected protocol for this example.

Configuring global parameters:

Enter host name [Router]: **router**

The enable secret is a one-way cryptographic secret used instead of the enable password when it exists.

Enter enable secret: **barney**

The enable password is used when there is no enable secret and when using older software and some boot images.

Enter enable password: **betty**

```

line vty 0 4
password cisco
no snmp-server
!
ip routing
no bridge 1
no appletalk routing
no decnet routing
no clns routing
no ipx routing
!
interface FastEthernet0/0
media-type 100BaseX
full-duplex
ip address 10.2.2.1 255.255.255.0
no mop enabled
!
interface GigabitEthernet0/0
ip address 25.2.4.10 255.255.0.0
no mop enabled
!
interface GigabitEthernet0/1
ip address 70.1.1.2 255.255.255.0
no mop enabled
!
interface GigabitEthernet0/2
shutdown
no ip address
!
interface GigabitEthernet0/3
shutdown
no ip address
!
end

```

- Step 11** If you choose not to save your configuration, go directly into the router command structure by choosing 0, or choose one from the menu to go back to the start of the setup menu. See the following output for options 0, 1, and 2. Choose option 2 to save your settings to NVRAM. (See the “[Checking the Running Configuration Settings](#)” section on page 3-21, and then the “[Saving the Running Configuration to NVRAM](#)” section on page 3-21.) If you do not save the configuration settings that you created in the router using configuration mode and the setup facility, your configuration will be lost the next time you reload the router.

```
[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
media-type 100BaseX
Building configuration...
Use the enabled mode 'configure' command to modify this configuration.

Press RETURN to get started!
```

Configuring the Native Gigabit Ethernet Interfaces

The Cisco 7201 router reports the Gigabit Ethernet SFP ports as GigabitEthernet 0/0, GigabitEthernet 0/1, GigabitEthernet 0/2, and GigabitEthernet 0/3. The Cisco 7201 router reports the RJ-45 ports as GigabitEthernet 0/0 and Gigabit Ethernet 0/1. Before configuring either the GigabitEthernet 0/0 or Gigabit Ethernet 0/1 interfaces, you must first use the **media-type** interface command to select the media type, **sfp** or **rj45**.

Changing the Media Type

To be able to use a particular media type, use Cisco IOS to select the media type. This is done by using the **media-type** interface command:

```
media-type { sfp | rj45 }
```

Example:

```
interface GigabitEthernet 0/0
media-type rj45
end
```

Configuring the Interface Transmission and Speed Modes

After changing the media type, configure the speed and duplex transmission modes to appropriately match the new interface characteristics. Changing the speed and duplex of a Cisco 7201 router Gigabit Ethernet interface is done using the **speed** and **duplex** interface commands.

Table 3-3 Supported Speed and Duplex Settings

Media Type	Speed	Duplex
SFP	1000, auto	full, half, auto ¹
RJ-45	10, 100, 1000, auto	full, half, auto

1. GE 0/3 only supports full duplex mode.

When using the **sfp** media type, there is also the additional **negotiation auto** command that is used to enable the IEEE 802.1z Gigabit Ethernet (1000 Mbps) autonegotiation protocol.

To turn this **negotiation auto** feature off (it is on by default), issue the interface command **no negotiation auto**. This is useful for connecting to other Gigabit Ethernet equipment that does not support IEEE 802.1z autonegotiation. We recommend that a fixed **speed** and **duplex** setting should be used.

When the interface is configured for **negotiation auto**, the interface advertises all modes of which it is capable. The link only comes up if the negotiation process succeeds in finding a common mode between the Cisco 7201 SFP media type and its link partner.

The **sfp** media type always defaults to 1000-Mbps, full-duplex operation. The only available speed in this mode is 1000 Mbps; there is no difference whether **1000** or **auto** is selected. GE 0/0, GE 0/1 and GE 0/2 support half and full duplex mode; GE 0/3 only supports full duplex mode.


Note

Copper SFP modules are considered to be SFP media types, not RJ-45 media types. GE 0/2 and GE 0/3 are optical ports, whether or not a copper SFP module with an RJ-45 connector, or a standard SFP module is installed.



Note The **negotiation auto** feature is not supported when using the **rj-45** media type and will be ignored if implementation is attempted. (Autonegotiation is always on in RJ-45 mode.)

When an RJ-45 interface is enabled, it advertises all modes of which it is capable. The link only comes up if the negotiation process succeeds in finding a common mode between the Cisco 7201 RJ-45 media type and its link partner.

If you change from the **sfp** to the **rj-45** media type, you must set **speed** and **duplex** after you have executed the **media type** command to ensure the interface operates in the correct mode.

For information on flow control, see the [“Gigabit Ethernet Flow Control Information” section on page A-9](#).

Debugging

Cisco IOS provides two commands to provide information on your interfaces: **show interface GigabitEthernet 0/X** (where X is 0, 1, 2, or 3) and **show controllers GigabitEthernet 0/X** (where X is 0, 1, 2, or 3).

The output of the **show interface** command is useful for determining the current operating mode of the interface (speed/duplex/media type) and the current interface statistics.

The output of the **show controllers** command displays more information specific to the Cisco 7201 router Gigabit Ethernet interface. For example, it shows the detected link status, speed, and duplex, and also determines the current status of autonegotiation and the link partners' abilities (if it is an autonegotiation-capable interface).

The **show controllers** command also displays the current operating state of the driver and the Ethernet controller hardware. The **show controllers** command is a very powerful debugging aid, especially for Cisco engineers should you need help in debugging a problem. If you have any problems with your Gigabit Ethernet interfaces, you will need to provide this information to Cisco for analysis.

Resetting the Interface

Should you have a problem with your interface and you want to try and reset it, use the command:
clear interface GigabitEthernet 0/X (where X is 0, 1, 2, or 3)

Clearing Counters

Interface counters may be cleared (reset) by using the command:
clear counters GigabitEthernet 0/X (where X is 0, 1, 2, or 3)



Note

Using this command will not reset the interface.

Configuring Port Adapter Interfaces

Following are the steps for configuring interfaces to allow communication over a LAN or WAN. To configure the interface parameters, you need your interface network addresses and subnet mask information. Consult with your network administrator for this information.



Note

Only one port adapter can be installed in the Cisco 7201 router. Following are three examples of three different interfaces that might be used.

Configuring ATM Interfaces

In the following example, an ATM interface in slot 1 is configured for an ATM LAN using IP. Follow these steps to configure an ATM interface:

-
- Step 1** Using your own addresses and mask at the setup prompts, respond to the prompts as follows:
- ```
Configuring interface parameters:

Configuring interface ATM1/0:
Is this interface in use? [yes]:
Configure IP on this interface? [yes]:
IP address for this interface: 1.1.1.10
Number of bits in subnet field [0]:
Class C network is 1.1.1.0, 0 subnet bits; mask is /24
```
- Step 2** Determine if you are going to enable IPX on this interface; if you are, enter the unique IPX network number:
- ```
Configure IPX on this interface? [no]: yes
IPX network number [2]:
```
- Step 3** If you are using AppleTalk on the interface, enter **yes**. Enter **yes** to configure for extended AppleTalk networks, and then enter the cable range number. Enter the zone name and any other additional zones that are associated with your local zone:
- ```
Configure AppleTalk on this interface? [no]: yes
Extended AppleTalk network? [no]: yes
AppleTalk starting cable range [0]:
```

- Step 4** Save your settings to NVRAM. (See the “[Checking the Running Configuration Settings](#)” section on page 3-21, and then the “[Saving the Running Configuration to NVRAM](#)” section on page 3-21.) If you do not save the configuration settings that you created in the router using configuration mode and the setup facility, your configuration will be lost the next time you reload the router.



**Note** If additional ATM interfaces are available in your system, you are prompted for their configurations as well.

## Configuring Fast Ethernet Interfaces

In the following example, a Fast Ethernet interface in slot 1 is configured for a Fast Ethernet LAN using IP. Follow these steps to configure Fast Ethernet interfaces:

- Step 1** Using your own addresses and mask at the setup prompts, respond to the prompts as follows:

```
Configuring interface parameters:

Configuring interface FastEthernet1/0:
Is this interface in use? [yes]:
Use the 100 Base-TX (RJ-45) connector? [yes]:
Operate in full-duplex mode? [no]:
Configure IP on this interface? [yes]:
IP address for this interface: 1.1.1.20
Number of bits in subnet field [0]:
Class C network is 1.1.1.0, 0 subnet bits; mask is /24
```

- Step 2** Determine if you are going to enable IPX on this interface; if you are, enter the unique IPX network number:

```
Configure IPX on this interface? [no]: yes
IPX network number [2]:
```

- Step 3** If you are using AppleTalk on the interface, enter **yes**. Enter **yes** to configure for extended AppleTalk networks, and then enter the cable range number. Enter the zone name and any other additional zones that are associated with your local zone:

```
Configure AppleTalk on this interface? [no]: yes
Extended AppleTalk network? [no]: yes
AppleTalk starting cable range [0]:
```

- Step 4** Save your settings to NVRAM. (See the “[Checking the Running Configuration Settings](#)” section on page 3-21, and then the “[Saving the Running Configuration to NVRAM](#)” section on page 3-21.) If you do not save the configuration settings that you created in the router using configuration mode and the setup facility, your configuration will be lost the next time you reload the router.



**Note** If additional Fast Ethernet interfaces are available in your system, you are prompted for their configurations as well.

## Configuring Synchronous Serial Interfaces

Synchronous serial interfaces are configured to allow connection to WANs through a CSU/DSU. In the following example, a synchronous serial interface in slot 1 is configured for a WAN connection using IP. Follow these steps to configure synchronous serial interfaces:

- 
- Step 1** Using your own addresses and mask at the setup prompts, respond to the prompts as follows:
- ```
Configuring interface parameters:

Configuring interface serial 1/0:
Is this interface in use? [yes]:
Configure IP on this interface? [yes]:
IP address for this interface: 1.1.1.30
Number of bits in subnet field [0]:
Class A network is 1.1.1.0, 0 subnet bits; mask is /24
```
- Step 2** Determine if you are going to enable IPX on this interface; if you are, enter the unique IPX network number:
- ```
Configure IPX on this interface? [no]: yes
IPX network number [2]:
```
- Step 3** If you are using AppleTalk on the interface, enter **yes**. Enter **yes** to configure for extended AppleTalk networks, and then enter the cable range number. Enter the zone name and any other additional zones that are associated with your local zone:
- ```
Configure AppleTalk on this interface? [no]: yes
Extended AppleTalk network? [no]: yes
AppleTalk starting cable range [0]:
```
- Step 4** Save your settings to NVRAM. (See the “[Checking the Running Configuration Settings](#)” section on page 3-21, and then the “[Saving the Running Configuration to NVRAM](#)” section on page 3-21.) If you do not save the configuration settings that you created in the router using configuration mode and the setup facility, your configuration will be lost the next time you reload the router.
-



Note If additional synchronous serial interfaces are available in your system, you are prompted for their configurations as well.

The following example display lists the ATM configuration parameters:

```
Configuring interface ATM1/0:
Is this interface in use? [yes]:
Configure IP on this interface? [yes]:
IP address for this interface: 1.1.1.10
Number of bits in subnet field [0]: 0
Class C network is 1.1.1.0, 0 subnet bits; mask is /24
Configure IPX on this interface? [yes]:
IPX network number [2]:
Configure AppleTalk on this interface? [no]: yes
Extended AppleTalk network? [no]: yes
AppleTalk starting cable range [0]:
```

The following configuration command script was created:

```
hostname Router
```

```

enable secret 5 $1$u8z3$PMYY8em./8sszhzk78p/Y0
enable password betty
line vty 0 4
password fred
snmp-server community public
!
ip routing
no vines routing
ipx routing
appletalk routing
no apollo routing
no decnet routing
no xns routing
no clns routing
no bridge 1
! Turn off IPX to prevent network conflicts.

interface ATM1/0
ip address 1.1.1.10 255.0.0.1
appletalk cable-range 0-0 0.0
appletalk discovery
!
router igrp 15
network 1.0.0.0
!
end

```

```

Use this configuration? [yes/no]: yes
Building configuration...
Use the enabled mode 'configure' command to modify this configuration.

```

Press RETURN to get started!

Your router is now minimally configured and ready to use. You can use the **setup** command if you want to modify the parameters after the initial configuration. To perform more complex configurations, use the **configure** command.

For information on additional interface configuration and specific system configurations, refer to the modular configuration and modular command reference publications in the Cisco IOS software configuration documentation set that corresponds to the software release installed on your Cisco hardware.

Performing a Basic Configuration Using Global Configuration Mode

You can configure a Cisco 7201 router manually if you prefer not to use the setup facility or AutoInstall. Complete the following steps to configure the router manually:

-
- Step 1** Connect a console terminal to the console port.
 - Step 2** When asked if you want to enter the initial dialog, answer **no** to go into the normal operating mode of the router:

```

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

```

- Step 3** After a few seconds the user EXEC prompt (`Router>`) is displayed. Type **enable** to enter enable mode (configuration changes can only be made in enable mode):

```
Router> enable
```

The prompt changes to the privileged EXEC prompt:

```
Router#
```

- Step 4** Enter the **configure terminal** command at the enable prompt to enter configuration mode from the terminal:

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

At the `Router(config)#` prompt, enter the **interface** *type slot/port* command to enter the interface configuration mode:

```
Router(config)# interface serial 0/1
Router(config-int)#
```

In either configuration mode, you can now enter any changes to the configuration. Press **Ctrl-Z** (hold down the **Control** key while you press **Z**) or enter **end** to exit configuration mode and return to the EXEC command interpreter.

- Step 5** Save your settings to NVRAM. (See the [“Checking the Running Configuration Settings”](#) section on page 3-21, and then the [“Saving the Running Configuration to NVRAM”](#) section on page 3-21.) If you do not save the configuration settings that you created in the router using configuration mode and the setup facility, your configuration will be lost the next time you reload the router.

Your router is now minimally configured and will boot with the configuration you have entered. To see a list of the configuration commands available to you, enter **?** at the prompt while in configuration mode.

Checking the Running Configuration Settings

To check the value of the settings you have entered, enter the **show running-config** command at the `Router#` prompt:

```
Router# show running-config
```

To review changes you make to the configuration, use the EXEC mode **show startup-config** command to display the information stored in NVRAM.

Saving the Running Configuration to NVRAM

To review changes you make to the configuration, use the EXEC mode **show startup-config** command to display the information stored in NVRAM.

To store the configuration or changes to your startup configuration in NVRAM, enter the **copy running-config startup-config** command at the `Router#` prompt:

```
Router# copy running-config startup-config
```

Using this command saves the configuration settings that you created in the router using configuration mode and the setup facility. If you fail to do this, your configuration will be lost the next time you reload the router.

Performing Other Configuration Tasks

To make advanced configuration changes after you establish the basic startup configuration for your router, refer to the modular configuration and modular command reference publications in the Cisco IOS software configuration documentation set that corresponds to the software release installed on your Cisco hardware. These publications contain additional information on using the **configure** command.

The configuration publications also provide information about the following tasks:

- Understanding and working with the user interface on your router
- Booting and rebooting the router
- Setting the configuration register
- Loading configuration files or system images using remote copy protocol (rcp) or Trivial File Transfer Protocol (TFTP)
- Reloading the operating system

Upgrading ROMmon on the Cisco 7201

Upgrading the rewriteable ROM monitor (ROMmon) allows you to download a new ROMmon image instead of having to replace hardware (Cisco 7201) to get a new image.

There are two ROMmon images: the ReadOnly image that ships with your system (and is always available if you have Cisco 7201 hardware EPROM Version 1.4 and software C7201:Rommon version is 12.3(4r)T2 or later), and the upgradable ROMmon image that is downloaded from a specified TFTP file location. You can choose to configure the system to point to the upgradable ROMmon image. At bootup, the system starts with the ReadOnly image and then, if configured, jumps to the upgradable ROMmon image. If the upgradable ROMmon image fails to boot, the router marks this ROMmon image as invalid and reverts to the ReadOnly ROMmon image.

The first time a new ROMmon image is executed, you must allow the system to boot ROMmon before doing any additional resets or power cycling. If the ROMmon-executing process is interrupted, the system interprets this as a bootup failure of the new ROMmon image. The router reverts to the ReadOnly image.



Note

The ROMmon upgradable image is marked as invalid if it fails to boot. Do not reset the router when it is doing an initial bootup.

Using the show rom-monitor Command and showmon Command

Use the **show rom-monitor** command if you are in Cisco IOS, or the **showmon** command if you are in ROMmon, to determine which ROMmon images are available. See the following examples for information shown in the output of the **show rom-monitor** or **showmon** commands:

- If you are in Cisco IOS, use the **show rom-monitor** command:

```
Router> show rom-monitor

ReadOnly ROMMON version:

System Bootstrap, Version 12.2(20031011:151758)
Copyright (c) 1994-2003 by cisco Systems, Inc.

Upgrade ROMMON version:

System Bootstrap, Version 12.2(20031011:151758)
Copyright (c) 1994-2003 by cisco Systems, Inc.

Currently running ROMMON from Upgrade region
ROMMON from Upgrade region is selected for next boot
```

- If you are in ROMmon, use the **showmon** command:

```
rommon 1 > rommon CLI showmon

ReadOnly ROMMON version is:
System Bootstrap, Version 12.4(4r)XD5, RELEASE SOFTWARE (fc1) Technical Support:
http://www.cisco.com/techsupport
Copyright (c) 2006 by cisco Systems, Inc.

No upgrade ROMMON version present
ReadOnly ROMMON currently running
ReadOnly ROMMON is selected for next boot rommon 3 >
```

Using the upgrade rom-monitor Command

Use the **upgrade rom-monitor file file_id** command to program the ROMmon.

See the following example of the **upgrade rom-monitor** command:

```
Router# upgrade rom-monitor file tftp://00.0.0.0/biff/C7200_c7200p-kboot-mz
Loading pgettner/C7200_NPEG2_RMFUR.srec from 00.0.0.0 (via GigabitEthernet0/1):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 392348 bytes]

This command will reload the router. Continue? [yes/no]:yes
ROMMON image upgrade in progress.
Erasing boot flash eeeeeeeeeeeeeeeeeee
Programming boot flash pppppp
Now Reloading via hard watchdog timeout

Unexpected exception, CP
System Bootstrap, Version 12.2(20031011:151758) [biff]
Copyright (c) 1994-2003 by cisco Systems, Inc.

Running new upgrade for first time
```

```
System Bootstrap, Version 12.2(20031011:151758) [biff]
Copyright (c) 1994-2003 by cisco Systems, Inc.
```

```
ROM:Rebooted by watchdog hard reset
C7201 platform with 1048576 Kbytes of main memory
```

```
Upgrade ROMMON initialized
rommon 1 >
```

**Note**

Loading a known good Cisco IOS image after a ROMmon upgrade is advisable.

Changing Preferences to Change the ROMmon Image

To change the ROMmon image (readonly or upgrade), use one of the following commands to make the change depending on whether you are in Cisco IOS or in ROMmon:

- In Cisco IOS, use the **upgrade rom-monitor preference** command to change the ROMmon image:

```
upgrade rom-monitor preference [readonly | upgrade]
```

Example:

```
Router: upgrade rom-monitor preference readonly
You are about to mark ReadOnly region of ROMMON for the highest boot preference.
Proceed? [confirm]
Done! Router must be reloaded for this to take effect.
```

In ROMmon, use the ROMmon CLI **rommon-pref [readonly | upgrade]** command to change the ROMmon image:

Example:

```
rommon 2 > rommon-pref readonly
```

Troubleshooting the Upgrade

This section contains sample error messages that appear if an upgrade fails, or if an upgrade is successful but the upgrade image is corrupted.

ROMmon Upgrade Error Messages

One if these error message appears when the upgrade has failed or if the upgrade image is corrupted:

- ROMmon image is not compatible with ReadOnly image:

```
Router: upgrade rom-monitor file tftp://00.0.00.0/biff/c7200p-kboot-mz
Loading biff/C7200_NPEG2_RMFUR.srec from 00.0.00.0 (via GigabitEthernet0/1):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 392348 bytes]
```

```
ROMMON upgrade aborted; new ROMMON image version is not compatible with ReadOnly
```


- ROMmon upgrade image is too big:

```
Router: upgrade rom-monitor file tftp://00.0.00.0/biff/c7200p-kboot-mz
Loading biff/C7200_NPEG2_RMFUR.srec from 00.0.00.0 (via GigabitEthernet0/1):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 392348 bytes]

ROMMON upgrade aborted; new ROMMON is too big
```

- Hardware does not support ROMmon upgrade:

```
Router: upgrade rom-monitor file tftp://00.0.00.0/biff/c7200p-kboot-mz
Loading biff/C7200_NPEG2_RMFUR.srec from 00.0.00.0 (via GigabitEthernet0/1):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 392348 bytes]

ROMMON upgrade aborted; Current ROMMON does not support upgrade capability
```

- Upgrade command with incorrect file type:

```
Router# upgrade rom-monitor file tftp://00.0.00.0/biff/c7200p-kboot-mz
from 00.0.00.0 (via GigabitEthernet0/1):!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 524288 bytes]

%Error:not srec file
Router#
```

- A boot of a corrupted upgrade image:

```
System Bootstrap, Version 12.2(20031011:151758) [pgettner-npeg1-fur 135], DEVELOPMENT
SOFTWARE
Copyright (c) 1994-2003 by cisco Systems, Inc.

Upgrade ROMMON corrupted.
Falling to ReadOnly ROMMON

ROM:Rebooted by watchdog hard reset
C7201 platform with 1048576 Kbytes of main memory

ReadOnly ROMMON initialized
rommon 1 >
```

Upgrading FPGA

A field-programmable gate array (FPGA) device exists on the Cisco 7201. FPGA devices are a type of field-programmable device (FPD) that support separate software upgrades. Whenever a Cisco image is released that supports the FPD feature, a companion FPD image package is also released for that Cisco IOS software release. The FPD image package is available from Cisco.com and is accessible from the Cisco Software Center page where you go to download your Cisco IOS software image.

For FPGA upgrade information and procedures, see the *Field-Programmable Device Upgrades* document at

http://www.cisco.com/en/US/docs/routers/7200/configuration/feature_guides/fpd.html

Replacing or Recovering a Lost Password

This section describes how to recover a lost enable or console login password, and how to replace a lost enable secret password on your Cisco 7201 router.


Note

It is possible to recover the enable or console login password. The enable secret password is encrypted, however, and must be replaced with a new enable secret password.

Overview of the Password Recovery Procedure

Following is an overview of the steps in the password recovery procedure:

- Step 1** If you can log in to the router, enter the **show version** command to determine the existing configuration register value.
- Step 2** Press the **Break** key to get to the bootstrap program prompt (ROM monitor). You might need to reload the system image by power cycling the router.


Note

To recover a lost password if the Break function is disabled on the router, you must have physical access to the router.

- Step 3** Change the configuration register so the following functions are enabled:
- Break
 - Ignore startup configuration
 - Boot from flash memory


Note

The key to recovering a lost password is to set the configuration register bit 6 (0x0040) so that the startup configuration (usually in NVRAM) is ignored. This allows you to log in without using a password and to display the startup configuration passwords.


Note

When powering off the router, wait 30 seconds before powering it on again.

- Step 4** Power cycle the router by turning power off and then back on.
- Step 5** Log in to the router and enter the privileged EXEC mode.
- Step 6** Enter the **show startup-config** command to display the passwords.
- Step 7** Recover or replace the displayed passwords.
- Step 8** Change the configuration register back to its original setting.

Details of the Password Recovery Procedure

Complete the following steps to recover or replace a lost enable, enable secret, or console login password:

-
- Step 1** Attach an ASCII terminal to the console port on your router.
 - Step 2** Configure the terminal to operate at 9600 baud, 8 data bits, no parity, and 1 stop bit (9600 8N1).
 - Step 3** If you can log in to the router as a nonprivileged user, enter the **show version** command to display the existing configuration register value. Note the value for use later and proceed to Step 6. If you cannot log in to the router at all, go to the next step.
 - Step 4** Press the **Break** key or send a Break from the console terminal. If Break is enabled, the router enters the ROM monitor, indicated by the ROM monitor prompt (`rommon1>`). Proceed to Step 6. If Break is disabled, power cycle the router (turn the router off or unplug the power cord, and then restore power after waiting 30 seconds). Then proceed to Step 5.
 - Step 5** Within 60 seconds of restoring the power to the router, press the **Break** key or send a Break. This action causes the router to enter the ROM monitor and display the ROM monitor prompt (`rommon1>`).
 - Step 6** Set the configuration register using the configuration register utility; enter the **confreg** command at the ROM monitor prompt as follows:

```
rommon1> confreg
```

- Step 7** Answer **yes** to the enable “ignore system config info?” question, and note the current configuration register settings.
- Step 8** Initialize the router by entering the **reset** command as follows:

```
rommon2> reset
```

The router initializes, the configuration register is set to 0x142, and the router boots the system image from flash memory and enters the System Configuration Dialog prompt as follows:

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

- Step 9** Enter **no** in response to the System Configuration Dialog prompts until the following message is displayed:

```
Press RETURN to get started!
```

- Step 10** Press **Return**. The user EXEC prompt is displayed as follows:

```
Router>
```

- Step 11** Enter the **enable** command to enter privileged EXEC mode. Then enter the **show startup-config** command to display the passwords in the configuration file as follows:

```
Router# show startup-config
```

- Step 12** Scan the configuration file display looking for the passwords (the enable passwords are usually near the beginning of the file, and the console login or user EXEC password is near the end). The passwords displayed look something like this:

```
enable secret 5 $1$ORPP$s9syZt4uKn3SnpuLDrhuei
enable password 23skiddoo
.
line con 0
 password onramp
```

The enable secret password is encrypted and cannot be recovered; it must be replaced. The enable and console login passwords may be encrypted or clear text. Proceed to the next step to replace an enable secret, console login, or enable password. If there is no enable secret password, note the enable and console login passwords, if they are not encrypted, and proceed to [Step 17](#).

**Caution**

Do not execute the next step unless you have determined you must change or replace the enable, enable secret, or console login passwords. Failure to follow the steps as shown might cause you to erase your router configuration.

- Step 13** Enter the **configure memory** command to load the startup configuration file into running memory. This action allows you to modify or replace passwords in the configuration.

```
Router# configure memory
```

- Step 14** Enter the privileged EXEC **configure terminal** command to enter configuration mode:

```
Hostname# configure terminal
```

- Step 15** Change all three passwords using the following commands:

```
Hostname(config)# enable secret newpassword1
Hostname(config)# enable password newpassword2
Hostname(config)# line con 0
Hostname(config-line)# password newpassword3
```

Change only the passwords necessary for your configuration. You can remove individual passwords by using the **no** form of the above commands. For example, entering the **no enable secret** command removes the enable secret password.

- Step 16** You must configure all interfaces to be *not* administratively shut down as follows:

```
Hostname(config)# interface gigabitethernet 0/0
Hostname(config-int)# no shutdown
```

Enter the equivalent commands for all interfaces that were originally configured. If you omit this step, all interfaces are administratively shut down and unavailable when the router is restarted.

- Step 17** Use the **config-register** command to set the configuration register to the original value noted in Step 3 or Step 8, or to the factory default value 0x2102 as follows:

```
Hostname(config)# config-register 0x2102
```

- Step 18** Press **Ctrl-Z** (hold down the **Control** key while you press **Z**) or enter **end** to exit configuration mode and return to the EXEC command interpreter.

**Caution**

Do not execute the next step unless you have changed or replaced a password. If you skipped [Step 13](#) through [Step 16](#), skip to [Step 20](#). Failure to observe this caution causes you to erase your router configuration file.

- Step 19** Enter the **copy running-config startup-config** command to save the new configuration to NVRAM.

- Step 20** Enter the **reload** command to reboot the router.

- Step 21** Log in to the router with the new or recovered passwords.

This completes the steps for recovering or replacing a lost enable, enable secret, or console login password.

Viewing Your System Configuration

You can use the **show version**, **show hardware**, and the **show diag** commands to view information specific to the hardware configuration of your Cisco 7201 router.

Use the **show version** (or **show hardware**) command to display the system hardware, processor and the number of interfaces installed, the software version, the names and sources of configuration files, and the boot images.

The following is Cisco 7201 sample output of the **show version** command:

```
Router# show version
Cisco IOS Software, 7200 Software (C7200P-ADVENTERPRISEK9-M), Version
12.4(biffDEV.061001), INTERIM SOFTWARE Copyright (c) 1986-2006 by Cisco Systems, Inc.
Compiled Sun 01-Oct-06 23:42 by biff
ROM: System Bootstrap, Version 12.4(4r)XD5, RELEASE SOFTWARE (fc1)
BOOTLDR: Cisco IOS Software, 7200 Software (C7200P-KBOOT-M), Version 12.4(TAZ3DEV.060927),
INTERIM SOFTWARE
c7201alpha1 uptime is 5 days, 18 hours, 32 minutes System returned to ROM by power-on
System image file is "disk0:c7200p-adventerprisek9-mz.2006-10-01.biffdev"
This product contains cryptographic features and is subject to United States and local
country laws governing import, export, transfer and use. Delivery of Cisco cryptographic
products does not imply third-party authority to import, export, distribute or use
encryption.
Importers, exporters, distributors and users are responsible for compliance with U.S. and
local country laws. By using this product you agree to comply with applicable laws and
regulations. If you are unable to comply with U.S. and local laws, return this product
immediately.
A summary of U.S. laws governing Cisco cryptographic products may be found at:
http://www.cisco.com/wwl/export/crypto/tool/stqrg.html
If you require further assistance please contact us by sending email to export@cisco.com.
Cisco 7201 (c7201) processor (revision A) with 917504K/65536K bytes of memory.
Processor board ID 222222222222
MPC7448 CPU at 1666Mhz, Implementation 0, Rev 2.2
1 slot midplane, Version 2.255
Last reset from power-on
1 FastEthernet interface
4 Gigabit Ethernet interfaces
2045K bytes of NVRAM.
62443K bytes of USB Flash usbflash0 (Read/Write)
250880K bytes of ATA PCMCIA card at slot 0 (Sector size 512 bytes).
65536K bytes of Flash internal SIMM (Sector size 512K).
Configuration register is 0x2
```

Use the **show diag** command to determine what type of Gigabit Ethernet port is active or what type of port adapter is installed in your Cisco 7201 router. You can also use the **show diag slot** command to display information about the port adapter slot.

The following example shows the **show diag** command output from a Cisco 7201 router. Note that slot 0 is reserved for the native Gigabit Ethernet ports:



Note

Both native SFP and RJ-45 Gigabit Ethernet ports are reported as Gigabit Ethernet ports. To select either optical Gigabit Ethernet or copper Gigabit Ethernet ports, use the **media-type** command. See the “[Configuring the Native Gigabit Ethernet Interfaces](#)” section on page 3-15.

```
Router# show diag
Slot 1:
Dual OC3 POS Port adapter, 2 ports
Port adapter is analyzed
Port adapter insertion time 00:02:19 ago
```

```

EEPROM contents at hardware discovery:
Hardware Revision : 1.0
PCB Serial Number : JAE07520DYL
Part Number : 73-8220-02
Board Revision : A0
RMA Test History : 00
RMA Number : 0-0-0-0
RMA History : 00
Deviation Number : 0
Product (FRU) Number : PA-POS-20C3
Top Assy. Part Number : 800-21857-02
EEPROM format version 4
EEPROM contents (hex):
0x00: 04 FF 40 03 E3 41 01 00 C1 8B 4A 41 45 30 37 35
0x10: 32 30 44 59 4C 82 49 20 1C 02 42 41 30 03 00 81
0x20: 00 00 00 00 04 00 88 00 00 00 00 CB 94 50 41 2D
0x30: 50 4F 53 2D 32 4F 43 33 20 20 20 20 20 20 20 20
0x40: 20 C0 46 03 20 00 55 61 02 FF FF FF FF FF FF FF
0x50: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0x60: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0x70: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF

```

For specific information on the **show version**, **show hardware**, **show diag**, and other software commands, refer to the modular configuration and modular command reference publications in the Cisco IOS software configuration documentation set that corresponds to the software release installed on your Cisco hardware.

Performing Complex Configurations

After you have installed your Cisco 7201 router hardware, checked all external connections, turned on the system power, allowed the system to boot up, and minimally configured the system, you might need to perform more complex configurations, which are beyond the scope of this publication.

For specific information on system and interface configuration, refer to the modular configuration and modular command reference publications in the Cisco IOS software configuration documentation set that corresponds to the software release installed on your Cisco hardware.



CHAPTER 4

Replacing Cisco 7201 Field-Replaceable Units

This chapter provides information on removing and replacing field-replaceable units. The following information is in this chapter:

- [Removing and Installing an SFP Module, page 4-2](#)
- [Removing and Installing the CompactFlash Disk, page 4-3](#)
- [Removing and Installing a USB Flash Memory Module or USB eToken Pro Key, page 4-4](#)
- [Removing and Installing a Port Adapter or Service Adapter, page 4-5](#)
- [Removing and Installing an AC Power Supply, page 4-7](#)
- [Removing and Installing a DC Power Supply, page 4-10](#)
- [Removing and Installing a DIMM, page 4-15](#)



Warning

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



Warning

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



Warning

During these procedures, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.
Statement 94



Warning

Before opening the chassis, disconnect the telephone-network cables to avoid contact with telephone-network voltages. Statement 2



Warning

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

Removing and Installing an SFP Module

For SFP module specifications and product numbers, see [Appendix A, “Specifications.”](#)



Warning

Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments. Statement 1051



Warning

Class 1 laser product. Statement 1008



Warning

Class 1 LED product. Statement 1027

For general information about SFP modules, see the “[SFP Module Information](#)” section on page 1-5.

Removing an SFP Module

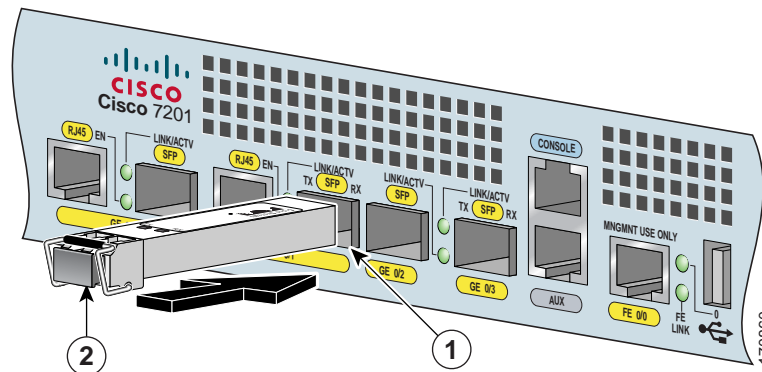
Use the following procedure to remove an SFP module:

- Step 1 Make sure there is no traffic flowing through the native Gigabit Ethernet port.
- Step 2 Remove the optical fiber cable, taking care not to touch the connector.
- Step 3 Pull gently to detach the SFP module from the chassis.
- Step 4 Insert a plug into the SFP module.



Installing an SFP Module

Use the following procedure to install an SFP module:

Figure 4-1 Inserting an SFP Module into the Cisco 7201 Gigabit Ethernet Port 0/1



1	Gigabit Ethernet port 0/1—SFP port	2	SFP module
---	------------------------------------	---	------------

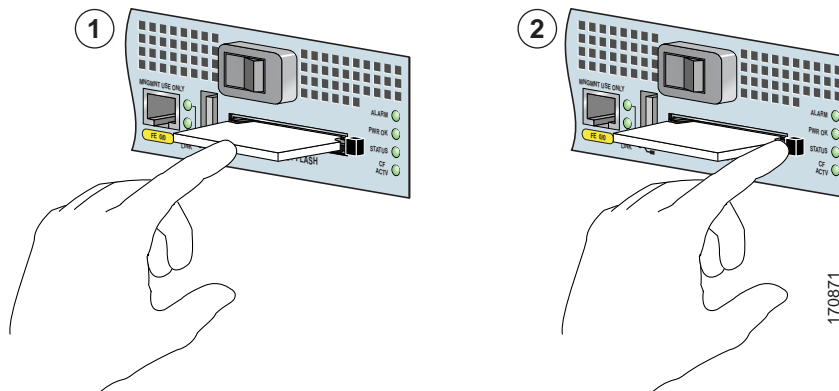
- Step 1** Attach an ESD-preventive wrist strap between you and an unpainted chassis surface.
- Step 2** Locate the label on the SFP module and turn the SFP module so the label is on top and the alignment groove is on the bottom.
-  **Note** The SFP module is keyed so that it cannot be inserted incorrectly.
- Step 3** Insert the SFP module into Gigabit Ethernet port 0/0, 0/1, 0/2, or 0/3. The SFP module snaps into place when you have completely and properly inserted it.
- Step 4** Repeat Step 2 and Step 3 if you are inserting a second, third, or fourth SFP module.
-  **Note** Do not remove the plug from the SFP optical bores until you are ready to install the network interface optical fiber cable. Save the plug for future use.
- Step 5** Clean the optical fiber cable before attaching it to the SFP module. For information, see the [Inspection and Cleaning Procedures for Fiber-Optic Connections](#) document and the [Compressed Air Cleaning Issues for Fiber-Optic Connections](#) document.

This completes the SFP module installation procedure.

Removing and Installing the CompactFlash Disk

For CompactFlash Disk specifications and product numbers, see [Appendix A, “Specifications.”](#) For use of the CompactFlash Disk, also see [Appendix B, “Using the CompactFlash Disk.”](#)

Figure 4-2 Installing and Removing a CompactFlash Disk



1	Inserting the CompactFlash Disk	2	Pressing the ejector button to release the CompactFlash Disk
---	---------------------------------	---	--

To install a CompactFlash Disk in the CompactFlash Disk slot, complete the following steps.

- Step 1** Orient the CompactFlash Disk so that its connector end faces the appropriate slot.
- Step 2** Carefully insert the CompactFlash Disk into the slot until it completely seats in the connector, and the ejector button for the slot pops out toward you.



Note The CompactFlash Disk is keyed and cannot be seated the wrong way. The ejector button does not pop out if the CompactFlash Disk is not completely inserted.

This completes the CompactFlash Disk installation procedure. Also see [Appendix B, “Using the CompactFlash Disk.”](#)

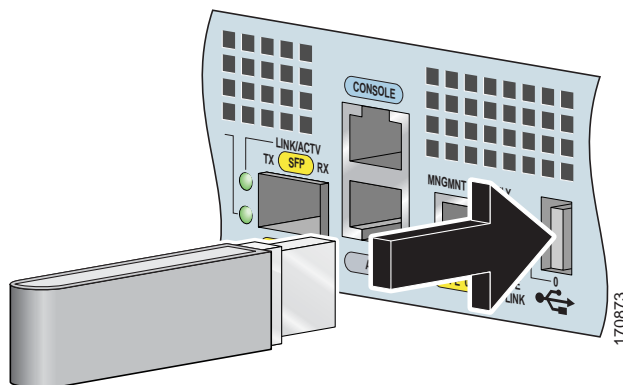
Removing and Installing a USB Flash Memory Module or USB eToken Pro Key

For USB specifications and product numbers, see [Appendix A, “Specifications.”](#) Also see the “[USB Port Information](#)” section on page 1-6.



Note Only Cisco USB Flash memory modules and the Aladdin USB eToken Pro key are supported by Cisco routers.

Figure 4-3 Connecting a USB Flash Memory Module to a Router USB Port



Caution Do not remove a USB Flash memory module when a read or write operation to the USB Flash memory module is in progress. The router might reload, or the USB Flash memory module can be damaged.

- Step 1** To remove a USB Flash memory module or Alladin USB eToken Pro key, pull it from the USB port.

- Step 2** Insert a Cisco USB flash memory module or the Aladdin USB eToken Pro key into the Cisco 7201 USB port as shown in [Figure 4-3](#). The USB Flash memory module can be inserted in only one way, and can be inserted or removed regardless of whether the router is powered on or not.
-

This completes the USB Flash memory or Aladdin USB eToken Pro key installation procedure.



Note

For detailed information about the Cisco IOS commands that support USB Flash memory modules, see the [USB Storage](#) document.

Removing and Installing a Port Adapter or Service Adapter

The information in this section also applies to service adapters.



Warning

During these procedures, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.

Statement 94

Before removing any port adapter, gracefully shut down the interface so that there is no traffic running through the port adapter when it is removed. Removing a port adapter while traffic is flowing through the ports can cause system disruption.

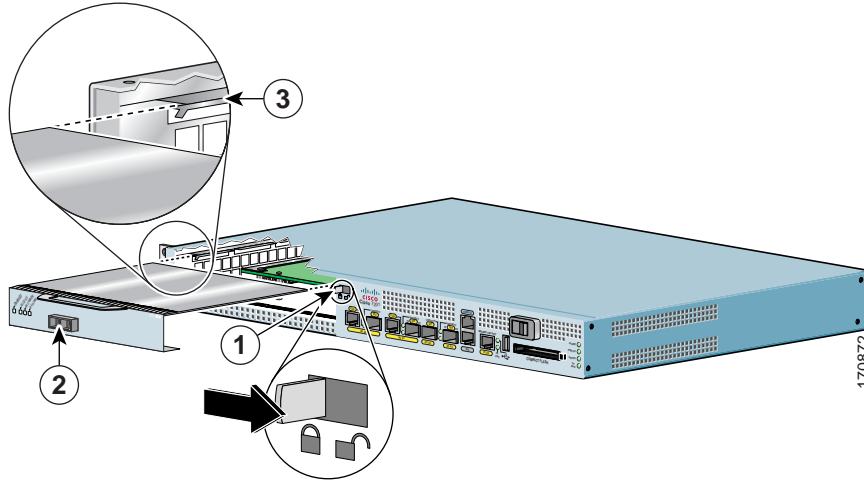
The Cisco 7201 router supports OIR of the port adapter. However, if you choose to power off the router to remove or install a port adapter, turn the power switch to the standby (I) position and then remove the power cable. After you have replaced the port adapter or inserted a port adapter blank panel, replace the power cable and then turn the power switch to the on (O) position.



Note

After powering off the router, wait at least 30 seconds before powering it on again.

Figure 4-4 Installing a Port Adapter or Service Adapter



1	Port adapter lever	3	Port adapter slot guide
2	Port adapter		

Follow these steps for inserting and securing a port adapter:

-
- Step 1** Attach an ESD-preventative wrist strap between you and an unpainted chassis surface.
- Step 2** Disconnect all cables from the port adapter.
- Step 3** Remove the port adapter from the chassis slot by sliding the port adapter lever to the right, in the unlocked position.
- Step 4** Grasp the handle and pull the port adapter or port adapter blank panel from the router.
- Step 5** Locate the port adapter slot guides inside the Cisco 7201 router. They are near the top, and are recessed about one-half inch.

**Caution**

The port adapter must slide into the slot guides under the chassis lid. Do not allow the port adapter components to come in contact with the system board or the port adapter could be damaged.

- Step 6** Carefully slide the port adapter into the port adapter slot and seat it. When installed, the port adapter input/output panel should be flush with the face of the router.
- Step 7** Slide the port adapter lever left to the locked position.
- Step 8** Reconnect any cables, including the port adapter and power cables, and place the cables through any cable-management bracket or power cable-retention clip.
- Step 9** Power on the router by turning the power switch to the on (O) position.

**Note**

If the port adapter fails to come up, reseal or reinsert the port adapter: do not use excessive force.

**Caution**

To ensure the proper flow of cooling air across the internal components, make sure a port adapter blank panel is installed in the unoccupied port adapter slot.

This completes the port adapter installation procedure. For information about configuring a port adapter, see the [Cisco 7201 Port Adapter Documentation Roadmap](#) which provides a linked list of all port adapter documentation for the Cisco 7201 router.

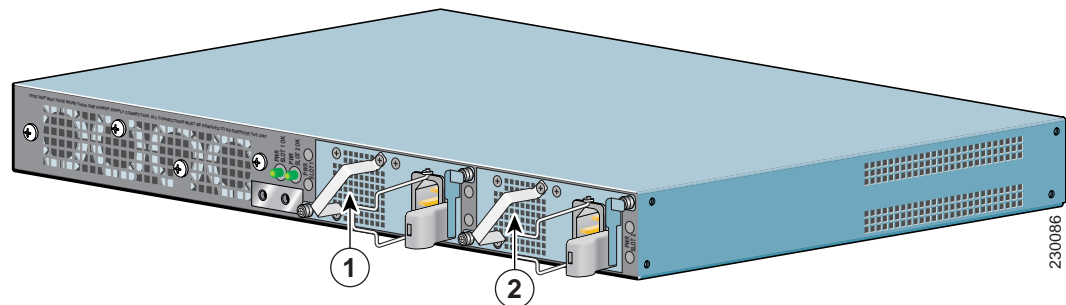
Removing and Installing an AC Power Supply

For AC power supply specifications and product numbers, see [Appendix A, “Specifications.”](#)

This section provides information about removing and replacing an AC power supply. Because of the power supply redundancy, there is no need to power off the Cisco 7201 router before removing one of the AC power supplies.

The Cisco 7201 has two of the same type of power supplies in power supply slot 1 and power supply slot 2. (See [Figure 4-5.](#))

Figure 4-5 Power Supply Slot 1 and Slot 2



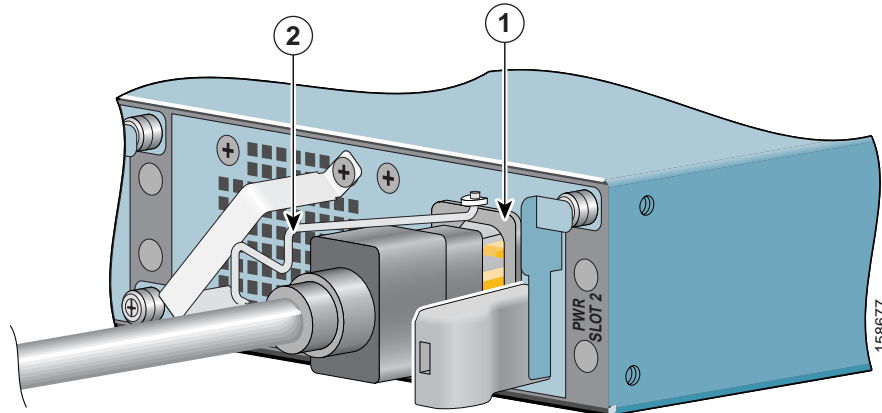
1	Power supply slot 1	2	Power supply slot 2
---	---------------------	---	---------------------

Removing the AC Power Supply

This section provides information about removing the AC power supply.

- Step 1** On the front of the router, turn the power switch to the standby (I) position.
- Step 2** Unplug the power cable from the power source.

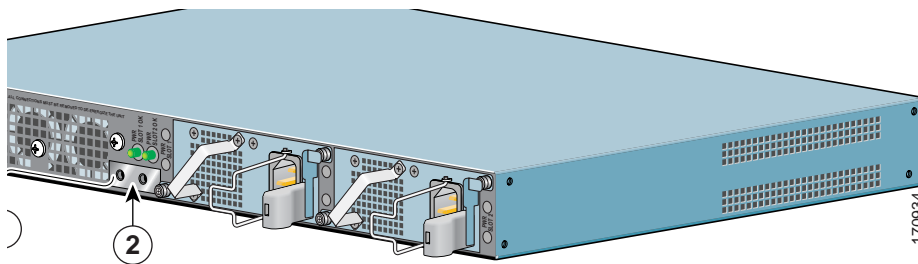
Figure 4-6 Removing the AC Power Cable



1	AC power receptacle	2	AC power cable-retention clip
---	---------------------	---	-------------------------------

- Step 3** Swing the cable-retention clip to the left.
- Step 4** Unplug the AC power cable from the power supply.

Figure 4-7 Removing the AC Power Supply



1	Power up restrictor	3	Lower power supply captive installation screw
2	Upper power supply captive installation screw		

- Step 5** Move the power up restrictor to the left to gain access to the upper power supply captive installation screw.
- Step 6** Unscrew the upper power supply captive installation screw while holding the power up restrictor to the left, then release the power up restrictor.
- Step 7** Unscrew the lower power supply captive installation screw.
- Step 8** Grasping the captive installation screws, pull the power supply from the chassis.

**Caution**

To ensure adequate airflow across the router power supplies, a power supply must be installed in each power supply bay.

You are finished removing the AC power supply. To install the AC power supply, go to the [“Installing the AC Power Supply”](#) section on page 4-9.

Installing the AC Power Supply

This section provides information about installing an AC power supply in the Cisco 7201 router.

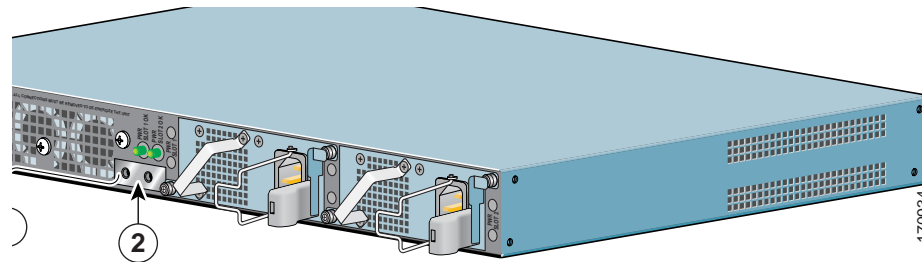
**Warning**

Never install an AC power module and a DC power module in the same chassis. Statement 1050

**Warning**

Installation of the equipment must comply with local and national electrical codes. Statement 1074

Figure 4-8 *Installing the AC Power Supply*



1	Power up restrictor	3	Lower power supply captive installation screw
2	Upper power supply captive installation screw		

- Step 1** Insert an AC power supply in power supply slot 1 or power supply slot 2 until it is fully seated.
- Step 2** Tighten the captive installation screws.
- Tighten the lower power supply captive installation screw.
 - Push the power up restrictor to the left to allow you to tighten the upper power supply captive installation screw. Tighten the upper power supply captive installation screw.
 - Release the power up restrictor so that it again covers the upper power supply captive installation screw.
- Step 3** Slide the wire cable-retention clip to the left.
- Step 4** Insert the AC power cable.

- Step 5** Slide the wire cable-retention clip to the right, over the power supply cable.
- Step 6** Plug the power supply cable into the power source.
- Step 7** On the front of the router, place the power switch in the on (O) position to turn on the router.

You are finished replacing the AC power supply.

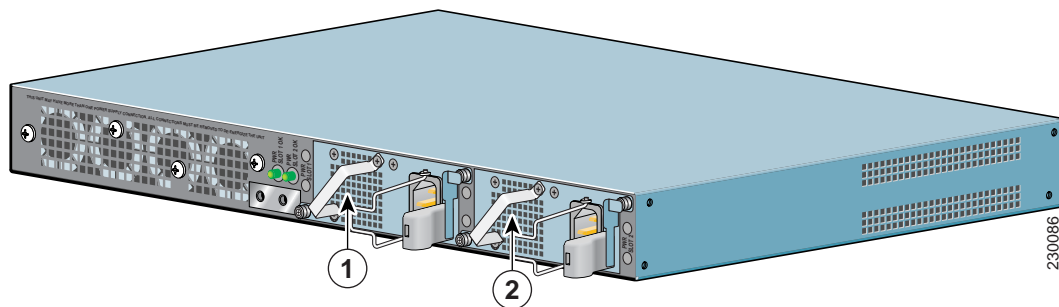
Removing and Installing a DC Power Supply

For DC power supply specifications and product numbers, see [Appendix A, “Specifications”](#).

This section provides information about removing and replacing a DC power supply. Because of the power supply redundancy, there is no need to power off the Cisco 7201 router before removing one of the DC power supplies.

The Cisco 7201 has two of the same type of power supplies in power supply slot 1 and power supply slot 2. (See [Figure 4-5](#).) The power supply slot numbers are on the chassis to the left of the left power supply, and to the right of the right power supply.

Figure 4-9 Power Supply Slot 1 and Slot 2



1	Power supply slot 1	2	Power supply slot 2
---	---------------------	---	---------------------

Removing the DC Power Supply



Warning

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



Warning

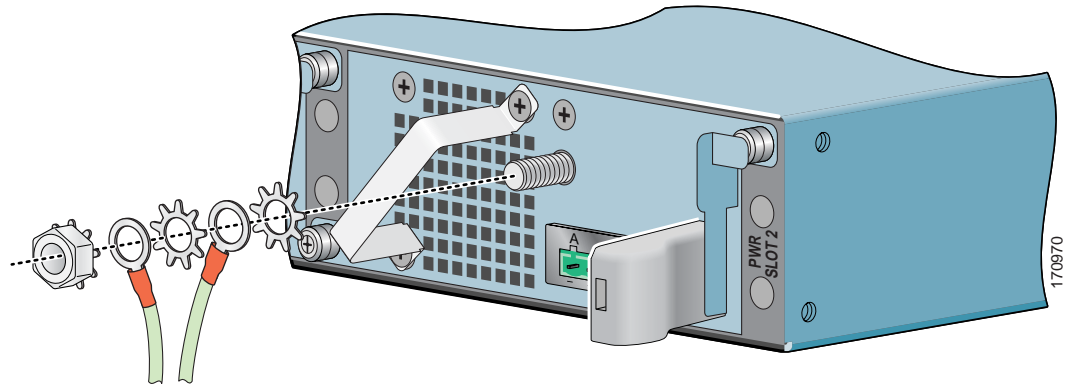
Only trained and qualified personnel should be allowed to install, replace, or service this equipment. Statement 1030



Warning

Installation of the equipment must comply with local and national electrical codes. Statement 1074

Figure 4-10 Removing the Ground Lugs

**Caution**

The DC return connection to this system is to remain isolated from the system frame and chassis (DC-I).

-
- Step 1** On the front of the router, turn the power switch to the standby (I) position.
 - Step 2** Switch the circuit breaker to the off position, and tape the switch handle to the off position.
 - Step 3** Pull the terminal block plug from the terminal block.
 - Step 4** Locate the DC power supply grounding stud.
 - Step 5** Remove the nut, ground lug, star washer, ground lug, and star washer and save for reuse on the new DC power supply.
 - Step 6** Move the power up restrictor to the left to gain access to the upper power supply captive installation screw.
 - Step 7** Use a Number 2 Phillips screwdriver to unscrew the upper power supply captive installation screw.
 - Step 8** Unscrew the lower power supply captive installation screw on the lower left of the power supply.
 - Step 9** Grasping the captive installation screws, pull the power supply from the chassis.
-

This complete the procedure for removing the DC power supply.

Installing the DC Power Supply

**Warning**

This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 120 VAC, 20A U.S. (240 VAC, 10A international).
Statement 1005

**Warning**

Never install an AC power module and a DC power module in the same chassis. Statement 1050

This section provides instructions for installing the DC power supply ground leads and installing the DC-input power leads.

**Caution**

Before you connect DC-input power, you must install the DC power ground leads to the DC power supply.

**Warning**

This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024

Obtain these necessary tools and equipment:

- Ratcheting torque screwdriver with a Phillips head that exerts up to 15 pound force-inches (lbf in.) or 240 ounce force-inches (ozf in.) of pressure
- Panduit crimping tool with optional controlled cycle mechanism
- 18-gauge copper ground wire (insulated or noninsulated)
- Four leads of 18-gauge copper wire
- Wire-stripping tool for stripping 18-gauge wire

To install the DC power supply, follow these instructions:

-
- Step 1** Slide the DC power supply into the chassis.
- Step 2** Move the power up restrictor to the left to gain access to the upper power supply captive installation screw.
- Step 3** Hold the power up restrictor to the left, while using a Number 2 Phillips screwdriver to tighten the upper power supply captive installation screw.
- Step 4** Tighten the lower power supply captive installation screw on the lower left of the power supply.
-

Go to the [“Installing the DC Grounding Leads” section on page 4-12](#) to continue the DC power supply installation procedure.

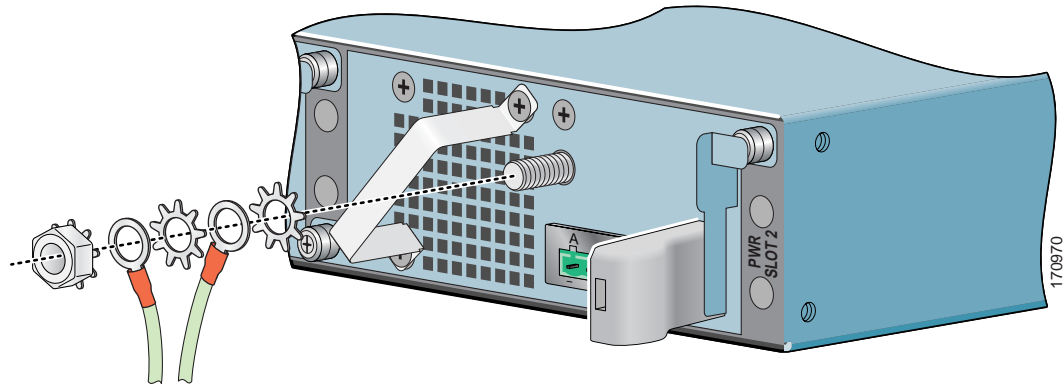
Installing the DC Grounding Leads

To install the DC grounding leads on the DC power supply, follow these instructions.

The DC power supply ships with the DC power supply ground lugs, star washers, and nut attached to the grounding stud on the DC power supply.

- If you are going to use the new ground lug and attach it to new ground wire, see the [“Installing the DC Grounding Leads” section on page 2-27](#).
- If you are going to use the current ground lug and ground wire with the new DC power supply, follow the instructions below.

Figure 4-11 Locating the DC Grounding Stud and Grounding Materials



- Step 1** Locate the grounding stud on the DC power supply.
- Step 2** Using the ground lugs from the previous power supply, replace them and the star washers and nut in the following order:
- Star washer
 - Ground lug with ground wire
 - Star washer
 - Ground lug with ground wire
 - Nut



Note If you are using the new lugs that came with the new DC power supply, see the [“Installing the DC Grounding Leads”](#) section on page 2-27 for instructions on wiring the ground lugs and ground wires.

- Step 3** Tighten the nut to complete the installation.

To continue the DC power supply installation procedure, go to the [“Wiring the DC-Input Power Source”](#) section on page 4-13.

Wiring the DC-Input Power Source



Note

The color coding of the DC-input power supply leads depends on the color coding of the DC power source at your site. Make certain the lead color coding you choose for the DC-input power supply matches lead color coding used at the DC power source.



Warning

When you install the unit, the ground connection must always be made first and disconnected last.
Statement 1046

**Warning**

This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 120 VAC, 20A U.S. (240 VAC, 10A international).

Statement 1005

**Warning**

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

Statement 1003

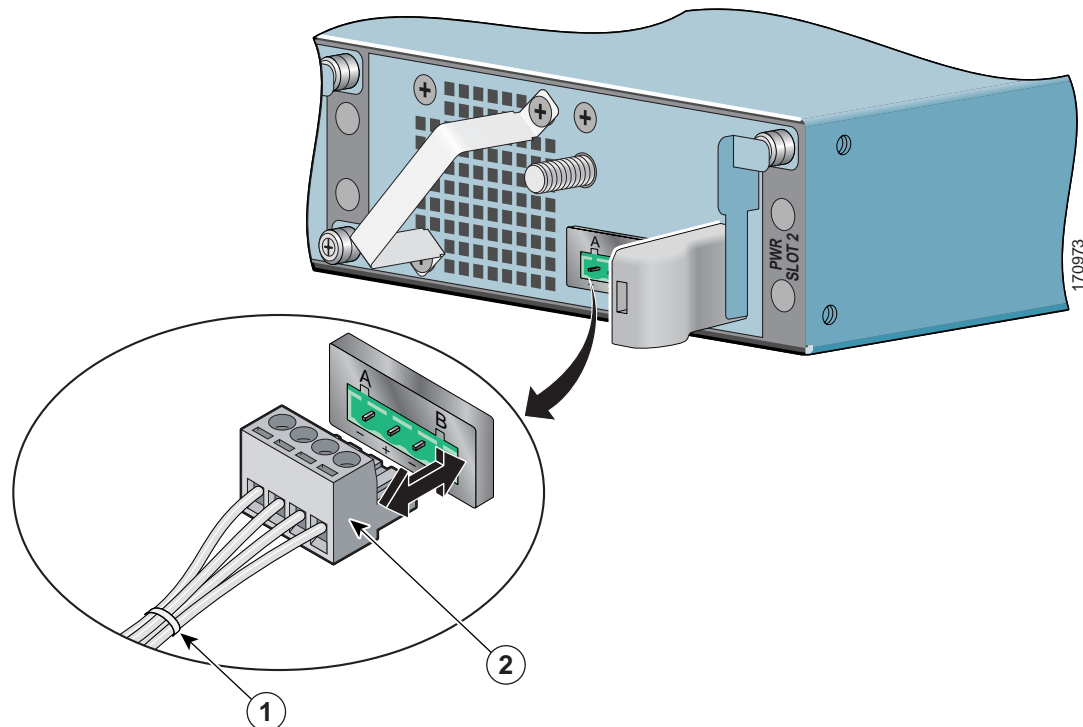
**Warning**

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

Statement 1030

- Step 1** At the front of the router, make sure the power switch is in the standby (I) position.
- Step 2** Check to make sure the power supply LEDs are off.
- Step 3** Move the circuit-breaker switch handle to the off position, and apply tape to hold it in the off position.

Figure 4-12 Inserting the Terminal Block Plug in the Block Header



1	Tie wrap	2	Terminal block plug
---	----------	---	---------------------

**Caution**

Secure the wires coming in from the terminal block plug so that they cannot be disturbed by casual contact.

- Step 4** Use a tie wrap to secure the wires to the rack, so that the wires are not pulled from the terminal block plug by casual contact. Make sure the tie wrap allows for some slack in the ground wire.
- Step 5** Insert the terminal block plug in the terminal block header on the DC power supply panel, as shown in [Figure 4-12](#).
- Step 6** Repeat Step 1 through Step 4 if you are replacing a second DC power supply.
- Step 7** Remove the tape from the circuit-breaker switch handle, and move the circuit-breaker switch handle to the on position.
- Step 8** On the front of the router, place the power switch in the on (O) position to turn on the router.

**Note**

After powering off the router, wait a minimum of 30 seconds before powering it on again.

You are finished installing the DC power supply.

Removing and Installing a DIMM

To remove and replace a SDRAM DIMM, use the information in this section. SDRAM specifications are in [Appendix A, “Specifications.”](#)

Powering Off the Router and Removing the Cover

This section provides information for powering off the router and removing the cover.

**Warning**

During these procedures, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.

Statement 94

**Warning**

This unit might have more than one power supply connection. All connections must be removed to de-energize the unit. Statement 1028

- Step 1** Attach an ESD-preventative wrist or ankle strap, connecting the equipment end of the strap to an unfinished chassis surface.
- Step 2** Power off the router by turning the power switch to the standby (I) position.

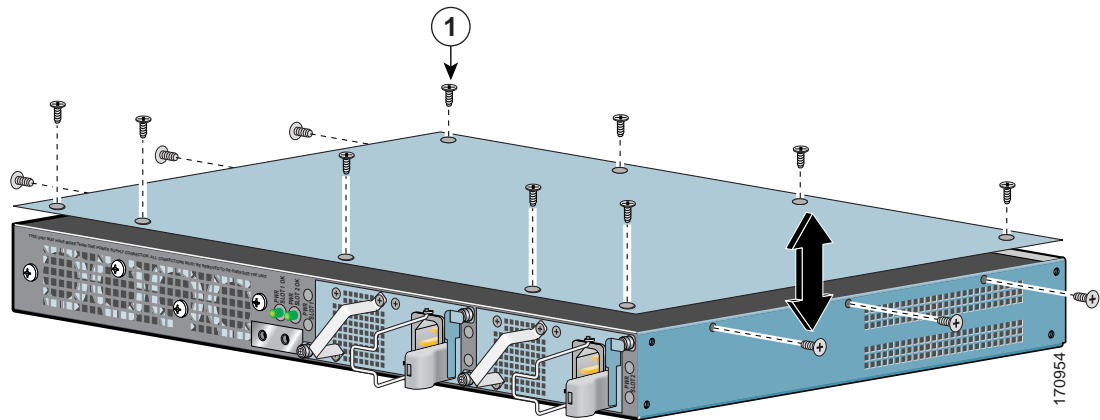
**Note**

After powering off the router, wait a minimum of 30 seconds before powering it on again.

- Step 3** Remove any power and input/output cables from the Cisco 7201 router. For AC power supplies, unplug the AC power cord from the power outlet. For DC power supplies, to ensure that all power is off, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the off position, tape the switch handle of the circuit breaker in the off position, and remove the DC connector.
- Step 4** Remove the ground cable.

Step 5 Remove the Cisco 7201 router from the rack, if it is rack-mounted.

Figure 4-13 Removing the Cover



1	Cover screws
---	--------------

Step 6 Turn the Cisco 7201 so that the back is facing you.

Step 7 Using a Phillips screwdriver, loosen the fifteen cover screws holding the cover to the chassis.

Step 8 Lift the cover off the router.

Proceed to the following sections for replacement instructions:

- [Removing and Installing the DIMM, page 4-16](#)
- [Replacing the Cover and Powering On the Router, page 4-18](#)

Removing and Installing the DIMM

The information in this section provides instructions for replacing the DDR-SDRAM DIMM and is included for future use. The memory configuration you ordered is installed in the Cisco 7201 router.



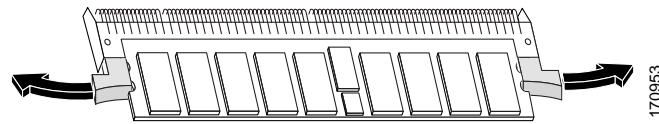
Warning

During these procedures, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.

Statement 94

To replace or upgrade the DIMM, follow these instructions:

Figure 4-14 Removing and Replacing the DIMM



Note Use only a DDR-SDRAM DIMM purchased from Cisco.

- Step 1** Attach an ESD-preventative wrist strap between you and an unpainted router surface.
- Step 2** Locate the DIMM on the system board.
- Step 3** Press both spring latches outward to release the DIMM.
- Step 4** Gently pull the DIMM free from the DIMM socket, taking care not to touch the pins that insert into the socket. Place the DIMM in an anti-static bag.



Caution Forcing the DIMM into the socket can damage the DIMM. Use the notches on the DIMM to align the DIMM in the DIMM socket before inserting it.

- Step 5** Locate the notches and align the DIMM with the socket before inserting it.
- Step 6** Gently insert the new DIMM, taking care not to damage the pins on the edge of the DIMM.
- Step 7** Press down on the DIMM until the spring latches lock the DIMM in place.

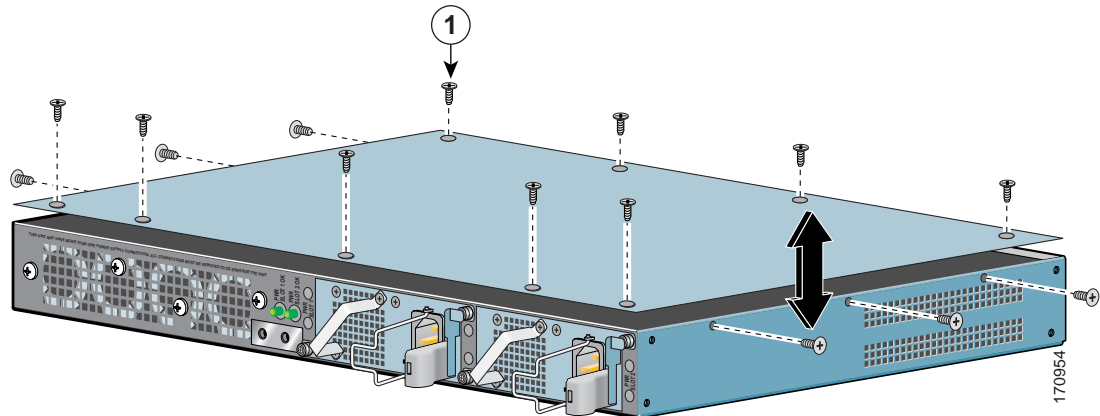
Go to the [“Replacing the Cover and Powering On the Router”](#) section on page 4-18 to complete this installation procedure.

For memory specifications and configurations, see [Appendix A, “Specifications.”](#)

Replacing the Cover and Powering On the Router

The Cisco 7201 router cover fits tightly on the chassis. Follow these instructions to replace the cover and power on the router:

Figure 4-15 Inserting the Screws and Replacing the Cover



1	Cover screws		
---	--------------	--	--

-
- Step 1** Place the cover on the top of the router with the four-screw edge aligned with the front of the router, and the five-screw edge aligned with the rear of the router.
- Step 2** Insert and tighten the fifteen cover screws with a Phillips screwdriver.
- Step 3** Return the router to its installation site, attach the ground cable, and input/output and power cables.
- Step 4** Power on the router by turning the power switch to the on position.
-

This completes the installation of the DIMM and replacement of the cover.



CHAPTER 5

Troubleshooting Initial Startup Problems

Your Cisco 7201 router went through extensive testing before leaving the factory. However, if you encounter problems starting the router, use the information in this chapter to help isolate the cause of the problems. This chapter contains the following sections:

- [Troubleshooting Overview, page 5-1](#)
- [Online Troubleshooting Resources, page 5-2](#)
- [Problem Solving Using a Subsystems Approach, page 5-3](#)
- [Upgrading the Boot Helper \(Boot Loader\) Image, page 5-8](#)
- [Boot Prompt: \(boot\)#, page 5-9](#)
- [ROMmon Prompt: rommon >, page 5-10](#)
- [Cleaning the Fiber-Optic Connections, page 5-14](#)

The procedures in this chapter assume that you are troubleshooting the initial system startup, and that your router is in the original factory configuration. If you have removed or replaced components or changed any default settings, the recommendations in this chapter might not apply. Make sure to review the safety warnings listed in the [Regulatory Compliance and Safety Information for Cisco 7200 Series Routers](#) publication that accompanied your Cisco 7201 router before using the troubleshooting procedures in this chapter.

Troubleshooting Overview

This section describes the troubleshooting methods used in this chapter and describes how the Cisco 7201 router is divided into subsystems for more efficient problem solving. If you are unable to easily solve the problem, contact a customer service representative for assistance and further instructions.

Provide the representative with the following information:

- Date you received the router
- Chassis serial number
- Type of software and release number
- Brief description of the problem you are having
- Brief explanation of the steps you have taken to isolate and resolve the problem
- Maintenance agreement or warranty information

The following table shows the general troubleshooting strategy described in this chapter. Refer to this table, as necessary, to follow the steps to isolate problems to a specific subsystem; resolve the problem if possible.

	Action	Yes	No
Step 1	Turn power on. Go to Step 2.	—	—
Step 2	Green STATUS LED on?	Go to Step 4.	Troubleshoot power system, and go to Step 3.
Step 3	Green STATUS LED on?	Go to Step 4.	Obtain technical assistance.
Step 4	Fans operating?	Go to Step 6.	Troubleshoot cooling subsystem, and go to Step 5.
Step 5	Fans operating?	Go to Step 6.	Obtain technical assistance.
Step 6	RJ-45 EN LEDs on?	Go to Step 8.	Check all cable connections. Clean optical fiber connectors; see the “ Cleaning the Fiber-Optic Connections ” section on page 5-14 . Check that the SFP module is fully seated. Restart the system. Go to Step 7.
Step 7	RJ-45 EN LEDs on?	Go to Step 8.	Obtain technical assistance
Step 8	Port adapter ENABLED LEDs on?	Go to Step 10.	Reseat port adapter and restart system. Go to Step 9.
Step 9	Port adapter ENABLED LEDs on?	Go to Step 10.	Obtain technical assistance.
Step 10	System startup successful.	—	—

Online Troubleshooting Resources

In addition to following the subsystems approach to troubleshooting, a variety of online troubleshooting resources are available:

- The [Cisco 7201 Troubleshooting Documentation Roadmap](#) document contains a link to the [Cisco 7201 Router Troubleshooting Module](#) and information to help you troubleshoot problems with the Cisco 7201 router.
- Cisco.com registered users can access various troubleshooting tools such as Software Advisor, Cisco IOS Error Message Decoder Tool, and Output Interpreter Tool from the [Tools and Resources](#) menu after logging in at http://www.cisco.com/en/US/support/tsd_most_requested_tools.html.
- [Inspection and Cleaning Procedures for Fiber-Optic Connections](#) provides information about cleaning fiber-optic connections.
- [Compressed Air Cleaning Issues for Fiber-Optic Connections](#) provides information about fiber-optic connections compressed air cleaning.

Problem Solving Using a Subsystems Approach

The key to solving problems with the system is isolating the problem to a specific subsystem. The first step in solving startup problems is to compare what the system *is doing* to what it *should be doing*. Because a startup problem is usually caused by a single component, it is more efficient to first isolate the problem to a subsystem rather than troubleshoot each component in the system. For these troubleshooting procedures, consider the following subsystems:

- Power subsystem—This subsystem comprises the power supply, the external power cable, and the system board.
- Cooling subsystem—The fans should be operating whenever system power is on. Contact your customer service representative if you determine a fan is not functioning properly.
- Processor subsystem—This subsystem includes the processing and input/output functions, the port adapter or service adapter, and system memory and management functions. The ENABLE LED on the port adapter indicates if the port adapter is initialized. A port adapter that is partially installed can cause the system to pause indefinitely and reload.

The following sections help you isolate a problem to one of these subsystems and direct you to the appropriate troubleshooting section.

Identifying Startup Problems

Startup problems are commonly due to the source power or to a port adapter or service adapter that is dislodged from the system board. Although an overtemperature condition is unlikely at initial startup, the environmental monitoring functions are included in this chapter because they also monitor internal voltages.

When you start up the router for the first time, you should observe the startup sequence described in the [“Starting the System and Observing Initial Conditions” section on page 3-8 in Chapter 3, “Starting and Configuring the Router.”](#) This section contains a more detailed description of the normal startup sequence and describes the steps to take if the system does *not* perform that sequence as expected.

LEDs indicate all system states in the startup sequence. By checking the state of the LEDs, you can determine when and where the system failed in the startup sequence. Use the following descriptions to isolate the problem to a subsystem, and then proceed to the appropriate sections to try to resolve the problem.

When you start up the system by turning on the power supply switch, the following should occur:

- You should immediately hear the fans operating. If not, proceed to the [“Troubleshooting the Cooling Subsystem” section on page 5-6](#). If you determine that the power supply is functioning normally and that a fan is faulty, contact a customer service representative. If a fan does not function properly at initial startup, there are no installation adjustments that you should make.
- The STATUS LED should come on. As the system boots to the ROM monitor state, the STATUS LED blinks amber. The STATUS LED turns green when the system boots to the Cisco IOS state. If the system does not boot properly, call your local service representative.
- The EN (Enable) LED comes on and indicates that a RJ-45 port (0/0 and 0/1) is initialized and enabled for operation by the system. This LED comes on during a successful router boot and remains on during normal operation of the router. If this LED remains off when you start the router, it is probably a problem with the RJ-45 port. Consult [Step 6](#) in the troubleshooting table on page 5-2.
- The native LINK/ACTV LED is solid green when a Gigabit Ethernet SFP port (0/0, 0/1, 0/2, or 0/3) is up with no activity. When it is receiving a carrier signal from the network, it flashes green.

- The PWR OK (power ok) LED is green when the system has powered on and is attempting to boot the software, or has booted the software.
- The ENABLED LED on the port adapter or service adapter comes on when the processor completes its initialization of the adapter for operation. An ENABLED LED indicates that the adapter is receiving power and has been recognized by the processor; it does not indicate the state of the individual interfaces on the adapters. If an ENABLED LED fails to come on, proceed to the [“Upgrading the Boot Helper \(Boot Loader\) Image” section on page 5-8](#).
- When all LEDs come on to indicate that the system has booted successfully, the initial system banner should be displayed on the console screen. If it is not displayed, see [Appendix A, “Specifications”](#) to verify that the terminal is set correctly and that it is properly connected to the console port. If the ALARM LED is on, check the STATUS LED and PWR OK LED.

Troubleshooting the Power Subsystem

Check the following to help isolate a problem with the power subsystem:



Note

If the system powers off, wait at least one minute before manually rebooting the system, or it will pause indefinitely.

Table 5-1 Troubleshooting the Power Subsystem

Symptom	Possible Cause	Possible Solution
System begins power on, amber STATUS LED comes on.	System has failed to boot Cisco IOS.	Power off, and reboot the system. Check to be sure you are using the correct Cisco IOS release. If Cisco IOS does not boot, and the green STATUS LED is not displayed, contact a service representative.
System does not power on.	AC power cable not fully seated at system or at the wall outlet (power source).	Turn the router power switch to the standby position (I) and reseal the AC power cable at the system or at the wall outlet (power source).
	DC power cable not turned on at the panel board of the circuit breaker.	Turn the router power switch to the standby position (I) and locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the on position.
	AC internal power cables are not fully seated; from the power supply to the system board, from the power supply to the power switch, and the power supply to the power connector.	Turn the router power switch to the standby position (I) and unplug the router power cable. Open the cover and check the power supply cable connections. Reseat the cables if necessary. Replace the cover, plug in the power cable, and power on the router.

Table 5-1 *Troubleshooting the Power Subsystem (continued)*

Symptom	Possible Cause	Possible Solution
System does not power on.	DC internal power cables are not fully seated; from the power supply to the system board, from the power supply to the power switch, and the power supply to the power connector.	Turn the router power switch to the standby position (I) and unplug the router power cable. Open the cover and check the power supply cable connections. Reseat the cables if necessary. Replace the cover, plug in the power cable, and power on the router.
	Power source is faulty.	Turn the power source switch off, connect the power cable to another power source, if available, and turn the router power switch back on.
	Faulty power cable.	Turn the router power switch to the standby position (I), (for DC power, also turn the circuit breaker to the off position and tape it in that position), remove the cable and replace it.
	Faulty power supply.	If the system still fails to come up when the power supply is connected to a different power source with a new power cable, the power supply is probably faulty. Contact a service representative.
System powers off, no STATUS LED, and no operating fans.	Power supply failure.	Contact a service representative.

Troubleshooting the Cooling Subsystem

Check the following to help isolate a problem with the cooling subsystem:

Table 5-2 Troubleshooting the Cooling Subsystem

Symptom	Possible Cause	Possible Solution
System displays the following message: Router: 00:03:46:%ENVM-3-BLOWER:Fan 2 may have failed	One or more fans are not operating.	Contact a service representative
System shuts down, some fans may or may not continue to rotate, and the following error message is displayed: Queued messages: %ENVM-1-SHUTDOWN: Environmental Monitor initiated shutdown	This error message indicates that the system has detected an overtemperature condition or out-of-tolerance power condition inside the chassis. <ul style="list-style-type: none"> One or more fans are not operating. The fans are operating too slowly. The power supply is not operating. To determine if the fans are operating, listen for them. In noisy environments, place your hand on the rear of the chassis to feel if air is being forced out the vents.	Contact a service representative.
	Heated exhaust air from other equipment is entering the router's inlet vents.	Move other equipment or the router to ensure proper airflow.
System shuts down and the following error message is displayed: Queued messages: %ENVM-1-SHUTDOWN: Environmental Monitor initiated shutdown	The error message could indicate a faulty component or temperature sensor. Before the system shuts down, use the show environment or show environment table command to display the internal chassis environment. See Chapter 3, "Starting and Configuring the Router," the "Reporting Functions" section on page 3-6 for descriptions of the show environment and show environment table commands.)	Contact a service representative.
This error message indicates that the system has detected an overtemperature condition or out-of-tolerance power condition inside the chassis. Note The system fans may continue to operate although the system shuts down.	If an environmental shutdown results from an out-of-tolerance power condition, the system shuts down.	If the system still fails to come up when the power supply is connected to a different power source with a new power cable, the power supply is probably faulty. Contact a service representative.

Troubleshooting the I/O Subsystem

The procedures in this section assume that you have not made changes to your configuration file.

If the Cisco 7201 router I/O LEDs (LINK/ACTV, EN, USB, FE 0/0, CF ACTV) do not go on as expected (see the [“Identifying Startup Problems”](#) section on page 5-3), check the following items to help isolate the problem:

Table 5-3 Troubleshooting the I/O Subsystem

Symptom	Possible Cause	Possible Solution
LEDs remain off when the system power switch is turned on.	Power supply or cooling subsystem is faulty.	If the LEDs stay off, first see the “Troubleshooting the Power Subsystem” section on page 5-4 and the “Troubleshooting the Cooling Subsystem” section on page 5-6 to ensure that both the fans and the power supply are functioning properly.
Power supply and fans appear operational, but none of the I/O LEDs are on.	The improperly connected port adapter has indefinitely paused the system.	Reseat the port adapter, make sure the port adapter lever is in the locked position, and then restart the system.
The prior configuration—native Gigabit Ethernet—LEDs remain on after configuring the ports to change the configuration from one media type to the other.	The media-type command was not used when changing the configuration of these ports.	See Chapter 3, “Starting and Configuring the Router,” the “Configuring the Native Gigabit Ethernet Interfaces” section on page 3-15.

Troubleshooting the Processor Subsystem

The processor subsystem comprises the system board and the port adapter. A port adapter that is partially connected to the system board sends incomplete signals to the processor, which faults the PCI bus and causes the system to pause indefinitely. Therefore, first ensure that the system software has initialized successfully and then check to see if the port adapter is fully connected.

Troubleshooting the Port Adapter or Service Adapter

Check the following to help isolate a problem with the port adapter or service adapter:

Table 5-4 Troubleshooting the Port Adapter or Service Adapter

Symptom	Possible Cause	Possible Solution
Port adapter or service adapter ENABLED LED is off.	The port adapter or service adapter might have pulled away from the system board.	Reseat the adapter in its slot (you do not have to turn off the system power when removing or replacing port adapters and service adapters). After the system reinitializes the interfaces, the ENABLED LED on the port adapter or service adapter should go on. If the ENABLED LED remains off, the system detected a processor hardware failure. (This LED should be on in normal operation.) Contact a service representative for instructions.

Upgrading the Boot Helper (Boot Loader) Image

The boot helper (boot loader) image resides in flash memory and contains a subset of the Cisco IOS software. This image is used to boot your router from the network or to load Cisco IOS images onto the router. This image is also used if the system cannot find a valid system image.

Your boot helper (boot loader) image should correspond to the Cisco IOS release that is running on your router.



Note

The Cisco 7201 router requires the c7200p-kboot-mz boot helper image.

To upgrade your boot helper (boot loader) image, obtain the most current boot helper image through Cisco.com and copy the new boot helper image to flash memory on your router. Access Cisco.com on the web and, if you are a registered Cisco.com user, click **Login** at the top right of the page. If you are not a registered Cisco.com user, you can register by clicking **Register** at the top right side of the Cisco.com page. After you have logged in, click **Support**. Click Download Software and choose the appropriate link.

To obtain a boot helper (boot loader) image from Cisco.com and upgrade your bootflash, do the following:

- Step 1** Download the boot helper (boot loader) image from Cisco.com to a Trivial File Transfer Protocol (TFTP) server.
- Step 2** Reformat the flash memory on your router as follows:

```
Router# format bootflash:
Format operation may take a while. Continue? [confirm]
Format operation will destroy all data in "bootflash:". Continue? [confirm]
Formatting sector ...
Format of bootflash:complete
```



Note

Reformatting flash memory erases the current flash memory contents.

Step 3 Copy the boot helper (boot loader) image from the TFTP server to flash memory as follows:

```
Router# copy tftp bootflash:
Address or name of remote host []? 10.7.0.99
Source filename []? c7201-boot-mz.122-4.BW
Destination filename [c7201-boot-mz.122-4.BW]?
Loading c7201-boot-mz.122-4.BW from 10.7.0.99 (via GigabitEthernet0/3):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!

[OK - 5137928/10275840 bytes]

5137928 bytes copied in 45.420 secs (114176 bytes/sec)
```

This completes the procedure for upgrading your boot helper (boot loader) image. For more detailed instructions on loading and maintaining system images and microcode, including boot helper images, refer to the *Cisco IOS Configuration Fundamentals Configuration Guide*, which is available on Cisco.com.

Boot Prompt: (boot)#

Use this procedure to recover a router stuck at the boot prompt:

Step 1 Ensure you have connectivity to the TFTP host that is storing the Cisco IOS image by using the **ping** command to ping the TFTP host.

```
7201(boot)# ping 2.0.0.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2.0.0.2, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/1 ms
```

Step 2 Copy the valid Cisco IOS image on the TFTP server to the CompactFlash Disk using the **copy tftp destination-flash-file-system** command and follow the prompts.

```
7201(boot)# copy tftp disk0:
Address or name of remote host [2.0.0.2]?
Source filename []? path/path/c7200p-js-mz
Destination filename [c7200p-js-mz]?
Accessing tftp://2.0.0.2/path/path/c7200p-imagename...
Loading path/path/c7200p-imagename from 2.0.0.2 (via FastEthernet0/0):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!! ...
[OK - 22174032 bytes]

22174032 bytes copied in 44.188 secs (501811 bytes/sec)
```

Step 3 Set the configuration register to 0x0 using the **config-register 0x0** command so the router will reboot in ROMmon mode.

```
7201(boot)# configure terminal
7201(boot)(config)# config-register 0x0
```

- Step 4** Reload the router using the **reload** command. Do not save the configuration.

```
7201(boot)# reload

System configuration has been modified. Save? [yes/no]: no
[confirm]

System Bootstrap, Version 12.4(12.2r)T, RELEASE SOFTWARE (fc1) Technical Support:
http://www.cisco.com/techsupport Copyright (c) 2006 by cisco Systems, Inc.
Socket jumper: not present Failsafe jumper: present = normal FPGA revision 0x00000015
C7200 platform with 1046528 Kbytes of main memory

Readonly ROMMON initialized
rommon 1 >
```

The router should now be in ROMmon mode (rommon >). Follow the instructions in the “ROMmon Prompt: rommon >” section on page 5-10 to boot the router from ROMmon.

For an example of this complete process, see the “Complete Boot Prompt and ROMmon Prompt Example” section on page 5-11.

ROMmon Prompt: rommon >

Use this procedure to recover a router stuck in ROMmon mode at the: rommon > prompt.

- Step 1** Check the contents of the flash file system by entering the **dir file-system:** command:

```
rommon 1> dir disk0:
2      22132744 Jan 22 2007 18:29:48 +00:00 c7200p-js-mz
6a

234317816 bytes available (22132744 bytes used)
```

- Step 2** If the flash file system has a valid Cisco IOS image, follow the instructions in step a. If the flash file system does not have a valid Cisco IOS image, follow the instructions in step b.

- a.** If a flash file system has a valid Cisco IOS image, boot the router using the **boot file-system:image-name** command.

```
rommon 2 > boot disk0:c7200p-js-mz

Self decompressing the image :
#####
#####
#####
#####
#####
#####
##### [OK]

<some output removed for brevity>

Cisco 7201 (c7201) processor (revision B) with 917504K/65536K bytes of memory.
Processor board ID 74832279
MPC7448 CPU at 1666Mhz, Implementation 0, Rev 2.2
1 slot midplane, Version 2.0
```

```
Last reset from power-on
1 FastEthernet interface
4 Gigabit Ethernet interfaces
2045K bytes of NVRAM.

250880K bytes of ATA PCMCIA card at slot 0 (Sector size 512 bytes).
65536K bytes of Flash internal SIMM (Sector size 512K).
Uncompressed configuration from 1000 bytes to 1703 bytes
```

```
Press RETURN to get started!
```

```
7201>
```

- b. If the flash file system does not have a valid Cisco IOS image, enter **confreg 0x1**, followed by **reset**.

```
rommon 2 > confreg 0x1
```

```
You must reset or power cycle for new config to take effect
rommon 3 > reset
```

```
System Bootstrap, Version 12.4(12.2r)T, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 2006 by cisco Systems, Inc.
```

```
<startup boot messages removed for brevity>
7201_devtest2(boot)>
```

After entering these commands, follow the instructions in the “ROMmon Prompt: rommon >” section on page 5-10 to download a valid Cisco IOS image.

- Step 3** (Optional) Set the configuration register using the **config-register** command. If you want the router to be in ROMmon mode after a reboot, this step is not necessary. To set the configuration register to reboot to the router prompt, enter the **config-register 0x2** command.

```
7201# configure terminal
7201(config)# config-register 0x2
```

See [Appendix C, “Configuration Register Information,”](#) for additional information regarding configuration register settings.

- Step 4** (Optional) Save the configuration using the **copy running-config startup-config** command. This step is especially important if you wish to save the configuration register settings.

Complete Boot Prompt and ROMmon Prompt Example

In the following example, a Cisco 7201 router starting in boot mode downloads a Cisco IOS image to Flash memory, reboots into ROMmon mode, and boots the Cisco IOS image from ROMmon mode to enter the Cisco IOS CLI.

```
7201(boot)# ping 2.0.0.2
```

```
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2.0.0.2, timeout is 2 seconds:
```

ROMmon Prompt: rommon >

```
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/1 ms
```

```
7201(boot)# copy tftp disk0:
Address or name of remote host [2.0.0.2]?
Source filename []? path/path/c7200p-js-mz
Destination filename [c7200p-js-mz]?
Accessing tftp://2.0.0.2/path/path/c7200p-imagename...
Loading path/path/c7200p-imagename from 2.0.0.2 (via FastEthernet0/0):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!! ...
[OK - 22174032 bytes]
```

22174032 bytes copied in 44.188 secs (501811 bytes/sec) Configuring from terminal, memory, or network [terminal]? t Enter configuration commands, one per line. End with CNTL/Z.

```
7201(boot) (config)# config-register 0x0
7201(boot) (config)# ^Z
7201(boot)# reload
```

System configuration has been modified. Save? [yes/no]: no
[confirm]

System Bootstrap, Version 12.4(12.2r)T, RELEASE SOFTWARE (fc1) Technical Support:
<http://www.cisco.com/techsupport> Copyright (c) 2006 by cisco Systems, Inc.
Socket jumper: not present Failsafe jumper: present = normal FPGA revision 0x00000015
C7200 platform with 1046528 Kbytes of main memory

```
Readonly ROMMON initialized
rommon 1 > boot disk0:c7200p-js-mz
```

```
Self decompressing the image :
#####
#####
#####
#####
#####
#####
##### [OK]
```

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

Cisco IOS Software, 7200 Software (C7200P-ADVENTERPRISEK9-M), Version 12.4(4)XD7, RELEASE SOFTWARE (fc2) Technical Support: <http://www.cisco.com/techsupport> Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Fri 23-Mar-07 16:00 by kellythw Image text-base: 0x0000A3B8, data-base: 0x0327C000

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A summary of U.S. laws governing Cisco cryptographic products may be found at: <http://www.cisco.com/wwl/export/crypto/tool/stqrg.html>

If you require further assistance please contact us by sending email to export@cisco.com.

Cisco 7201 (c7201) processor (revision B) with 917504K/65536K bytes of memory.
Processor board ID 74832279
MPC7448 CPU at 1666Mhz, Implementation 0, Rev 2.2
1 slot midplane, Version 2.0

Last reset from power-on
1 FastEthernet interface
4 Gigabit Ethernet interfaces
2045K bytes of NVRAM.

250880K bytes of ATA PCMCIA card at slot 0 (Sector size 512 bytes).
65536K bytes of Flash internal SIMM (Sector size 512K).
Uncompressed configuration from 1000 bytes to 1703 bytes

Press RETURN to get started!

```
7201> en
Password: ****
7201# show version
Cisco IOS Software, 7200 Software (C7200P-ADVENTERPRISEK9-M), Version
12.4(4)XD7, RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Fri 23-Mar-07 16:00 by kellythw
```

```
ROM: System Bootstrap, Version 12.4(12.2r)T, RELEASE SOFTWARE (fc1)
```

```
7201_devtest3 uptime is 0 minutes
System returned to ROM by reload at 18:34:50 UTC Tue Mar 27 2007
System image file is "disk0:imagenam <<<<<<<<
Last reload reason: Reload Command
```

This product contains cryptographic features and is subject to United States and local country laws governing import, export, transfer and use. Delivery of Cisco cryptographic products does not imply third-party authority to import, export, distribute or use encryption. Importers, exporters, distributors and users are responsible for compliance with U.S. and local country laws. By using this product you agree to comply with applicable laws and regulations. If you are unable to comply with U.S. and local laws, return this product immediately.

A summary of U.S. laws governing Cisco cryptographic products may be found at: <http://www.cisco.com/wwl/export/crypto/tool/stqrg.html>

If you require further assistance please contact us by sending email to export@cisco.com.

```
Cisco 7201 (c7201) processor (revision B) with 917504K/65536K bytes of memory.  
Processor board ID 74832279  
MPC7448 CPU at 1666Mhz, Implementation 0, Rev 2.2  
1 slot midplane, Version 2.0
```

```
Last reset from power-on  
1 FastEthernet interface  
4 Gigabit Ethernet interfaces  
2045K bytes of NVRAM.
```

```
250880K bytes of ATA PCMCIA card at slot 0 (Sector size 512 bytes).  
65536K bytes of Flash internal SIMM (Sector size 512K).  
Configuration register is 0x0
```

Cleaning the Fiber-Optic Connections

For information about cleaning fiber-optic cable connectors and receptacles, see the [Inspection and Cleaning Procedures for Fiber-Optic Connections](#) document. It provides detailed illustrations and photos of procedures and equipment required to properly clean fiber-optic connections. Also see the [Compressed Air Cleaning Issues for Fiber-Optic Connections](#) document.



Specifications

This appendix provides router specifications and cable assemblies and pinouts for the cables shipped with the Cisco 7201 router, as well as power supply information and SFP module information.

For additional information on how the cables are physically connected to the devices, see, [Chapter 1, “Overview,”](#) and [Chapter 2, “Installing the Cisco 7201 Router.”](#)

This appendix includes the following information:

- [Cisco 7201 Router Specifications, page A-1](#)
- [Power Supply Product Numbers, page A-2](#)
- [Software Requirements, page A-3](#)
- [Processor and Memory Specifications, page A-3](#)
- [SFP Module Specifications and Configurations, page A-4](#)
- [Gigabit Ethernet RJ-45 Port Pinouts, page A-6](#)
- [Gigabit Ethernet Flow Control Information, page A-9](#)
- [Console Port and Auxiliary Port Signals and Pinouts, page A-10](#)

Cisco 7201 Router Specifications

The specifications for the Cisco 7201 router are listed in [Table A-1](#).

Table A-1 Cisco 7201 Router Specifications

Description	Specification
Dimensions (H x W x D)	1.73 in. x 17.3 in. x 16.2 in. (4.39 cm x 43.94 cm x 41.20 cm)
Weight	Chassis fully configured with a port adapter ~ 16.5 lb (7.48 kg)
Heat dissipation	290 BTU ¹ /hr at 85W typical input power 512 BTU/hr at 150W maximum input power
Temperature	32° to 104°F (0° to 40° C) operating; -4° to 149° F (-20° to 65° C) nonoperating
Humidity	10% to 90% noncondensing
Dual AC Power Supply Information	
AC-input power	150W maximum
AC-input power (typical)	85W

Table A-1 Cisco 7201 Router Specifications (continued)

Description	Specification
Dual AC Power Supply Information (continued)	
AC-input voltage rating	100–240 VAC ²
AC-input current rating	2A ³ maximum
AC-input current (typical)	0.85A at 100 VAC 0.35A at 240 VAC
AC-input frequency rating	50 to 60 Hz ⁴
AC-input cable	Use only Cisco Agency-approved power cords
Dual DC Power Supply Information	
DC-input power	150W maximum
DC- input power (typical)	85W
DC-input nominal voltage rating	–48 VDC ⁵ to –60 VDC
DC-rated input voltage	–40 VDC to –72 VDC
DC-input current rating	6A maximum
DC-input current (typical)	1.8A at –48 VDC, 1.4A at –60 VDC
DC-input cable	16-AWG ⁶ (1.0 mm ²) or 18-AWG (0.75 mm ²) wire with a circuit breaker rating of 20A maximum. The ground wire must be at least as large as the supply wires.

1. BTU = British thermal units
2. VAC = volts alternating current
3. A = amperes
4. Hz = hertz
5. VDC = volts direct current
6. AWG = American Wire Gauge

Power Supply Product Numbers

Table A-2 Power Supply Product Numbers

Power Supply	Product Number
AC power supply	PWR-7201-AC= ¹
DC power supply	PWR-7201-DC= ²

1. This product number provides a single AC power supply.
2. This product number provides a single DC power supply.

Software Requirements

The minimum software requirement for the Cisco 7201 router is Cisco IOS Release 12.4(4)XD7, Cisco IOS Release 12.2(31)SB5, or Cisco IOS Release 12.4(15)T1.

To check the minimum software requirements of Cisco IOS software with the hardware installed on your router, Cisco maintains the Software Advisor tool on Cisco.com. This tool does not verify whether modules within a system are compatible, but it does provide the minimum Cisco IOS requirements for individual hardware modules or components.

To access Software Advisor, go to Cisco.com. From the top of the page, choose Support. From the Support drop-down menu, Tools and Resources, click the Software Advisor link. You can also access the tool by pointing your browser directly to

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



Note

Access to this tool is limited to users with Cisco.com login accounts.

Choose a product family or enter a specific product number to search for the minimum supported software release needed for your hardware.

Processor and Memory Specifications

Table A-3 Processor and Memory Specifications

Memory Type	Size	Quantity	Description
SDRAM	1 GB	1	SDRAM DIMM
	2 GB	1	SDRAM DIMM
Boot ROM	3 MB	1	Flash PROM for the ROM monitor program
Primary cache	64 KB (32 KB instruction, 32 KB data)	—	Freescale 7448 processor, internal cache
Secondary cache	1 MB	—	Freescale 7448 processor, internal cache
Flash memory	64 MB	1	Contains the default boot helper (boot loader) image
NVRAM	2 MB	1	Battery-backed SRAM for the system configuration file

Table A-4 CompactFlash Disk Configuration

Memory Size	Product Number
256 MB	MEM-7201-FLD256=

Table A-5 USB Flash Memory Module Specifications

Memory Module Size	Product Number
128-MB USB Flash Token for Cisco 1800/2800/3800/7200	MEMUSB-128FT=
256-MB USB Flash Token for Cisco 1800/2800/3800/7200	MEMUSB-256FT=

Aladdin USB eToken Pro keys are not available from Cisco.

Table A-6 DIMM Configurations

Total SDRAM	Quantity/Description	Product ID
1 GB	1 1-GB DIMM	MEM-7201-1GB=
2 GB	1 2-GB DIMM	MEM-7201-2GB=

SFP Module Specifications and Configurations

Table A-7 SFP Module Configurations

Product ID	Type
SFP-GE-F=	Medium wavelength (100BASE-FX)
SFP-GE-L=	Long wavelength/long haul (1000BASE-LX)
SFP-GE-S=	Short wavelength (1000BASE-SX)
SFP-GE-T=	RJ-45 copper SFP module (1000BSET)
SFP-GE-Z=	Extended distance wavelength (1000BASE-ZX)

Table A-8 provides SFP specifications.

Table A-8 SFP Specifications

Specification	Description
Optical SFP module dimensions	Height: 0.33 in. (8.5 mm) Width: 2.22 in. (56.5 mm) Depth: 0.53 in. (13.4 mm)
Optical connectors	Multimode fiber-optic: LC Single-mode fiber-optic: LC
RJ-45 (copper) SFP module maximum dimensions	Height: 0.55 in. (14.0 mm) Width: 0.54 in. (13.7 mm) Depth: 2.8 in. (71.1 mm)
RJ-45 (copper) SFP module connector	RJ-45

Table A-9 provides SFP port cabling specifications.

Table A-9 SFP Port Cabling Specifications

SFP Module	Wavelength (nm)	Fiber Type	Core Size (microns)	Modal Bandwidth (MHz/km)	Cable Distance
100BASE-FX SFP-GE-F=	1270 1300 1380	MMF	62.5 2.5 50.0 50.0	500	6562 ft. (2 km)
1000BASE-LX/LH SFP-GE-L=	1300	MMF ¹ SMF	62.5 50.0 50.0 9/10	500 400 500 —	1804 ft (550 m) 1804 ft (550 m) 1804 ft (550 m) 6.2 miles (10 km)
1000BASE-SX SFP-GE-S=	850	MMF	62.5 62.5 50.0 50.0	160 200 400 500	722 ft (220 m) 902 ft (275 m) 1640 ft (500 m) 1804 ft (550 m)
1000BASE-ZX SFP-GE-Z=	1550	SMF	9/10	—	229670 ft (70 km)
1000BASE-T SFP-GE-T=	N/A	Copper	N/A	N/A	328 ft. (100 m)

1. A mode-conditioning patch cord is required. Using an ordinary patch cord with MMF, 1000BASE-LX/LH SFP modules, and a short link distance (tens of meters) can cause transceiver saturation resulting in an elevated bit error rate (BER). In addition, when using the LX/LH SFP module with 62.5-micron diameter MMF, you must install a mode-conditioning patch cord between the SFP module and the MMF cable on both the transmit and receive ends of the link. The mode-conditioning patch cord is required for link distances greater than 984 ft (300 m).

Table A-10 provides SFP module power budget information.

Table A-10 SFP Module Transmit Power, Receive Power, and Power Budget

SFP Module	Transmit Power		Receive Power		Power Budget
	Minimum	Maximum	Minimum	Maximum	
SFP-GE-F= For 50/125 cabling For 62.5/125 cabling	-23.5 dBm -20 dBm	-14 dBm -14 dBm	-33.5 dBm -33.5 dBm	-11.8 dBm -11.8 dBm	10 dBm 13.5 dBm
SFP-GE-L=	-9.5 dBm ¹ -11.5 dBm ²	-3 dBm ³	-20 dBm	-3 dBm	7.5 dBm ⁴ and 8.0 dBm ⁵
SFP-GE-S=	-9.5 dBm ⁶	-4 dBm ⁶	-17 dBm	0 dBm	7.5 dBm ⁷
SFP-GE-Z=	0 dBm	5 dBm	-23 dBm	0 dBm	-24 dBm

1. For fiber types 9/125 μ m SMF.
2. For fiber types 62.5/125 μ m MMF and 50/125 μ m MMF.
3. For fiber types 9/125 μ m SMF, 62.5/125 μ m MMF, and 50/125 μ m MMF.
4. For fiber types 50/125 μ m MMF and 62.5/125 μ m MMF.
5. For fiber type 10 μ m SMF.

6. For fiber types 50/125 μm , NA = 0.20 fiber and 62.5/125 μm , NA = 0.275 fiber.
7. For fiber types 50/125 μm MMF and 62.5/125 μm MMF.

For related documentation, see the following documents:

- [Gigabit Interface Converter \(GBIC\) Module and Small Form-Factor Pluggable \(SFP\) GBIC Module Installation Information and Specifications](#)
- [Cisco SFP Optics for Gigabit Ethernet Applications Data Sheet](#)
- [Cisco 1000BASE-T SFP Data Sheet](#)

Gigabit Ethernet RJ-45 Port Pinouts

The Cisco 7201 router has RJ-45 ports for the two 10/100/1000 Gigabit Ethernet/Fast Ethernet/Ethernet connections. In addition, the Cisco 7201 router has an RJ-45 Fast Ethernet Management port. The RJ-45 ports support IEEE 802.3ab (Gigabit Ethernet) and IEEE 802.3u (Fast Ethernet) interfaces compliant with 10BASET, 100BASETX, and 1000BASET specifications.

The RJ-45 ports support standard straight-through and crossover Category 5 UTP cables with RJ-45 connectors. Cisco does not supply Category 5 UTP cables; these cables are available commercially.

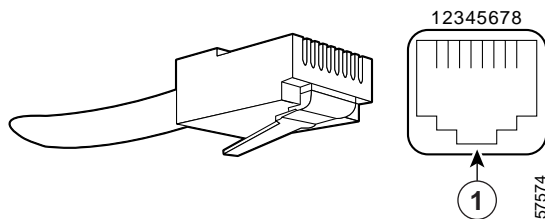


Warning

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. Use caution when connecting cables. Statement 1021

Figure A-1 shows an RJ-45 port and connector. Table A-11 lists the pinouts and signals for the RJ-45 port.

Figure A-1 RJ-45 Port and Connector



1	RJ-45 connector		
---	-----------------	--	--

Table A-11 RJ-45 Receptacle Pinouts

Pin	FE Signal	GE Signal
1	TX DATA ⁺¹	Tx A+
2	TX DATA ⁻	Tx A-
3	RX DATA ⁺²	Rx B+
4	N/C	Tx C+
5	N/C	Tx C-

Table A-11 RJ-45 Receptacle Pinouts (continued)

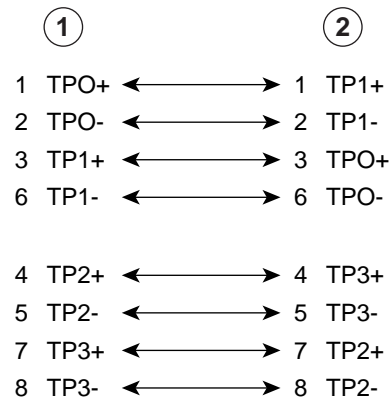
Pin	FE Signal	GE Signal
6	RX DATA-	Rx B-
7	N/C	Rx D+
8	N/C	Rx D-

1. TX DATA = Transmit Data
2. RX DATA = Receive Data

**Note**

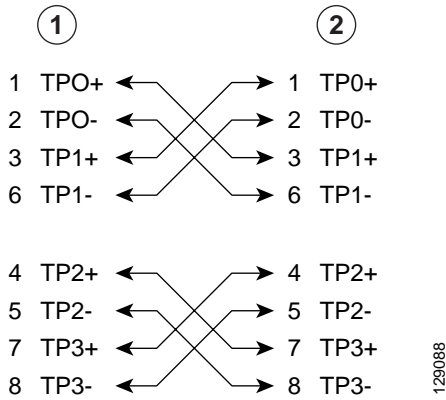
With reference to the RJ-45 pinouts in [Table A-11](#), proper common-mode line terminations should be used for the unused Category 5 UTP cable pairs 4/5 and 7/8. Common-mode line termination reduces electromagnetic interference (EMI).

Depending on your RJ-45 interface cabling requirements, use the pinouts shown in [Figure A-2](#) and [Figure A-3](#) for Gigabit Ethernet straight-through and crossover twisted-pair cable connections. Use [Figure A-4](#) for Ethernet/Fast Ethernet straight-through and crossover twisted-pair cable connections.

Figure A-2 Four Twisted-Pair Straight-Through Cable Schematics for 10/100/1000 and 1000BASE-T SFP Module Ports

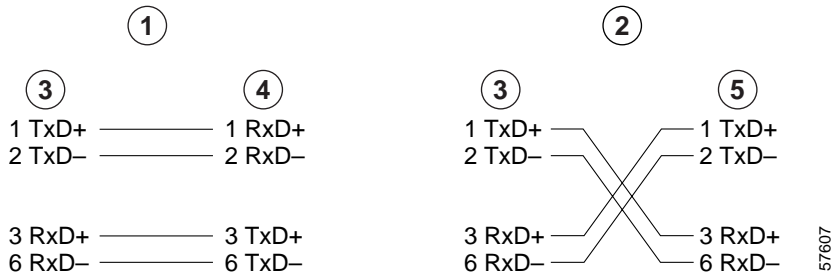
1	Router	2	Hub
---	--------	---	-----

Figure A-3 Four Twisted-Pair Crossover Cable Schematics for 10/100/1000 and 1000BASE-T SFP Module Ports



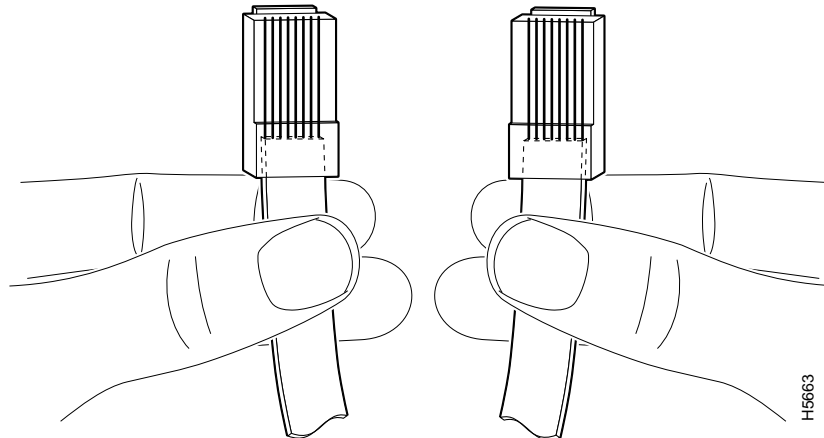
1	Router	2	Hub
---	--------	---	-----

Figure A-4 Ethernet, Fast Ethernet Pinouts—Straight-Through or Crossover Cable



1	Straight-through cable pinout, Ethernet port to a hub or repeater	4	Hub
2	Crossover cable pinout, Ethernet port to a DTE	5	DTE
3	Ethernet port		

To determine whether a UTP cable is a crossover cable or a straight-through cable, hold the two RJ-45 connectors next to each other so you can see the colored wires inside the ends, as shown in [Figure A-5](#).

Figure A-5 Identifying a Crossover or Straight-Through Cable

Examine the sequence of colored wires to determine the type of cable, as follows:

- Straight-through—The colored wires are in the same sequence at both ends of the cable.
- Crossover—The first (far left) colored wire at one end of the cable is the third colored wire at the other end of the cable.

You can identify a crossover cable by comparing the two modular ends of the cable. Holding the cables in your hand, side-by-side, with the tab at the back, the wire connected to the pin on the outside of the left connector (pin 1) should be the same color as the pin on the outside of the right connector (pin 8).

[Table A-12](#) provides information about asynchronous device cabling options.

Table A-12 Asynchronous Device Cabling Options

Cable	Adapter	End Device
Crossover	RJ-45-to-DB-25M	Terminal or DTE
Crossover	RJ-45-to-DB-9M	Terminal or DTE
Straight-through	RJ-45-to-DB-25F	Modem or DCE

Gigabit Ethernet Flow Control Information

Flow control is not configurable. The information in this section explains some of the parameters of flow control.

GE port 0/3:

- When the Cisco 7201 GE 0/3 port is set to **no negotiation auto**, it does not advertise anything in regard to flow control. The Cisco 7201 GE 0/3 port responds to pause frames if the other side makes the request, but will not send pause frames.
- When the Cisco 7201 GE 0/3 port is set to **negotiation auto**, flow control is enabled, which means the peer accepts symmetrical or asymmetrical flow control, and sends pause frames. If the peer does not accept flow control requests, the Cisco 7201 router does not send pause frames. (The Cisco 7201 router always accepts pause frames, whether in fixed mode or auto mode.)

GE ports 0/0, 0/1, and 0/2:

These interfaces function the same as above with the exception that there will never be a pause request transmitted regardless of mode.

Console Port and Auxiliary Port Signals and Pinouts


Note

The console cable kit product number is ACS-2500ASYN.

The Cisco 7201 router does not support Data Carrier Detect (DCD).

Table A-13 Console Port Signals

Pin	Signal	Direction	Description
1	CTS	Out	Clear to Send (tied to pin 8)
2	DSR	Out	Data Set Ready
3	RXD	Out	Receive Data
4	GND	—	Signal Ground
5	GND	—	Signal Ground
6	TXD	In	Transmit Data
7	DTR	In	Data Terminal Ready
8	RTS	In	Ready to Send (tied to pin 1)

Table A-14 lists the RJ-45 auxiliary port signals.

Table A-14 Auxiliary Port Signals

Pin	Signal	Direction	Description
1	RTS	Out	Ready to Send
2	DTR	Out	Data Terminal Ready
3	TXD	Out	Transmit Data
4	RING ¹	In	Ring Indication
5	GND	—	Signal Ground
6	RXD	In	Receive Data
7 ²	DSR/DCD (RLSD)	In	Data Set Ready/Data Carrier Detect (Receive Line Signal Detect)
8	CTS	In	Clear to Send (tracks RTS)

1. RING is not supported on Cisco-supplied adapters. To use this pin, you must create a customized cable.
2. Pin 7 can be used as a DCD input for connection to a modem. The RJ-45-to-DB-25F adapter maps DCD to this pin when used with a straight-through cable.



APPENDIX B

Using the CompactFlash Disk

This appendix describes installation prerequisites you should observe before you can use the CompactFlash Disk in your system, and includes the following sections:

- [Product Description, page B-1](#)
- [Hardware and Software Requirements, page B-2](#)
- [Tools and Parts Required, page B-2](#)
- [Compatibility Requirements, page B-2](#)
- [Boot Environment Variables, page B-3](#)
- [Sample Upgrade Process, page B-5](#)
- [Working with a CompactFlash Disk, page B-5](#)

Product Description

CompactFlash Disks are designed with flash technology, a nonvolatile storage solution that does not require a battery to retain data indefinitely. CompactFlash Disks provide complete PCMCIA-ATA functionality and compatibility as defined by the CompactFlash Association in their CF+ and CompactFlash Specification, revision 1.4.

The CompactFlash Disk is more flexible than linear flash memory because the CompactFlash Disk has controller circuitry that allows it to emulate a hard disk and automatically maps out bad blocks and performs automatic block erasure. Further, the CompactFlash Disk provides the capability to allocate noncontiguous sectors, which eliminates the need for the **squeeze** command (previously required with linear flash memory cards).

The CompactFlash Disk provides increased flash-based memory space—256 MB—for storage of system configuration files, Cisco IOS software images, and other types of system-related files. [Table B-1](#) provides memory information for the CompactFlash Disk.

Table B-1 CompactFlash Disk Memory Options

Memory Size	Product Number
256 MB	MEM-7201-FLD256=

**Note**

The CompactFlash Disk is only supported on systems with the Cisco IOS File System feature, and the Cisco IOS File System feature is supported in Cisco IOS Release 12.0(1) or later releases of 12.0. In general, CompactFlash Disk functionality requires Cisco IOS Release 12.0(2) or a later release of 12.0.

The Cisco IOS File System feature provides a single interface to all file systems your system uses:

- Flash memory file systems—CompactFlash Disks and onboard flash memory
- Network file systems—File Transfer Protocol (FTP), Remote Copy Protocol (rcp), and TFTP
- Any other endpoint for reading or writing data—NVRAM, the running configuration, ROM, raw system memory, system bundled microcode, Xmodem, Flash load helper log, modems, and BRI MUX interfaces

**Note**

A complete discussion of the Cisco IOS File System feature is beyond the scope of this publication. For information about this feature, refer to the *Configuration Fundamentals Configuration Guide* and *Configuration Fundamentals Command Reference* publications for Cisco IOS Release 12.x. These publications are available on the Documentation DVD and through Cisco.com. (For information on how to access Cisco.com, see the “[Obtaining Documentation, Obtaining Support, and Security Guidelines](#)” section on page xviii.)

Hardware and Software Requirements

The Cisco 7201 router uses only a 256-MB CompactFlash Disk.

The minimum Cisco IOS release for the Cisco 7201 CompactFlash Disk is Cisco IOS Release 12.4(4)XD7.

Tools and Parts Required

You need some or all of the following tools and parts to install a CompactFlash Disk:

- Antistatic wrist strap
- Access to a Trivial File Transfer Protocol (TFTP) server
- CompactFlash Disk (MEM-7201-FLD256=)

Compatibility Requirements

This section discusses CompactFlash Disk compatibility and use between supported systems.

In order to boot a Cisco IOS software image from the CompactFlash Disk, when the system is executing from the ROM monitor software image, your ROM monitor software image and your boot image must be from one of the minimum Cisco IOS releases listed in the “[Hardware and Software Requirements](#)” section on page B-2. Use the **show version** or **show hardware** commands to verify that your system is running these software images.

The **format** command places a processor-specific file system on the CompactFlash Disk so that the ROM monitor software can read the CompactFlash disk media. If you plan to use the **boot** or **dir** commands at the ROM monitor prompt (`rommon>`), you might need to reformat your CompactFlash Disk *if* it was not already formatted on a like system processor.

For simple file storage and retrieval functions, CompactFlash Disks can be interchanged between any Cisco 7201 router.

**Note**

The CompactFlash Disk in the Cisco 7201 router is supported on the c7200p-kboot-mz image.

System Memory and Software Image Functions and Interactions

The read-only memory (ROM) monitor image on your system performs important functions, such as running a brief set of system diagnostics, and initializing the hardware. This image gains control at reset or power on, or after a nonrecoverable event (such as a bus error). The ROM monitor software image has a rudimentary user interface that is recognizable by way of the ROM monitor prompt (`rommon>`). The ROM monitor software image has console drivers and trap handlers for parity and bus errors; however, the ROM monitor does not have any network interface code and it *cannot* boot an image over the network.

**Note**

The ROM monitor is *only* able to load an image from boot flash memory or a CompactFlash Disk.

By default, and as a result of a reset or power on, the ROM monitor loads the boot image from boot flash memory. If the ROM monitor cannot find a bootable image in boot flash memory, it searches the CompactFlash Disk for the first bootable image. Normally, this would be the c7200p-kboot-mz image.

The boot image, when loaded, looks in the boot environment variables—stored in nonvolatile random-access memory (NVRAM)—to determine the location of the Cisco IOS software image and the configuration to use. If boot environment variables are not defined, the system will boot the first image found on the CompactFlash Disk.

The operation of the boot environment variables is described in the “[Boot Environment Variables](#)” section, which follows.

Boot Environment Variables

The contents of the boot environment variables, which are stored in the configuration file in NVRAM, determine the actions your system takes on bootup. To see the current settings of these variables, use the **show bootvar** command as follows:

```
Router> show bootvar
BOOT variable =
CONFIG_FILE variable =
Current CONFIG_FILE variable =
BOOTLDR variable does not exist
Configuration register is 0x100
```

Following are explanations for each of these boot environment variables:

- **BOOT** variable—Points to the Cisco IOS software image that you want to boot; you set it in configuration mode. The default software image is the CISCOxxx image (where xxx is a filename assigned by the system, if you do not enter a specific filename). The system then looks for the first image on the CompactFlash Disk in slot 0.

Enter configuration mode and specify a filename and the CompactFlash Disk slot from which to boot using the **configure terminal** and **boot system** commands as follows:

```
Router# configure terminal
Enter configuration commands, one per line. End with CTRL-Z.
System(config)# boot system flash disk0:rsp-p-mz.12-0
```

The result of this configuration file entry is that the BOOT variable is disk0:c7200p-kboot-mz.122...bin.

CONFIG_FILE (configuration file) variable—Determines where the configuration is read from on bootup; you set it in configuration mode as follows:

```
Router# configure terminal
Enter configuration commands, one per line. End with CTRL-Z.
System(config)# boot config disk0:configfile
```

The result of this configuration file entry is that the CONFIG_FILE variable is disk0:configfile.

- **BOOTLDR** (boot loader) variable—Determines which image is used as the boot helper (boot image); you set it in configuration mode as follows:

```
Router# configure terminal
Enter configuration commands, one per line. End with CTRL-Z.
System(config)# boot bootldr bootflash:c7200p-kboot-mz
```

The result of this configuration file entry is that the BOOTLDR variable is bootflash:c7200p-kboot-mz.

- **Configuration register** variable—Instructs the system where to look for a bootable Cisco IOS software image; you set it as a hexadecimal value in configuration mode as follows:

```
Router# configure terminal
Enter configuration commands, one per line. End with CTRL-Z.
System(config)# config-register 0x102
```

The result of this configuration file entry is that the configuration register is set to hexadecimal 0x102. See [Chapter 3, “Starting and Configuring the Router”](#) and [Appendix C, “Configuration Register Information”](#) for information about the configuration register.

Sample Upgrade Process

This section applies to users who want to use a CompactFlash Disk for simple file storage.

-
- Step 1** Format your onboard flash memory—called boot flash memory. (See the **format** command description in the “[Software Command Overview](#)” section on page B-6.)
 - Step 2** Upgrade your onboard flash memory by copying the Cisco IOS Release 12.x boot image (c7200p-kboot-mz) into onboard flash memory. (See the “[Software Command Overview](#)” section on page B-6.)
 - Step 3** Copy the Cisco IOS Release 12.x software image from onboard flash memory to the CompactFlash Disk.
 - Step 4** Change the boot variables in your configuration file to point to the new Cisco IOS image in your CompactFlash Disk. (See the preceding section, “[Boot Environment Variables](#),” and the “[Making a CompactFlash Disk-Based Software Image the Bootable Software Image](#)” section on page B-13.)
 - Step 5** Reboot your system to load the Cisco IOS Release 12.x software image from the CompactFlash Disk.
 - Step 6** Insert a new CompactFlash Disk. (See the “[Removing and Installing the CompactFlash Disk](#)” section on page 4-3.)
 - Step 7** With your system running Cisco IOS Release 12.x, format the blank CompactFlash Disk. (See the **format** command description in [Table B-2](#) on page B-6, and the “[Using the format Command](#)” section on page B-9.)
-

You should now be able to store configuration files and Cisco IOS software images on your CompactFlash Disk.

Working with a CompactFlash Disk

This section provides basic instructions for working with a CompactFlash Disk in your system. Detailed descriptions of more complex CompactFlash Disk options and the Cisco IOS File System feature are beyond the scope of this publication and can be found in the following Cisco IOS Release 12.x publications:

- *Configuration Fundamentals Configuration Guide*, in the chapter “File Management”
- *Configuration Fundamentals Command Reference*, in the chapter “File Management Commands”

**Note**

These and all publications are available online, on the Documentation DVD, and on Cisco.com. For information on how to access Cisco.com, see the “[Obtaining Documentation, Obtaining Support, and Security Guidelines](#)” section on page xviii.

This section includes the following subsections:

- [Software Command Overview](#), page B-6
- [Using Software Commands](#), page B-7
- [Enabling Booting from a CompactFlash Disk](#), page B-12
- [Making a CompactFlash Disk-Based Software Image the Bootable Software Image](#), page B-13

Software Command Overview

This section lists some of the basic software commands you can use with the CompactFlash Disk. Examples of these commands are included in the sections that follow.

The CompactFlash Disk and other memory devices and locations in your system are defined as *file systems*, which are locations where you can store, use, or retrieve files and software images. (See the brief discussion about the Cisco IOS File System feature in the “Working with a CompactFlash Disk” section on page B-5.)

A CompactFlash Disk in the Cisco 7201 is referred to as `disk0`.

The following partial output of the **show file systems** command shows a sample system with a CompactFlash Disk—called *disk0*—installed in slot 0:

```
System# show file systems
File Systems:

      Size(b)      Free(b)      Type  Flags  Prefixes

(Additional displayed text omitted from this example.)

      48755200     48747008     flash   rw    disk0:
```

Table B-2 lists the software commands that you can use with the CompactFlash Disk.



Note

You can use other arguments with some of the commands listed in Table B-2; however, in Table B-2 and throughout this document, command arguments are limited to those that apply to the CompactFlash Disk and related file systems.

For a discussion of additional command arguments, refer to the *Configuration Fundamentals Command Reference* document, in the chapter “File Management Commands.”

Table B-2 CompactFlash Disk-Related Software Commands for the Cisco 7201

Command and Arguments	Purpose
<code>cd [disk0: directory-name]</code>	Changes current directory. Allows you to move between directories on a CompactFlash Disk, where <i>directory-name</i> is the directory to which you want to move.
<code>copy [disk0:]source-filename [tftp:]destination-filename</code>	Copies from one file to another. Allows you to make a copy of a file (<i>source-filename</i>) located on a source file system (disk0:) and place it with either the same filename or a different filename (<i>destination-filename</i>) on a destination file system. Along with disk0: , the source and destination file system arguments include, but are not limited to: <ul style="list-style-type: none"> bootflash: (onboard flash memory) nvr: (onboard nonvolatile random-access memory) running-config (the running system configuration file) startup-config (the startup system configuration file) tftp: (a TFTP server to which you have access)

Table B-2 CompactFlash Disk-Related Software Commands for the Cisco 7201 (continued)

Command and Arguments	Purpose
<code>delete [disk0:] filename</code>	Deletes a file. Allows you to delete any file you designate, where <i>filename</i> designates the name of the file.
<code>dir [/all disk0:]</code>	Lists files on a file system. Allows you to list the contents of the CompactFlash Disk in slot 0. The /all argument lists all files on all file systems in your system.
<code>format [bootflash: disk0:]</code>	Formats a file system. Allows you to format onboard flash memory (bootflash:) or a new CompactFlash Disk (disk0:). This command also allows you to reformat a CompactFlash Disk that was formatted on another type of system. Note This command destroys all data currently in flash memory; therefore, we strongly recommend that you use the format command with caution to prevent irretrievable loss of data.
<code>mkdir [disk0:] directory-name</code>	Creates a new directory. Allows you to create directories on a CompactFlash Disk, where <i>directory-name</i> is the name you assign to this directory.
<code>pwd</code>	Displays current working directory. Allows you to display the name of the CompactFlash Disk directory in which you are currently working.
<code>rename [disk0:] filename [disk0:] filename</code>	Renames a file. Allows you to rename a file that is located on one CompactFlash Disk and assign to that file another (or the same) file system path and filename. The first group of arguments defines the source (current) file system path and filename, and the second set of arguments defines the destination file system path and filename.
<code>rmdir [disk0:] directory-name</code>	Removes an existing directory. Allows you to remove a directory that currently exists on a CompactFlash Disk, where <i>directory-name</i> is the name of the directory you want to remove.
<code>show [disk0:]</code>	Lists information about CompactFlash Disk format and geometry.

Using Software Commands

This section provides examples of some of the basic software commands you can use with the CompactFlash Disk. See [Table B-2](#) for optional arguments you can use with some of the following commands:

- [Using the cd Command, page B-8](#)
- [Using the show Command, page B-8](#)
- [Using the pwd Command, page B-9](#)
- [Using the dir Command, page B-9](#)
- [Using the format Command, page B-9](#)
- [Using the mkdir Command, page B-10](#)

- [Using the rmdir Command, page B-11](#)
- [Using the delete Command, page B-11](#)

Using the cd Command

Use the **cd** command by defining a specific path name. Then, to verify your working directory, use the **pwd** command:

```
System# cd disk0:
System# pwd
disk0:/
```

You can also move up (or back) one level in the CompactFlash Disk directory hierarchy using the **cd ..** command, and then verify your working directory with the **pwd** command:

```
System# pwd
disk0:daily_dir/
System# cd ..
System# pwd
disk0:/
System#
```

Using the show Command

To display information about CompactFlash Disk format and geometry, use the **show [disk0:]** command:

```
System# show disk0:filesys
***** ATA Flash Card Geometry/Format Info *****

ATA CARD GEOMETRY
  Number of Heads:          16
  Number of Cylinders       840
  Sectors per Cylinder     32
  Sector Size               512
  Total Sectors             430080

ATA CARD FORMAT
  Number of FAT Sectors    105
  Sectors Per Cluster     16
  Number of Clusters      26822
  Number of Data Sectors  429536
  Base Root Sector        338
  Base FAT Sector         128
  Base Data Sector        370
```

In this example:

- Number of Heads is the number of heads on the CompactFlash Disk.
- Number of Cylinders is the number of cylinders on the CompactFlash Disk.
- Sectors per Cylinder is the number of sectors in each cylinder.
- Sector Size is the number of bytes in each sector.
- Total Sectors is the total number of sectors on the CompactFlash Disk.
- Number of FAT Sectors is the number of sectors used to track allocation of clusters to files.
- Sectors Per Cluster is the number of sectors contained in each cluster. (Files grow by a minimum of one cluster.)
- Number of Clusters is the total number of clusters available for use by files.

- Number of Data Sectors is the number of sectors available for files.
- Base Root Sector is the logical address of the first sector of the root directory.
- Base FAT Sector is the first sector in the File Allocation Table (FAT).
- Base Data Sector is the first sector available for use by files.

Using the pwd Command

You can verify your working directory by using the **pwd** command:

```
System# pwd
disk1:daily_dir/
System# cd ..
System# pwd
disk1:/
System#
```

Using the dir Command

To list the directory structure and contents of the CompactFlash Disk from which you are currently working, use the **dir** command with no arguments:

```
System# dir
Directory of disk0:/

  1 drw-          0   Jul 25 1998 10:23:11  daily_dir
  2 drw-          0   Jul 25 1998 10:28:37  access_lists

64755200 bytes total (64742912 bytes free)
System#
```

Note that the size of the CompactFlash Disk is shown in the output of the **dir** command. (A 64-MB CompactFlash Disk is shown in this example.) You can also view the contents of other directories and file systems using specific optional arguments with the **dir** command.

Using the format Command

To format a new CompactFlash Disk, use the **format [disk0:]** command.



Note

You must format a new CompactFlash Disk before you can use it. If you plan to use a CompactFlash Disk that was formatted and used on another type of system, see the [“Compatibility Requirements” section on page B-2](#) to determine if you need to reformat the CompactFlash Disk first.



Caution

The formatting procedure erases all information on the CompactFlash Disk. To prevent the loss of important data that might be stored on a CompactFlash Disk, proceed carefully. If you want to save data that is currently on your CompactFlash Disk, copy the data to a TFTP server or to another CompactFlash Disk on another router *before* you format the new CompactFlash Disk. A CompactFlash Disk that was shipped as part of a configured system contains a CompactFlash Disk-compatible Cisco IOS software image; therefore, you do not need to format it to use it in the system in which it was shipped.

**Note**

If you order a spare CompactFlash Disk, it is shipped blank; therefore, you must format it before you can use it.

Use the following procedure to format a new CompactFlash Disk using the **format** command. (The procedure assumes you have already booted your system.)

Step 1 Insert the CompactFlash Disk into slot 0 using the procedures in the [“Removing and Installing the CompactFlash Disk”](#) section on page 4-3.

Step 2 Use the **format disk0:** command to format the CompactFlash Disk in slot 0 as follows:

```
Router# format disk0:

Format operation may take a while. Continue? [confirm]
Format operation will destroy all data in "disk0:". Continue? [confirm]

Format: Drive communication & 1st Sector Write OK
Writing Monlib
sectors.....
.....
....
Monlib write complete

Format: All system sectors written. OK...

Format: Total sectors in formatted partition: 125152
format: Total bytes in formatted partition: 64077824
Format: Operation completed successfully.

Format of disk0 complete
```

**Note**

A 64-MB CompactFlash Disk was formatted in this example.

The new CompactFlash Disk is now formatted and ready to use in the system on which you formatted it. (For specific formatting and compatibility requirements, see the [“Compatibility Requirements”](#) section on page B-2.)

Using the mkdir Command

To create a directory on the CompactFlash Disk, use the **mkdir** command. The following example shows how to create a directory called *daily_dir* on the CompactFlash Disk in slot 0, and then verify that it was created:

```
System# mkdir disk0:daily_dir
Created dir disk0:daily_dir
System# dir
Directory of disk0:/

 1  drw-          0   Jul 25 1998 10:15:43  daily_dir

48755200 bytes total (48751104 bytes free)
System#
```

**Note**

If you create a directory and place a file in it that you plan to access or use later on, be sure to define the entire directory path to the file as you enter the appropriate software commands.

For example, if you placed the file *itsa.file* into the directory *daily_dir* on the CompactFlash Disk in slot 0, you must designate the entire directory path as follows: *disk0:daily_dir/itsa.file*. Otherwise, the system might not be able to locate this file.

Using the rmdir Command

To remove a directory from the CompactFlash Disk, use the **rmdir** command. The following example shows how to remove the directory *daily_dir* from the CompactFlash Disk in slot 0, and then verify that it was removed:

```
System# rmdir disk0:daily_dir
Delete disk0:daily_dir? [confirm] y
Removed dir disk0:daily_dir
System# dir
Directory of disk0:/

   No files in directory.

48755200 bytes total (48751104 bytes free)
System#
```

Using the delete Command

To delete a file from a CompactFlash Disk, use the **delete** command. Use the **dir** command to find the file you want to delete, and then use the **delete** command to delete it.

The following example shows how to find a file (called *fun1*) on the CompactFlash Disk, delete the file, and then verify that it is deleted:

Step 1 Find the file you want to delete:

```
System# dir
Directory of disk0:/

   1  drw-          0   May 10 1998 09:54:53 fun1

48755200 bytes total (48742912 bytes free)
```

Step 2 Delete the file *fun1*:

```
System# delete disk0:fun1
```

Step 3 Verify that the file *fun1* is deleted:

```
System# dir
Directory of disk0:/

   No files in directory.

48755200 bytes total (48742912 bytes free)
System#
```

Enabling Booting from a CompactFlash Disk

This section explains how to enable booting from a CompactFlash Disk.

To enable booting from a CompactFlash Disk, set configuration register bits 3, 2, 1, and 0 to a value between 2 and 15 in conjunction with the **boot system [disk0:]filename** configuration command. This section includes only descriptions of **boot** commands specific to the CompactFlash Disk. (You can use either the **slotn:** argument or the **diskn:** argument for **boot** commands.)

Following are definitions of the various CompactFlash Disk-related **boot** commands:

- **boot system flash disk0:** or **boot system slot0:**—Boots the first file in the CompactFlash Disk in slot 0.
- **boot system flash disk0:herfile** or **boot system slot0:herfile**—Boots the file named *herfile* from the CompactFlash Disk in slot 0.

As you enter **boot** commands, pay attention to how you use the Spacebar, which influences the way your system interprets the commands. Also, ensure that you define the entire path to a file as you enter the **boot** commands; otherwise, the system might not be able to find the file.

For example, notice the difference in the following correct and incorrect commands:

```
System(config)# boot system flash disk0:myfile
```

Based on the preceding correct command, the system boots the file specified (*myfile*).

```
System(config)# boot system flash disk0: myfile
```

Based on the preceding incorrect command, the system finds the *filename* field blank because there is a space after **disk0:**. In this case, the system ignores the filename argument and boots the first file on the CompactFlash Disk, which might not be the file called *myfile*.

Use the following procedure to enable booting the file *myfile* from a CompactFlash Disk:

-
- Step 1** Enter configuration mode and specify an image filename in the CompactFlash Disk slot from which to boot by using the **configure terminal** command, as follows:

```
System# configure terminal
Enter configuration commands, one per line. End with CTRL-Z.
System(config)# boot system flash disk0:myfile
```

- Step 2** Enable the **boot system flash disk0:myfile** command using the **config-register** command with the hexadecimal value shown in the following example:

```
System(config)# config-reg 0x2102
```

This command, with the hexadecimal value 0x2102, results in the following:

- Enables the system to boot the default boot ROM software if the CompactFlash Disk-based image fails to boot—hexadecimal value 0x2000
- Disables Break—hexadecimal value 0x0100
- Enables the image *myfile* as the default boot image—hexadecimal value 0x0002

Step 3 Press **Ctrl-Z** to exit configuration mode:

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

Step 4 Save the new configuration to NVRAM by using the **copy system:running-config nvram:startup-config** command as follows:

```
System# copy system:running-config nvram:startup-config
```

Making a CompactFlash Disk-Based Software Image the Bootable Software Image

This section explains how to make a CompactFlash Disk-based Cisco IOS software image a bootable image.

After you copy a software image to the CompactFlash Disk, use the following series of commands to make the image bootable (the file named *new.image* in this example). The software image in this example is located on the CompactFlash Disk in slot 0. Note that the **config-register** command is also a part of this command sequence because you must set the configuration register to 0x2102 to enable loading an image from the CompactFlash Disk.

```
System# configure terminal  
System(config)# no boot system  
System(config)# boot system flash disk0:new.image  
System(config)# config-register 0x2102  
Ctrl-Z  
System# copy system:running-config nvram:startup-config  
System# reload
```

When the system reloads, it boots the image *new.image* from the CompactFlash Disk in slot 0



Configuration Register Information

The following information is found in this appendix:

- [Configuration Bit Meanings, page C-1](#)
- [Displaying the Configuration Register While Running Cisco IOS, page C-5](#)
- [Displaying the Configuration Register While Running ROM Monitor, page C-5](#)
- [Setting the Configuration Register While Running Cisco IOS, page C-6](#)
- [Setting the Configuration Register While Running ROM Monitor, page C-6](#)

Configuration Bit Meanings

Use the processor configuration register information contained in this appendix to do the following:

- Set and display the configuration register value
- Force the system into the bootstrap program
- Select a boot source and default boot filename
- Enable or disable the Break function
- Control broadcast addresses
- Set the console terminal baud rate
- Load operating software from ROM
- Enable booting from a Trivial File Transfer Protocol (TFTP) server

[Table C-1](#) lists the meaning of each of the configuration memory bits. Following the table is a more in-depth description of each setting.

Table C-1 Configuration Register Bit Settings

Bit No.	Hex	Meaning
00–03	0x0000–0x000F	Boot field
06	0x0040	Causes the system software to ignore nonvolatile random-access memory (NVRAM) contents
07	0x0080	Original equipment manufacturer (OEM) bit enabled
08	0x0100	Break disabled
10	0x0400	IP broadcast with all zeros

Table C-1 Configuration Register Bit Settings (continued)

Bit No.	Hex	Meaning
11–12	0x800–0x1000	Console line speed
13	0x2000	Boots default ROM software if initial boot fails
14	0x4000	IP broadcasts do not have network numbers
15	0x8000	Enables diagnostic messages and ignores NVRAM contents

Bits 0–3

The lowest four bits of the processor configuration register (bits 3, 2, 1, and 0) form the boot field. [Table C-2](#) provides information about the bits settings.

Table C-2 Bits 0–3 Settings

Boot Field	Meaning
0	Stays at the system bootstrap prompt (ROM monitor) on a reload or power cycle
1	Boots the boot helper image as a system image
2	Full boot process, which loads the Cisco IOS image into flash memory
2-F	Specifies a default filename for booting over the network from a TFTP server

The boot field specifies a number in binary. If you set the boot field value to 0, you must have a console port access to boot the operating system manually. Boot the operating system by entering the **b** command at the bootstrap prompt as follows:

```
> b [tftp] flash filename
```

Definitions of the various command options follow:

- b**—Boots the default system software from ROM
- b flash**—Boots the first file in flash memory
- b filename [host]**—Boots over the network using TFTP
- b flash filename**—Boots the file (*filename*) from flash memory

If you set the boot field value to a value of 2 through F, and there is a valid system **boot** command stored in the configuration file, the router boots the system software as directed by that value. (See [Table C-3](#).) If you set the boot field to any other bit pattern, the router uses the resulting number to form a default boot filename for netbooting.

If there are no **boot** commands in the configuration file, the router attempts to boot the first file in system flash memory. If no file is found in system flash memory, the router attempts to netboot a default file with a name derived from the value of the boot field (for example, cisco2-7201). If the netboot attempt fails, the boot helper image in boot flash memory will boot up.

If **boot** commands are 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 the end of the list is reached without a file being successfully booted, the router will retry the **netboot** commands up to six times if bit 13 of the configuration register is set, otherwise it will load the operating system software available

in ROMmon. If bit 13 is not set, the router will continue to netboot images indefinitely. The default setting for bit 13 is 0. If bit 13 is set, the system boots the boot helper image found in boot flash memory without any retries.

The server creates a default filename as part of the automatic configuration processes. To form the boot filename, the server starts with Cisco and links the octal equivalent of the boot field number, a dash, and the image name. [Table C-3](#) lists the default boot filenames or actions.



Note

A **boot system configuration** command in the router configuration in NVRAM overrides the default netboot filename.

Table C-3 Default Boot Filenames

Action/File Name	Bit 3	Bit 2	Bit 1	Bit 0
Bootstrap mode	0	0	0	0
ROM software	0	0	0	1
Flash software	0	0	1	0
cisco3-<image-name1>	0	0	1	1
cisco4-<image-name2>	0	1	0	0
cisco5-<image-name3>	0	1	0	1
cisco6-<image-name4>	0	1	1	0
cisco7-<image-name5>	0	1	1	1
cisco10-<image-name6>	1	0	0	0
cisco11-<image-name7>	1	0	0	1
cisco12-<image-name8>	1	0	1	0
cisco13-<image-name9>	1	0	1	1
cisco14-<image-name10>	1	1	0	0
cisco15-<image-name11>	1	1	0	1
cisco16-<image-name12>	1	1	1	0
cisco17-<image-name13>	1	1	1	1

Bit 6

Bit 6 causes the system software to ignore nonvolatile random-access memory (NVRAM) contents.

Bit 7

Bit 7 enables the OEM bit. It disables the bootstrap messages at startup.

Bit 8

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 system into the bootstrap monitor, halting normal operation. A Break can be sent in the first sixty seconds while the system reboots, regardless of the configuration settings.

Bit 10 and Bit 14

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 IP broadcast address. [Table C-4](#) shows the combined effect of bit 10 and bit 14.

Table C-4 Bit 10 and Bit 14 Settings

Bit 14	Bit 10	IP Address (<net> <host>)
Off	Off	<ones><ones>
Off	On	<zeros><zeros>
On	On	<net><zeros>
On	Off	<net><ones>

Bit 11 and Bit 12

Bit 11 and bit 12 in the configuration register determine the baud rate of the console terminal. [Table C-5](#) shows the bit settings for the four available baud rates. (The factory set default baud rate is 9600.)

Table C-5 Bit 11 and Bit 12 Settings

Baud	Bit 12	Bit 11
9600	0	0
4800	0	1
2400	1	1
1200	1	0

Bit 13

Bit 13 determines the server response to a bootload failure. If **boot** commands are 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 the end of the list is reached without a file being successfully booted, the router will retry the **netboot** commands up to six times if bit 13 of the configuration register is set, otherwise it will load the operating system software available in ROMmon. If bit 13 is not set, the router will continue to netboot images indefinitely. The default setting for bit 13 is 0. If bit 13 is set, the system boots the boot helper image found in boot flash memory without any retries.

Bit 15

Bit 15 enables diagnostic messages and ignores NVRAM contents.

Displaying the Configuration Register While Running Cisco IOS

The configuration register can be viewed by using the **show version** or **show hardware** command.

The following is sample output of the **show version** command from a Cisco 7201 router.

```
Router# show version
Cisco IOS Software, 7200 Software (C7200P-ADVENTERPRISEK9-M), Version
12.4(biffDEV.061001), INTERIM SOFTWARE Copyright (c) 1986-2006 by Cisco Systems, Inc.
Compiled Sun 01-Oct-06 23:42 by biff
ROM: System Bootstrap, Version 12.4(4r)XD5, RELEASE SOFTWARE (fc1)
BOOTLDR: Cisco IOS Software, 7200 Software (C7200P-KBOOT-M), Version 12.4(TAZ3DEV.060927),
INTERIM SOFTWARE
c7201alpha1 uptime is 5 days, 18 hours, 32 minutes System returned to ROM by power-on
System image file is "disk0:c7200p-adventerprisek9-mz.2006-10-01.biffdev"
This product contains cryptographic features and is subject to United States and local
country laws governing import, export, transfer and use. Delivery of Cisco cryptographic
products does not imply third-party authority to import, export, distribute or use
encryption.
Importers, exporters, distributors and users are responsible for compliance with U.S. and
local country laws. By using this product you agree to comply with applicable laws and
regulations. If you are unable to comply with U.S. and local laws, return this product
immediately.
A summary of U.S. laws governing Cisco cryptographic products may be found at:
http://www.cisco.com/wwl/export/crypto/tool/stqrg.html
If you require further assistance please contact us by sending email to export@cisco.com.
Cisco 7201 (c7201) processor (revision A) with 917504K/65536K bytes of memory.
Processor board ID 222222222222
MPC7448 CPU at 1666Mhz, Implementation 0, Rev 2.2
1 slot midplane, Version 2.255
Last reset from power-on
1 FastEthernet interface
4 Gigabit Ethernet interfaces
2045K bytes of NVRAM.
62443K bytes of USB Flash usbflash0 (Read/Write)
250880K bytes of ATA PCMCIA card at slot 0 (Sector size 512 bytes).
65536K bytes of Flash internal SIMM (Sector size 512K).
Configuration register is 0x2
```

Displaying the Configuration Register While Running ROM Monitor

If the bootstrap prompt is ">", the **o** command displays the virtual configuration register currently in effect. It includes a description of the bits. See the following sample output:

```
>o
Configuration register + 02x100 at last boot
Bit#      Configuration register option settings:
15        Diagnostic mode disabled
14        IP broadcasts do not have network numbers
13        Boot default ROM software if network boot fails
12-11     Console speed is 9600 baud
10        IP broadcasts with ones
```

```

09          Do not use secondary bootstrap
08          Break disabled
07          OEM disabled
06          Ignore configuration disabled
05          Fast boot disabled
04          Fan boot disabled
03-00      Boot to ROM monitor

```

If the prompt is “rommon1”, the **confreg** command displays the virtual configuration register currently in effect. It includes a description of the bits. See the following sample output:

```

rommon 1 > confreg

Configuration Summary
enabled are:
load rom after netboot fails
console baud: 9600
boot: the ROM Monitor

Do you wish to change the configuration? y/n [n]

```

Setting the Configuration Register While Running Cisco IOS

The configuration register can be set in the configuration mode with the **config-register 0x value** command. See the following sample output:

```

Router# configure terminal
Enter configuration commands, one per line. End with CNTRL/Z.
Router(config)#config-register 0x2142
Router(config)#end
Router#
%SYS-5-CONFIG_I: Configured from console by console

```

Setting the Configuration Register While Running ROM Monitor

If the prompt is “>”, the **o/r0x value** command sets the configuration register. See the following sample output:

```

>o/r 0x2102
>

```

If the prompt is “rommon1”, the **confreg** command sets the configuration register. It prompts the user about each bit. See the following sample output:

```

rommon 1 > confreg

Confiruatiun Summary
enabled are:
load rom after netboot fails
console baud: 9600
boot: the ROM Monitor

do you wish to change the configuration y/n [n]: y
enable "diagnostic mode"? y/n [n]: n
enable "use net in IP bcast address"? y/n [n]: n
disable "use rom after netboot fails"? y/n [n]: n
enable "use all zero broadcast"? y/n [n]: n
enable "break/abort has effect"? y/n [n]: n

```

```
enable "ignore system config info"? y/n [n]: n
change console baud rate? y/n [n]: n
change the boot characteristics? y/n [n]:y
enter to boot:
0 = ROM Monitor
1 = the boot helper image
2 - 15 = boot system
  [0]: 2

Configuration Summary:
enabled are:
load rom after netboot fails
console baud: 9600
boot: image sepcified by the boot system commands or default to: cisco2-c7201

do you wish to change the configuration? y/n [n] n

You must reset or power cycle for new config to take effect
rommon 2 >
```

■ Setting the Configuration Register While Running ROM Monitor



INDEX

A

- AC power supply
 - removing [4-7](#)
 - replacing [4-9](#)
- AC power supply product number [A-2](#)
- airflow
 - chassis clearance [3-6](#)
 - exhaust [3-6](#)
 - monitoring [3-6](#)
 - through the chassis [2-4](#)
- ALARM LED [1-4](#)
- ambient site temperature [2-4](#)
- asynchronous device cabling options [2-16](#)
- ATM interfaces, configuring [3-17](#)
- audience, documentation [i-x](#)
- AutoInstall, configuring [3-10](#)
- auxiliary port [1-10](#)
 - cables [2-15](#)
 - specifications [A-10](#)

B

- banner, system [3-9](#)
- baud rate [2-17](#)
- boot helper image [5-8](#)
- boot image, Cisco 7201 [5-8](#)
- boot loader image [5-8](#)
- Boot ROM [1-10](#)
- boot system flash command [B-12](#)

C

- cable-management kit [2-3](#)
- cables
 - auxiliary port [2-15](#)
 - connecting port adapter [2-14](#)
 - console port [2-15](#)
 - Fast Ethernet Management port [2-17](#)
 - grounded, shielded cable Ethernet/Fast Ethernet warning [2-22](#)
 - I/O [2-14](#)
 - native Gigabit Ethernet [2-18](#)
 - RJ-45 pinout [A-6](#)
 - specifications [A-1](#)
 - swapping power [5-6](#)
 - troubleshooting power subsystem [5-5](#)
- cache memory [1-10](#)
- cautions
 - blank port adapter use [4-7](#)
 - changed or replaced password required [3-28](#)
 - changing passwords [3-28](#)
 - chassis overheating [3-6](#)
 - erasing router configuration [3-28](#)
 - installing power supply filler plates [4-7](#)
 - lithium battery [i-xvi](#)
 - port adapter insertion [4-6](#)
 - prevent overheating [3-6](#)
- cd command [B-8](#)
- CF ACTV (CompactFlash Active) LED [1-4](#)
- changing preferences, ROMmon [3-24](#)
- chassis
 - airflow [2-4](#)
 - clearance [3-6](#)

chassis (continued)

- dimensions 2-2
- ground connection procedure 2-12
- ground lug connector 1-7
- rack-mounting 2-6
- circuit breaker warning 2-6, 2-24, 2-29
- Cisco 7201
 - features 1-2
 - front panel 1-3
 - LEDs 1-4
 - options 1-3
 - rear view 1-7
 - specifications A-1
- Cisco 7201 boot image 5-8
- Cisco Documentation DVD i-xvii
- Cisco IOS documentation i-xvii
- Class 1 laser product 1-6, 4-2
- cleaning procedures for fiber-optic connections 1-5, 5-14
- clearance, chassis 3-6
- commands
 - cd B-8
 - clear counters GigabitEthernet (0 or 1) 3-17
 - clear interface GigabitEthernet (0 or 1) 3-17
 - config-register 3-28, B-12
 - configure 3-20
 - configure memory 3-28
 - configure terminal 3-21, 3-28
 - confreg 3-27
 - copy running-config startup-config 3-10, 3-21, 3-28
 - delete B-11
 - dir B-9
 - duplex 3-15
 - enable 3-21, 3-27
 - enable password 3-28
 - enable secret 3-28
 - format B-9
 - interface *type slot/port* 3-21
 - line con 0 3-28
 - media-type 3-15, 5-7

- mkdir B-10
- negotiation auto 3-16
- no negotiation auto 3-16
- no shutdown 3-28
- password 3-28
- pwd B-9
- reload 3-28
- reset 3-27
- rmdir B-11
- show controller 3-16
- show diag 3-29
- show environment 3-6, 5-6
- show environment all 3-6, 3-7
- show environment last 3-6
- show environment table 3-6, 5-6
- show hardware 3-29
- show interface GigabitEthernet X/O 3-16
- show interfaces 3-2
- showmon 3-23
- show rom-monitor 3-23
- show running-config 3-21
- show startup-config 3-21, 3-26, 3-27
- show version 3-29
- speed 3-15
- upgrade ROM monitor 3-23
- CompactFlash Disk 1-10
- CompactFlash Disk configurations A-3
- config-register command 3-28, B-12
- configuration bit meanings C-1
- configuration file, saving 3-20, 3-21
- configuration modes, basic 3-20
- configuration register C-1
- configurations
 - CompactFlash Disk A-3
 - SDRAM DIMMs A-4
 - SFP module A-4
- configuration settings, viewing 3-29
- configure command 3-20
- configure memory command 3-28

- configure terminal command [3-21, 3-28](#)
 - configuring
 - AppleTalk [3-17, 3-18, 3-19](#)
 - ATM interfaces [3-17](#)
 - AutoInstall [3-10](#)
 - basic router [3-9](#)
 - examples [3-17](#)
 - Fast Ethernet (port adapter) [3-18](#)
 - global parameters [3-11](#)
 - interface parameters
 - sample configuration [3-19 to 3-20](#)
 - interfaces [3-17](#)
 - Interior Gateway Routing Protocol (IGRP) [3-13](#)
 - native Gigabit Ethernet interfaces [3-15](#)
 - reviewing changes [3-21](#)
 - setup facility [3-10](#)
 - SNMP [3-13](#)
 - synchronous serial interfaces [3-19](#)
 - using configuration mode [3-20](#)
 - confreg command [3-27](#)
 - console port cables [2-15](#)
 - console port kit product number [2-15, A-10](#)
 - console port specifications [A-10](#)
 - console terminal, system banner display [5-4](#)
 - cooling subsystem
 - description [5-3](#)
 - troubleshooting [5-6](#)
 - copper SFP ports supported [2-19](#)
 - copy running-config startup-config command [3-10, 3-21, 3-28](#)
 - cover removal [4-18](#)
 - crossover cable, Ethernet pinout [A-8](#)
-
- D
- DCE device [2-15](#)
 - DC power shutdown [3-5](#)
 - DC power supply
 - removing [4-10](#)
 - replacing [4-11](#)
 - DC power supply product number [A-2](#)
 - delete command [B-11](#)
 - dimensions and weight of chassis [2-2](#)
 - dimensions of router [A-1](#)
 - DIMM configurations [A-4](#)
 - dir command [B-9](#)
 - commands
 - boot system [B-12](#)
 - displays, environmental [3-6](#)
 - documentation [1-11](#)
 - audience [i-x](#)
 - obtaining [i-xviii](#)
 - related [i-xvii](#)
 - documentation feedback [i-xviii](#)
 - document version history [i-ix](#)
 - duplex command [3-15](#)
-
- E
- EEPROM, MAC address bank [3-3](#)
 - electrostatic discharge [2-4](#)
 - electrostatic discharge (ESD) [2-4](#)
 - EN (enable) LED [1-4](#)
 - enable command [3-21, 3-27](#)
 - enable password command [3-28](#)
 - enable secret command [3-28](#)
 - environmental monitor
 - critical status level [3-5](#)
 - normal status level [3-5](#)
 - warning status level [3-5](#)
 - environmental monitoring and reporting
 - description [3-4](#)
 - show commands [3-6](#)
 - environmental monitoring error message [5-6](#)
 - error messages
 - environmental shutdown [5-6](#)
 - fan failure [5-6](#)
 - Ethernet/Fast Ethernet/Gigabit Ethernet pinouts

Ethernet/Fast Ethernet/Gigabit Ethernet pinouts (continued)

- straight-through or crossover cable [A-8](#)
- etoken, Aladdin USB eToken Pro key [1-6](#)
- exhaust air [3-6](#)

F

- faceplate [1-3](#)
- fan failures, shutdown [3-8](#)
- Fast Ethernet (port adapter), configuring [3-18](#)
- Fast Ethernet Management port [1-2, 1-3](#)
- Fast Ethernet Management port cables [2-17](#)
- FE (Fast Ethernet Management port) LED [1-4](#)
- fiber-optic connectors, cleaning procedures [5-14](#)
- field-programmable gate array upgrade
 - see FPGA [3-25](#)
- filename [B-12](#)
- flash memory [1-10](#)
- flow control for Gigabit Ethernet information [A-9](#)
- format disk command [B-9](#)
- front panel [1-3](#)

G

- Gigabit Ethernet (native) cables [2-18](#)
- Gigabit Ethernet (native interface), configuring [3-15](#)
- Gigabit Ethernet flow control information [A-9](#)
- Gigabit Ethernet ports [1-3](#)
- Gigabit Ethernet SFP and GBIC module mode conditioning patch cords [2-21](#)
- global parameters, configuring [3-11](#)
- ground connection
 - connector [1-7](#)
 - procedure [2-12](#)
 - warning [2-12](#)

H

- hardware address [3-2](#)
- heat dissipation [A-1](#)

I

- I/O panel [1-3](#)
- identifying startup problems [5-3](#)
- image, boot helper or boot loader [5-8](#)
- input/output
 - cables [2-14](#)
 - connectors [2-14](#)
- installation
 - brackets on the chassis [2-7](#)
 - chassis in a rack [2-6](#)
 - chassis on a tabletop (general installation) [2-5](#)
 - checking shipping container [1-11](#)
 - connecting port adapter cables [2-14](#)
 - grounding the chassis [2-12](#)
 - interface parameters [3-17](#)
 - site requirements [2-4](#)
 - starting the router [3-8](#)
 - tools for [2-3](#)
 - workbench or tabletop [2-5](#)
- interface
 - configuration [3-17](#)
 - parameters [3-17](#)
 - sample configuration [3-19 to 3-20](#)
- Interior Gateway Routing Protocol
 - see IGRP [3-13](#)

K

- kit, rack-mount and cable-management [2-3](#)

L

LEDs [1-4](#)ALARM [1-4](#)CF ACTV (CompactFlash Active) [1-4](#)EN (enable) [1-4](#)enabled on interface processors [3-9](#)FE (Fast Ethernet Management port) [1-4](#)identification and status [5-2](#)LINK/ACTV (activity) [1-4](#)native I/O ports [5-3](#)PWR (power) OK [1-4](#)STATUS [1-4](#)USB [1-4](#)

using for troubleshooting

 native I/O ports [5-3](#) port adapter [5-4](#)line con 0 command [3-28](#)LINK/ACTV (activity) LED [1-4](#)

M

MAC address [3-3](#)make dir command [B-10](#)management port, Fast Ethernet [1-2, 1-3](#)media-type command [3-15, 5-7](#)memory, cache [1-10](#)

messages

 environmental [3-6](#)mkdir command [B-10](#)mode-conditioning patch cord description [2-21, A-6](#)modifications to configuration, reviewing [3-21](#)

N

native Gigabit Ethernet cables [2-18](#)native Gigabit Ethernet interface, configuring [3-15](#)native I/O ports, LEDs [5-3](#)negotiation auto command [3-16](#)no negotiation auto command [3-16](#)

nonvolatile random-access memory

See NVRAM

normal status level

 environmental monitor [3-6](#)no shutdown command [3-28](#)

numbering

 logical interface [3-2](#) port adapter slot [3-2](#)

NVRAM

 log [3-5](#) saving and viewing contents [3-21](#)

O

online insertion and removal

 see OIR [3-4](#)optical connections cleaning information [1-5](#)options, Cisco 7201 [1-3](#)out-of-tolerance voltage condition [3-5](#)

overheating

 at startup [5-3](#) damage [3-4](#) monitoring [3-5](#)

P

password

 command [3-28](#) recovering lost [3-26](#)pinouts, RJ-45 [A-6](#)pinouts for the RJ-45 to DB-25 adapters [2-15](#)plug, SFP module [4-3](#)

port adapter

 connecting cables [2-14](#) documentation [i-xvii](#) logical interface numbering [3-2](#) slot numbering [3-2](#)

port adapter (continued)

- troubleshooting [5-4, 5-8](#)
- port pinouts, Gigabit Ethernet RJ-45 [A-6](#)
- ports, Gigabit Ethernet [1-3](#)
- power budget, SFP module [A-5](#)
- power cord, troubleshooting [5-5, 5-6](#)
- power subsystem for troubleshooting [5-3, 5-4](#)
- power supply
 - AC product number [A-2](#)
 - DC product number [A-2](#)
 - disabled [3-5](#)
 - shutdown [3-5](#)
 - troubleshooting [5-3](#)
- power supply and environmental monitor [3-5](#)
- procedures
 - checking shipping container contents [1-11](#)
 - configuring the Cisco 7201 [3-9](#)
 - connecting port adapter cables [2-14](#)
 - grounding the chassis [2-12](#)
 - installing brackets on the chassis [2-7](#)
 - installing chassis on a tabletop (general installation) [2-5](#)
 - rack-mounting chassis [2-6](#)
 - replacing or recovering a lost password [3-26](#)
 - starting the router [3-8](#)
 - tabletop or workbench installation [2-5](#)
 - viewing system configuration [3-29](#)
- processor
 - shutdown [3-5](#)
 - subsystem for troubleshooting [5-3](#)
- product alerts and field notices [i-xviii](#)
- product disposal [i-xvi](#)
- product number
 - AC power supply [A-2](#)
 - DC power supply [A-2](#)
- PWR (power) OK LED [1-4](#)

R

- rack-mounting
 - front mounted [2-7](#)
 - rear mounted [2-8](#)
- rack-mount kit [2-3](#)
- rack-mount kit product ID [2-3](#)
- related documentation [i-xvii](#)
- reload command [3-28](#)
- removing a DC power supply [4-10](#)
- removing an AC power supply [4-7](#)
- replacing a DC power supply [4-11](#)
- replacing an AC power supply [4-9](#)
- replacing or recovering a lost password [3-26](#)
- reset command [3-27](#)
- reviewing changes to configuration [3-21](#)
- RJ-45, cable [2-17, 2-23, A-6](#)
- rmdir command [B-11](#)
- ROMmon (rom-monitor) upgrades [3-24](#)
- ROMmon, changing preferences [3-24](#)
- ROM monitor [3-23](#)
- ROMmon upgrade error messages [3-24](#)
- Routing Information Protocol
 - see RIP [3-13](#)

S

- sample configurations
 - global parameters [3-11](#)
 - interface parameters [3-17](#)
- saving the configuration file [3-20, 3-21](#)
- SDRAM configurations [A-4](#)
- security eToken
 - USB [1-6](#)
- security guidelines [i-xviii](#)
- serial interfaces, configuring [3-19](#)
- servicing equipment warning [2-29](#)
- setup command facility
 - System Configuration Dialog (example) [3-12](#)

- setup facility
 - configuration [3-10](#)
- SFP module
 - about [1-5](#)
 - configurations [A-4](#)
 - installation [4-2](#)
 - online insertion and removal [1-5](#)
 - specifications [A-4](#)
- SFP plug [4-3](#)
- SFP port cabling specifications [A-5](#)
- SFP ports supported with copper SFP module [2-19](#)
- SFP power budget [A-5](#)
- shipping container contents [1-11](#)
- show commands
 - show controller [3-16](#)
 - show diag [3-29](#)
 - show environment [3-6, 5-6](#)
 - show environment all [3-6, 3-7](#)
 - show environment last [3-6](#)
 - show environment table [3-6, 5-6](#)
 - show hardware [3-29](#)
 - show interface GigabitEthernet O/X [3-16](#)
 - show interfaces [3-2](#)
 - show rom-monitor [3-23](#)
 - show running-config [3-21](#)
 - show startup-config [3-21, 3-26, 3-27](#)
 - show version [3-29](#)
- shutdown
 - environmental [3-4](#)
 - fan failure [3-8](#)
 - power supply [3-5](#)
 - preventing administrative [3-28](#)
 - processor [3-5](#)
 - thresholds [3-4](#)
- Simple Network Management Protocol
 - See SNMP [3-13](#)
- site ambient temperature [2-4](#)
- site preparation [2-2](#)
- site requirements guidelines [2-4](#)
- slot/port numbers for interfaces [3-2](#)
- software requirements [A-3](#)
- specifications
 - auxiliary port [A-10](#)
 - CompactFlash Disk configurations [A-3](#)
 - console port [A-10](#)
 - dimensions [A-1](#)
 - Gigabit Ethernet RJ-45 port pinouts [A-6](#)
 - heat dissipation [A-1](#)
 - power supplies [A-1, A-2](#)
 - processor and memory [A-3](#)
 - SFP module [A-4](#)
 - SFP port cabling [A-5](#)
 - weight [A-1](#)
- speed command [3-15](#)
- startup
 - system [3-8](#)
 - troubleshooting [5-3](#)
- status
 - environmental [3-6](#)
 - interfaces [3-2](#)
 - LED [5-2](#)
- STATUS LED [1-4](#)
- straight-through cable, Gigabit Ethernet/Fast Ethernet/Ethernet pinout [A-8](#)
- subsystems for troubleshooting
 - cooling [5-3, 5-6](#)
 - I/O [5-7](#)
 - power [5-3, 5-4](#)
 - processor [5-3](#)
- support, obtaining [i-xviii](#)
- synchronous serial interfaces, configuring [3-19](#)
- system banner [3-9](#)
- system board components [1-9](#)
- system management functions [1-10](#)

T

tabletop installation [2-5](#)

temperature

- ambient site [2-4](#)
- thresholds [3-4](#)

tools for installation [2-3](#)

troubleshooting

- Cisco 7201 Troubleshooting Module [i-xvii, 5-2](#)
- cooling subsystem [5-3, 5-6](#)
- port adapter [5-8](#)
- power subsystem [5-3, 5-4](#)
- processor subsystem [5-3, 5-7](#)
- ROMmon upgrades [3-24](#)
- startup problems [5-3](#)

U

unpacking the Cisco 7201 router [2-2](#)

upgrade ROM monitor command [3-23](#)

upgrading FPGA [3-25](#)

upgrading ROMmon [3-23](#)

USB eToken [1-6](#)

USB Flash memory modules

- USB eToken [1-6](#)

USB LED [1-4](#)

V

voltage, monitoring [3-5](#)

W

warning

- chassis grounding [4-13](#)
- chassis power connection [2-27](#)
- circuit breaker [2-6, 2-24, 2-29](#)
- Class 1 laser product [1-6, 2-20, 4-2](#)

- Class 1 LED product [1-6, 2-20, 4-2](#)
- definition [1-1](#)
- disconnecting power [4-1](#)
- disconnecting telephone-network cables [4-1](#)
- equipment installation [i-xvi, 4-1](#)
- equipment installation complies with electrical codes [2-24](#)
- exposed DC wire [2-30](#)
- ground connection [2-12](#)
- ground connection order [2-26](#)
- grounded, shielded Ethernet/Fast Ethernet cables [2-22](#)
- intra-building lightning protection [2-22](#)
- laser radiation [1-6, 2-20, 4-2](#)
- lightning activity [4-1](#)
- more than one power supply connection [2-24, 4-15](#)
- only one power supply type in a router [2-24, 2-25, 2-26, 2-27](#)
- power cords [2-24](#)
- power supply disconnection [4-1](#)
- product disposal [i-xvi](#)
- removing power from DC circuit [2-29, 4-10, 4-14](#)
- safety information [1-1, 2-4](#)
- SELV circuit [2-14](#)
- servicing equipment [2-29, 4-10, 4-14](#)
- trained personnel [4-1](#)
- wrist strap [4-1, 4-5, 4-15, 4-16](#)

weight of router [A-1](#)

workbench installation [2-5](#)