



## **Cisco 1900 Series Integrated Services Router Hardware Installation**

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OL-19084-02 i

**Preface** vii

Objectives vii

Audience vii

Organization viii

Conventions viii

Related Documentation xv

Searching for Cisco Documents xvi

Obtaining Documentation and Submitting a Service Request xvi

**CHAPTER 1****Overview of the Router** 1-1

Safety Warnings 1-1

Safety Warnings for Finland, Norway and Sweden 1-2

Chassis Views 1-2

Hardware Features 1-6

Product Serial Number Location 1-6

Cisco Product Identification Tool 1-8

Built-In Interfaces 1-8

Removable, Interchangeable, and Optional Modules 1-8

Memory 1-9

LED Indicators 1-10

Chassis Ventilation 1-12

Real-Time Clock 1-12

Chassis Security 1-13

Wireless LAN Connectivity 1-13

Baud Reset Button 1-14

Interface Numbering 1-14

Specifications 1-14

Regulatory Compliance 1-18

**CHAPTER 2****Preparing for Router Installation** 2-1

Safety Recommendations 2-1

Safety with Electricity 2-2

Preventing Electrostatic Discharge Damage 2-3

General Site Requirements 2-3

Power Supply Considerations 2-4

Site Environment 2-4

Site Configuration	2-4
Wireless LAN Considerations	2-5
Network Cabling Specifications	2-5
Console and Auxiliary Port Considerations	2-5
Console Port Connections	2-5
EIA/TIA-232 Port	2-6
USB Serial Console	2-6
Auxiliary Port Connections	2-7
Preparing to Connect to a Network	2-7
Ethernet Connections	2-7
Serial Connections	2-7
Configuring Serial Connections	2-8
Serial DTE or DCE Devices	2-8
Signaling Standards Supported	2-8
Transmission Speeds and Distance Limitations	2-9
Asynchronous/Synchronous Serial Module Baud Rates	2-9
ISDN BRI Connections	2-9
CSU/DSU Connections	2-10
Inspecting the Router	2-10
Installation Checklist	2-11
Site Log	2-13
Required Tools and Equipment for Installation and Maintenance	2-13

**CHAPTER 3****Cable Information and Specifications for Cisco 1900 Series Routers 3-1**

Console and Auxiliary Port Considerations	3-1
Console Port Connections	3-1
EIA/TIA-232 Port	3-1
USB Serial Console	3-2
Auxiliary Port Connections	3-3
Preparing to Connect to a Network	3-3
Ethernet Connections	3-3
Serial Connections	3-3
Configuring Serial Connections	3-4
Serial DTE or DCE Devices	3-4
Signaling Standards Supported	3-4
Transmission Speeds and Distance Limitations	3-5
Asynchronous/Synchronous Serial Module Baud Rates	3-5
ISDN BRI Connections	3-5
CSU/DSU Connections	3-6

**CHAPTER 4****Installing and Connecting the Router 4-1**

- Safety Warnings 4-2
  - Safety Warnings for Finland, Norway and Sweden 4-2
- Setting Up the Chassis 4-3
  - Chassis Airflow Diagram 4-3
- Setting the Chassis on a Desktop 4-4
  - Chassis Grounding 4-4
- Wall-Mounting the Chassis 4-4
- Rack-Mounting the Chassis 4-7
  - Attaching Rack-Mount Brackets to Cisco 1900 Series Routers 4-7
- Installing the Chassis Ground Connection 4-10
- Power Connections 4-12
- Connecting WAN and LAN Cables 4-13
  - Ports and Cabling 4-15
  - Connection Procedures and Precautions 4-16
- Connecting to a Console Terminal or Modem 4-16
  - Connecting to the Console Port with Microsoft Windows 4-16
  - Connecting to the Console Port with Mac OS X 4-18
  - Connecting to the Console Port with Linux 4-18
  - Installing the Cisco Microsoft Windows USB Device Driver 4-18
    - Installing the Cisco Microsoft Windows XP USB Driver 4-19
    - Installing the Cisco Microsoft Windows 2000 USB Driver 4-19
    - Installing the Cisco Microsoft Windows Vista USB Driver 4-19
  - Uninstalling the Cisco USB Driver 4-20
    - Uninstalling the Cisco Microsoft Windows XP and 2000 USB Driver 4-20
    - Uninstalling the Cisco Microsoft Windows Vista USB Driver 4-20
- Connecting to the Auxiliary Port 4-21

**CHAPTER 5****Cable Connection Procedures for Cisco 1900 Series Routers 5-1**

- Power Connections 5-1
- Connecting WAN and LAN Cables 5-2
  - Ports and Cabling 5-2
  - Connection Procedures and Precautions 5-3
- Connecting to a Console Terminal or Modem 5-3
  - Connecting to the Console Port with Microsoft Windows 5-4
  - Connecting to the Console Port with Mac OS X 5-5
  - Connecting to the Console Port with Linux 5-6
  - Installing the Cisco Microsoft Windows USB Device Driver 5-6

Installing the Cisco Microsoft Windows XP USB Driver	5-6
Installing the Cisco Microsoft Windows 2000 USB Driver	5-7
Installing the Cisco Microsoft Windows Vista USB Driver	5-7
Uninstalling the Cisco USB Driver	5-8
Uninstalling the Cisco Microsoft Windows XP and 2000 USB Driver	5-8
Uninstalling the Cisco Microsoft Windows Vista USB Driver	5-8
Connecting to the Auxiliary Port	5-9

**CHAPTER 6****Configuring the Router 6-1**

Powering up the Router	6-1
Checklist for Power Up	6-1
Power Up Procedure	6-2
Verifying the Front Panel LED Indications	6-3
Performing the Initial Configuration on the Router	6-4
Using the Cisco Setup Command Facility	6-4
Completing the Configuration	6-7
Using Cisco Configuration Professional Express	6-8
Using the Cisco CLI—Manual Configuration	6-9
Configuring the Router Hostname	6-10
Configuring the Enable and Enable Secret Passwords	6-11
Configuring the Console Idle Privileged EXEC Timeout	6-12
Configuring Gigabit Ethernet Interfaces	6-14
Specifying a Default Route or Gateway of Last Resort	6-16
Configuring IP Routing and IP Protocols	6-16
Default Routes	6-16
Default Network	6-16
Gateway of Last Resort	6-17
Configuring Virtual Terminal Lines for Remote Console Access	6-19
Configuring the Auxiliary Line	6-20
Verifying Network Connectivity	6-22
Saving Your Router Configuration	6-23
Saving Backup Copies of Configuration and System Image	6-23
Verifying the Initial Configuration	6-25

**CHAPTER 7****Getting Software Licenses for the Router 7-1**

Activating a New Software Package or Feature	7-1
RMA License Transfer	7-2
Additional Information	7-3



## Preface

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This preface describes the objectives, audience, organization, and conventions of this guide, and describes related documents that have additional information. It contains the following sections:

- [Objectives, page vii](#)
- [Audience, page vii](#)
- [Organization, page viii](#)
- [Conventions, page viii](#)
- [Related Documentation, page xv](#)
- [Searching for Cisco Documents, page xvi](#)
- [Obtaining Documentation and Submitting a Service Request, page xvi](#)

## Objectives

This guide provides an overview and explains how to install, connect, and perform initial configuration for the Cisco 1900 series Integrated Services Routers (ISRs). Some information may not apply to your particular router model.

For warranty, service, and support information, see the “Cisco Warranty Terms” section in the *Readme First for the Cisco 1900 Series Integrated Services Routers* document that was shipped with your router.

## Audience

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

# Organization

This guide includes the following sections:

Section	Title	Description
1	Overview of Cisco 1900 Series Routers	Describes the features and specifications of the router.
2	Preparing for Router Installation	Describes the site requirements and equipment needed to install the router.
3	Installing and connecting the Router	Describes the safety requirements, general site requirements, network cabling, console connections, and preparing the router to connect to a network.
4	Configuring the Router	Describes how to power up, perform the initial configuration and verify network connectivity.
5	Getting Software Licenses for the Router	Describes how to activate a software package or feature and perform a license transfer.

# Conventions

This document uses the following conventions:

Convention	Indication
<b>bold font</b>	Commands and keywords and user-entered text appear in <b>bold font</b> .
<i>italic font</i>	Document titles, new or emphasized terms, and arguments for which you supply values are in <i>italic font</i> .
[ ]	Elements in square brackets are optional.
{ x   y   z }	Required alternative keywords are grouped in braces and separated by vertical bars.
[ x   y   z ]	Optional alternative keywords are grouped in brackets and separated by vertical bars.
string	A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.
<code>courier font</code>	Terminal sessions and information the system displays appear in <code>courier font</code> .
< >	Nonprinting characters such as passwords are in angle brackets.
[ ]	Default responses to system prompts are in square brackets.
!, #	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.



**Note**

Means *reader take note*.



**Tip**

Means *the following information will help you solve a problem.*

**Caution**

Means *reader be careful.* In this situation, you might perform an action that could result in equipment damage or loss of data.

**Timesaver**

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

**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

이 경고 기호는 위험을 나타냅니다. 작업자가 신체 부상을 일으킬 수 있는 위험한 환경에 있습니다. 장비에 작업을 수행하기 전에 전기 회로와 관련된 위험을 숙지하고 표준 작업 관례를 숙지하여 사고를 방지하십시오. 각 경고의 마지막 부분에 있는 경고문 번호를 참조하여 이 장치와 함께 제공되는 번역된 안전 경고문에서 해당 번역문을 찾으십시오.

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 للصدمات 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 συνήθειες πρακτικές για την αποφυγή ατυχημάτων. Χρησιμοποιήστε τον αριθμό δήλωσης που παρέχεται στο τέλος κάθε προειδοποίησης, για να εντοπίσετε τη μετάφρασή της στις μεταφρασμένες προειδοποιήσεις ασφαλείας που συνοδεύουν τη συσκευή.

**ΦΥΛΑΞΤΕ ΑΥΤΕΣ ΤΙΣ ΟΔΗΓΙΕΣ****אזהרה****הוראות בטיחות חשובות**

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

**שמור הוראות אלה****Opomena VAŽNI BEZBEDNOSNI NAPATCTVIJA**

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 prevedените 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 DÔLEŽITÉ 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**

**When installing the product, please use the provided or designated connection cables/power cables/AC adaptors. Using any other cables/adaptors could cause a malfunction or a fire. Electrical Appliance and Material Safety Law prohibits the use of UL-certified cables (that have the "UL" shown on the code) for any other electrical devices than products designated by CISCO. The use of cables that are certified by Electrical Appliance and Material Safety Law (that have "PSE" shown on the code) is not limited to CISCO-designated products. Statement 371.**

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**Warning**

**There is the danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions. Statement 1015**

---

**Warning**

**Do not use this product near water; for example, near a bath tub, wash bowl, kitchen sink or laundry tub, in a wet basement, or near a swimming pool. Statement 1035**

---

**Warning**

**Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations. Statement 1036**

---

**Warning**

**Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface. Statement 1037**

---

**Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electric shock from lightning.** Statement 1038

## Related Documentation

The Cisco IOS software that runs your Cisco 1940 series router includes extensive features and functionality. For information that is beyond the scope of this document, or for additional information, use the following resources.



### Timesaver

Make sure that you have access to the documents listed below. Some of these documents are available in print, and all are on the World Wide Web. If you need to order printed documents, see the “[Obtaining Documentation and Submitting a Service Request](#)” section on page xvi.

- *[Regulatory Compliance and Safety Information for Cisco 1900 Series Integrated Services Routers](#)*
- *[Software Activation for Cisco Integrated Services Routers](#)*
- *[Cisco IOS Software Activation Configuration Guide](#)*
- *[Cisco CP Express User’s Guide](#)*
- *[Overview of Cisco Network Modules and Service Modules for Cisco Access Routers](#)*
- *[Installing Cisco Network Modules and Service Modules in Cisco Access Routers](#)*
- *[Cisco Interface Cards for Cisco Access Routers](#)*
- *[Installing Cisco Interface Cards in Cisco Access Routers](#)*
- *[Installing, Replacing, and Upgrading Components in Cisco Modular Access Routers and Integrated Services Routers](#)*
- *[Declarations of Conformity and Regulatory Information for Cisco Access Products with 802.11a/b/g and 802.11b/g Radios](#)*
- *[Cisco IOS Release Notes](#)*
- *[Cisco IOS Quality of Service Solutions Command Reference, Release 12.4T](#)*
- *[Cisco IOS Security Configuration Guide, Release 12.4T](#)*
- *[Cisco IOS Security Command Reference, Release 12.4T](#)*
- *[Cisco IOS Command Reference for Cisco Aironet Access Points and Bridges, versions 12.4\(10b\) JA and 12.3\(8\) JEC](#)*
- *[Wireless LAN Controllers](#)*
- *[Unified Wireless LAN Access Points](#)*
- *[Cisco IOS Voice Port Configuration Guide](#)*
- *[SCCP Controlled Analog \(FXS\) Ports with Supplementary Features in Cisco IOS Gateways](#)*
- *[Cisco Modular Access Router Cable Specifications](#)*
- *[Module Support on Cisco's Integrated Services Routers Generation 2](#)*
- *[Installing and Upgrading Internal Modules and FRUs in Cisco 1900 Series ISRs](#)*

## Searching for Cisco Documents

To search a Hyper Text Markup Language (HTML) document using a web browser, press **Ctrl-F** (Windows) or **Cmd-F** (Apple). In most browsers, the option to search whole words only, invoke case sensitivity, or search forward and backward is also available.

To search a PDF document in Adobe Reader, use the basic Find toolbar (**Ctrl-F**) or the Full Reader Search window (**Shift-Ctrl-F**). Use the Find toolbar to find words or phrases within a specific document. Use the Full Reader Search window to search multiple PDF files simultaneously and to change case sensitivity and other options. Adobe Reader's online help has more information about how to search PDF documents.

## Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

<http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html>

Subscribe to the *What's New in Cisco Product Documentation* as a Really Simple Syndication (RSS) feed and set content to be delivered directly to your desktop using a reader application. The RSS feeds are a free service and Cisco currently supports RSS Version 2.0.





# CHAPTER 1

## Overview of the Router

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The Cisco 1900 Series Integrated Services Routers (ISRs) are modular routers with LAN and WAN connections that can be configured by means of interchangeable interface cards and internal service modules (ISMs). The series currently consists of the 1905, 1921, 1941, and 1941W (wireless) models. The 1941W is Wi-Fi CERTIFIED™ and 802.11a/b/g/n-compliant. The modular design of the routers provides flexibility, allowing you to configure your router according to your needs.

This ISR series has new slots that support next generation Enhanced High-Speed WAN Interface Cards (EHWICs), Internal Services Modules (ISMs, 1941 only), and 2 CompactFlash cards (1941 only). Universal serial bus (USB) ports are available for USB devices, and a USB mini Type-B serial console port is available in addition to the RJ-45 console connector.

This chapter provides an overview of the Cisco 1900 series routers and includes the following sections:

- [Safety Warnings, page 1-1](#)
- [Chassis Views, page 1-2](#)
- [Hardware Features, page 1-6](#)
- [Interface Numbering, page 1-14](#)
- [Specifications, page 1-14](#)
- [Regulatory Compliance, page 1-18](#)

## Safety Warnings



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



Warning

**Ultimate disposal of this product should be handled according to all national laws and regulations.**  
Statement 1040

---

**Warning****No user-serviceable parts inside. Do not open.** Statement 1073**Warning****Only trained and qualified personnel should be allowed to install, replace, or service this equipment.**  
Statement 1030

## Safety Warnings for Finland, Norway and Sweden

Warning statement 1017 applies to the countries of Finland, Norway, and Sweden.

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

Statement 1017

## Chassis Views

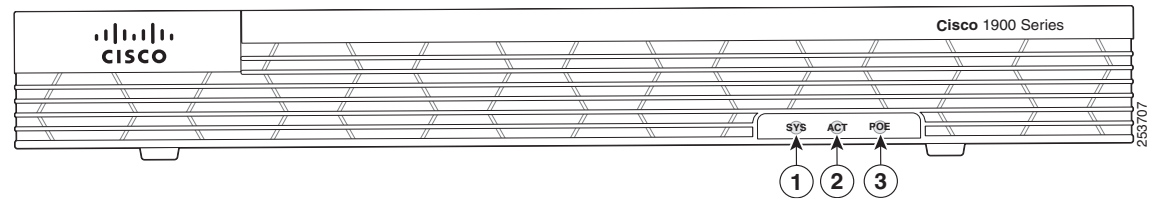
This section contains views of the front and rear panels of Cisco 1900 series routers, showing the locations of the power and signal interfaces, the interface card slots, and the status indicators.

[Figure 1-1](#) shows the front panel of the Cisco 1905 and Cisco 1921 router. [Figure 1-2](#) shows the back panel connectors on the Cisco 1905 and Cisco 1921 router. [Figure 1-3](#) shows the front panel of a Cisco 1941 wireless router and [Figure 1-4](#) shows the LEDs of the Cisco 1941 router. [Figure 1-5](#) shows the back panel connectors on the Cisco 1941 router.

**Caution****Power off the router and the power over Ethernet (PoE) before installing an EHWIC in the Cisco 1905 and Cisco 1921 ISRs.**

Figure 1-1 shows the front panel of the Cisco 1905 and Cisco 1921 router and LED names.

**Figure 1-1 Front Panel of the Cisco 1905, and Cisco 1921 Router**



<b>1</b>	SYS	<b>2</b>	ACT
<b>3</b>	PoE <sup>12</sup>		

1. Power over Ethernet (PoE) is available with optional external PoE power supply.

2. Power off the PoE before installing an EHWIC in the Cisco 1905 and Cisco 1921 ISRs.

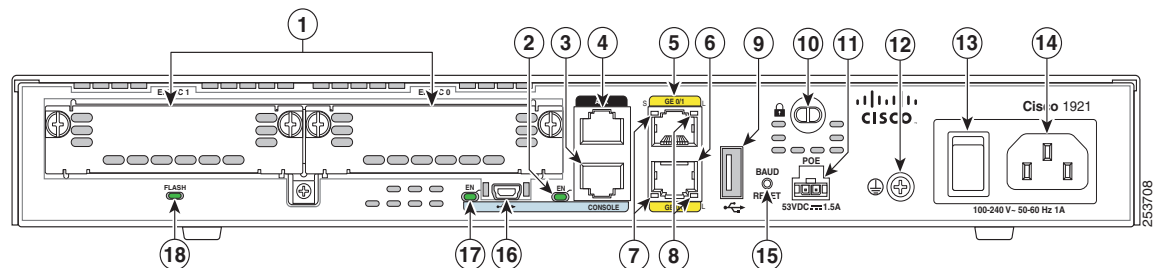


**Caution**

Power off the PoE before installing an EHWIC in the Cisco 1905 and Cisco 1921 ISRs.

Figure 1-2 shows the back panel of the Cisco 1905 and Cisco 1921 with ports and LEDs.

**Figure 1-2 Back Panel of the Cisco 1905 and Cisco 1921 Router (1921 shown)**



<b>1</b>	EHWIC (HWIC, WIC, or VWIC <sup>1</sup> ) slots 0 and 1—slot 0 (Right), slot 1 (Left), or double wide <sup>2345</sup>	<b>2</b>	EN (Enable RJ-45 console)
<b>3</b>	RJ-45 serial console port	<b>4</b>	AUX port
<b>5</b>	GE 0/1	<b>6</b>	GE 0/0
<b>7</b>	S (Speed)	<b>8</b>	L (Link)
<b>9</b>	USB port—USB 2.0 Type-A port	<b>10</b>	Kensington™ security slot
<b>11</b>	PoE <sup>6</sup>	<b>12</b>	Ground connector
<b>13</b>	On/Off switch	<b>14</b>	Input power connection
<b>15</b>	Baud reset	<b>16</b>	USB serial port—USB 5-pin mini USB Type-B
<b>17</b>	EN (Enable USB console)	<b>18</b>	Flash

1. VWIC support is for data only.

2. Double-wide slot on the 1921 only.

3. The 1905 slot 0 (Right) comes with a permanently installed interface card. Only slot 1 (Left) is available.

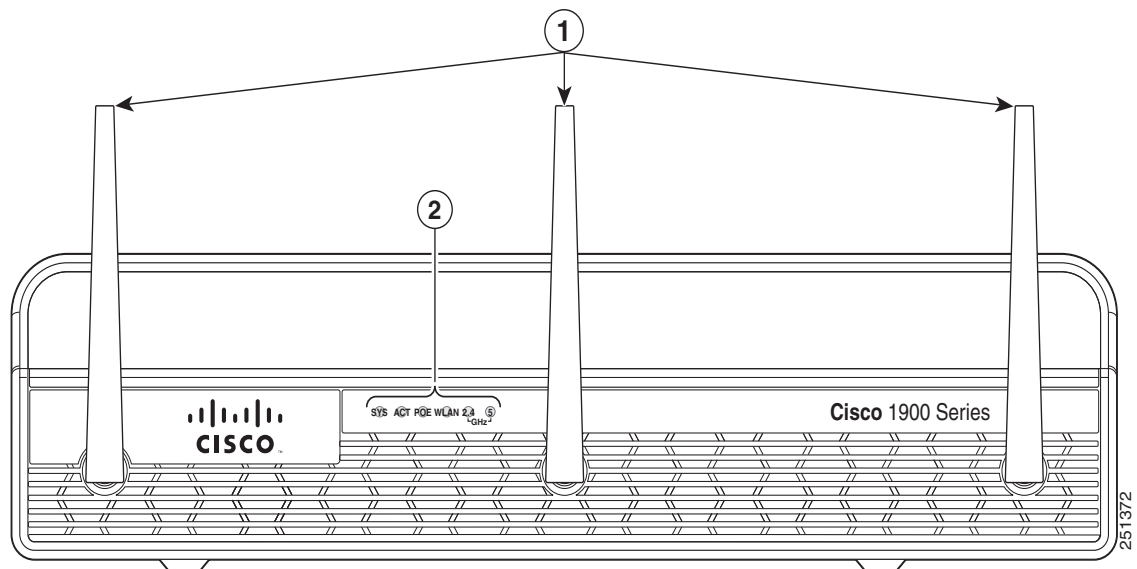
4. Only 1 EHWIC Gigabit Ethernet Switch can be installed in a 1905 or 1921.
5. See [Module Support on Cisco's Integrated Services Routers Generation 2](http://cisco.com/en/US/prod/collateral/routers/ps10538/aag_c07_563807.pdf) [http://cisco.com/en/US/prod/collateral/routers/ps10538/aag\\_c07\\_563807.pdf](http://cisco.com/en/US/prod/collateral/routers/ps10538/aag_c07_563807.pdf) for supported modules.
6. Power off the PoE before installing an EHWIC in the Cisco 1905 and Cisco 1921 ISRs.

Figure 1-3 shows the front panel of a Cisco 1941 wireless router with antennas mounted.



**Note** The Cisco 1905 comes with a permanently installed EHWIC in slot 0 (Right).

**Figure 1-3 Front Panel of the Cisco 1941W Router**

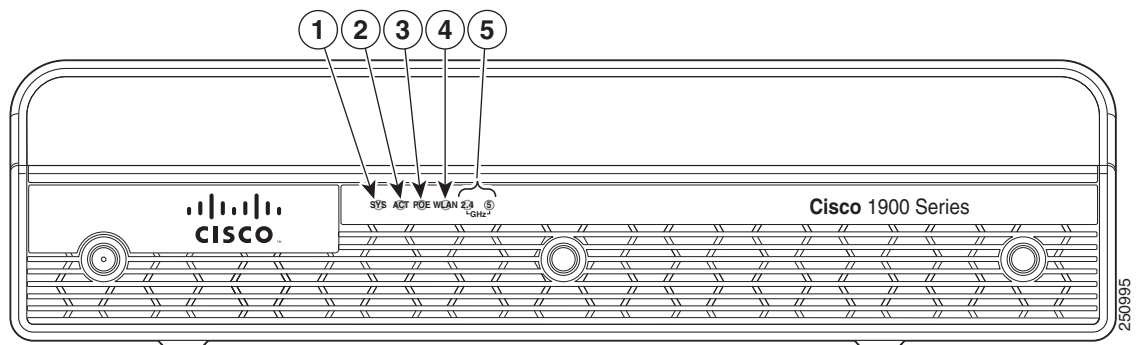


<b>1</b>	Antenna mounts <sup>1</sup>	<b>2</b>	LEDs <sup>2</sup>
----------	-----------------------------	----------	-------------------

1. The antenna mounts are not available on the non-wireless models.
2. Some LEDs are not available on the non-wireless models.

Figure 1-4 shows the front panel of the Cisco 1941W (without antennas) with the LED names.

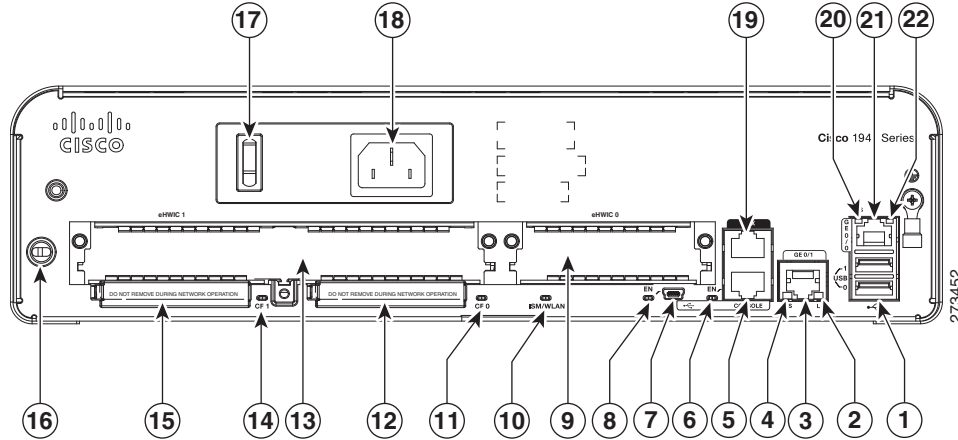
**Figure 1-4 Cisco 1941 and Cisco 1941W Router LEDs**



1	SYS	2	ACT
3	PoE	4	WLAN
5	2.4 or 5 GHz		

Figure 1-5 shows the Cisco 1941 and 1941W back panel with ports and LEDs.

Figure 1-5 Back Panel of the Cisco 1941 and Cisco 1941W Router



1	USB ports—two USB 2.0 Type-A ports (USB 0=Bottom)	2	L (Link)
3	GE 0/1	4	S (Speed)
5	RJ-45 serial console port	6	EN (Enable RJ-45 console)
7	USB serial port—USB 5-pin mini USB Type-B	8	EN (Enable USB console)
9	HWIC slot 0 (EHWIC, HWIC, WIC, or VWIC <sup>1</sup> )—single wide <sup>2</sup>	10	ISM <sup>3</sup> or WLAN
11	CF 0	12	CompactFlash 0
13	HWIC slot 1 (EHWIC, HWIC, or WIC)—double wide <sup>4</sup>	14	CF 1
15	CompactFlash 1	16	Kensington™ security slot
17	On/Off switch	18	Input power connection
19	AUX port	20	S (Speed)
21	GE 0/0	22	L (Link)

1. VWIC support is for data only.
2. See [Module Support on Cisco's Integrated Services Routers Generation 2](http://cisco.com/en/US/prod/collateral/routers/ps10538/aag_c07_563807.pdf) [http://cisco.com/en/US/prod/collateral/routers/ps10538/aag\\_c07\\_563807.pdf](http://cisco.com/en/US/prod/collateral/routers/ps10538/aag_c07_563807.pdf) for supported modules.
3. Internal Service Module (ISM).
4. The double-wide slot can accommodate a single wide EHWIC, HWIC, WIC, or VWIC (data only), on the left side of the slot.

# Hardware Features

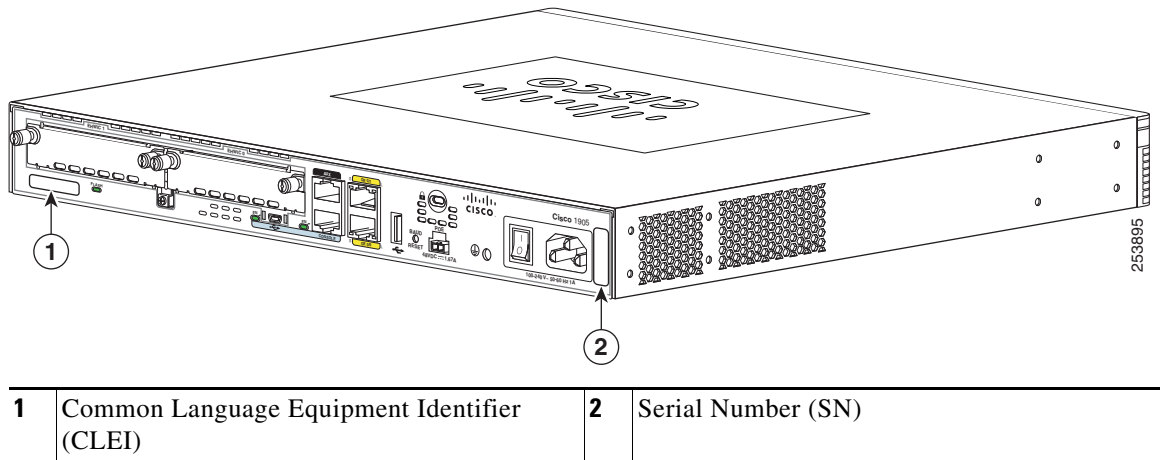
This section describes the basic features of Cisco 1900 series routers. It contains the following:

- [Product Serial Number Location](#)
- [Built-In Interfaces, page 1-8](#)
- [Removable, Interchangeable, and Optional Modules, page 1-8](#)
- [Memory, page 1-9](#)
- [LED Indicators, page 1-10](#)
- [Chassis Ventilation, page 1-12](#)
- [Real-Time Clock, page 1-12](#)
- [Chassis Security, page 1-13](#)
- [Wireless LAN Connectivity, page 1-13](#)
- [Baud Reset Button](#)

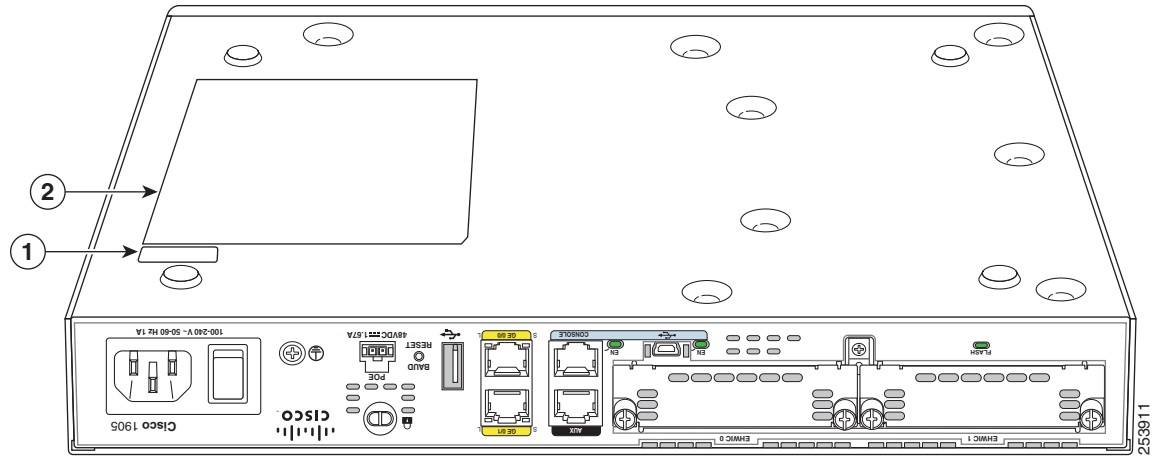
## Product Serial Number Location

The serial number and common language equipment identifier (CLEI) label for the Cisco 1905 and Cisco 1921 router is located on the rear of the chassis. (See [Figure 1-6](#).) The product ID (PID) label for the Cisco 1905 and Cisco 1921 series routers is located on the bottom of the chassis. (See [Figure 1-8](#).) The serial number label for the Cisco 1940 series routers is located on the rear of the chassis on a pull-out tab. (See [Figure 1-8](#).)

**Figure 1-6** Serial Number and CLEI Location on Cisco 1905 and Cisco 1921 Routers

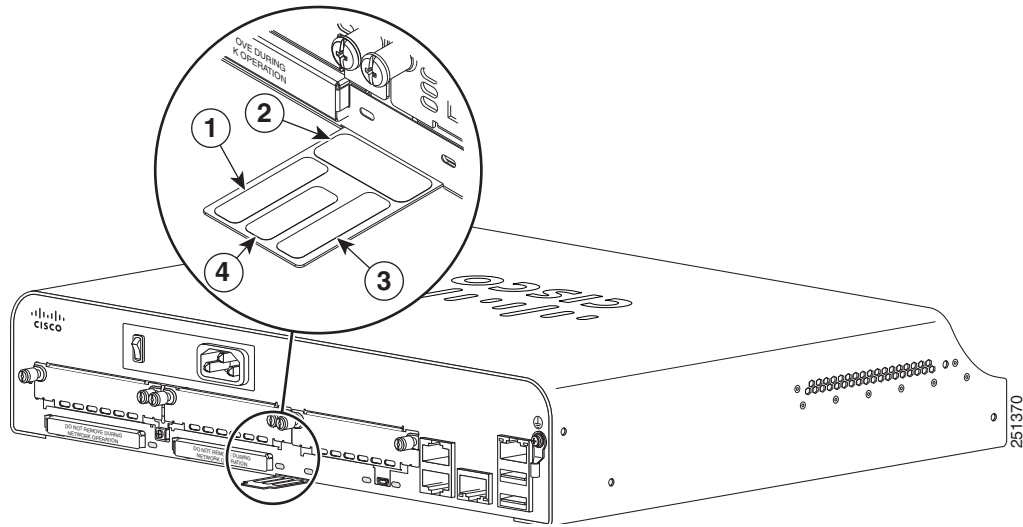


**Figure 1-7** PID and Compliance Label on Cisco 1905 and Cisco 1921 Routers



1	Product ID (PID)	2	Compliance label
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**Figure 1-8** Serial Number, PID/VID, and CLEI Number Location on Cisco 1940 Series Routers



1	Product ID (PID)	2	Serial Number (SN)
3	Product ID/Version ID (PID/VID)	4	Common Language Equipment Identifier (CLEI)



**Note** The serial number for Cisco 1900 series routers is 11 characters long.

## Cisco Product Identification Tool

The Cisco Product Identification (CPI) tool provides detailed illustrations and descriptions showing where to locate serial number labels on Cisco products. It includes the following features:

- A search option that allows browsing for models using a tree-structured product hierarchy
- A search field on the final results page making it easier to look up multiple products
- End-of-sale products are clearly identified in results lists

The tool streamlines the process of locating serial number labels and identifying products. Serial number information expedites the entitlement process and is important for access to support services.

The Cisco Product Identification tool can be accessed at the following URL:

<http://tools.cisco.com/Support/CPI/index.do>

## Built-In Interfaces

Table describes the interfaces available on the Cisco 1900 series routers.



### Note

Either the RJ-45 console port or USB console port may be used. They can not both be used at the same time.

**Table 1-1** *Interfaces Available on the Cisco 1900 Series Routers*

Interface	Description
Gigabit Ethernet (GE)	Two GE ports (RJ-45 connectors).
RJ-45 Console	One console port (RJ-45 connector).
Auxiliary	One auxiliary port (RJ-45 connectors).
USB console	In addition to the RJ-45 Console port, the Cisco 1900 ISRs have a USB 5-pin mini Type-B port. When first connecting to this port, a USB driver must be installed. You will be prompted to install the driver. Simply follow the installation prompts to install the driver.
USB	Two USB 2.0 Type-A compliant ports; 1940 series. One USB 2.0 Type-A compliant port; 1905 and 1921. These ports are backward compatible with USB 1.1 devices. The USB port provides connection for USB devices such as security tokens and flash memory.

## Removable, Interchangeable, and Optional Modules

Some modules can be installed either by inserting them into slots on the chassis, or by opening the chassis and plugging them into connectors inside. The WLAN is factory installed.

- CompactFlash memory and enhanced high-speed WAN interface cards (EHWICs) fit into slots on the Cisco 1940 series chassis, and can be installed or removed without opening the chassis.
- A connector inside the Cisco 1940 series chassis accommodates an optional field installable Internal Service Module (ISM). See *Installing and Upgrading Internal Modules and FRUs in Cisco 1900 Series ISRs*



- The ISM connector inside the Cisco 1941W chassis accommodates an optional factory installed wireless LAN card. The WLAN card is permanently installed in the ISM connector.
- Cisco 1940 series ISRs feature an optional upgrade to the internal power supply providing in-line power (802.3af-compliant Power-over-Ethernet (PoE) and Cisco standard inline power) to optional integrated switch modules. The Cisco 1905, and Cisco 1921 have an external feed for PoE. (See [Figure 1-2](#).)
- There are no user-installable or replaceable modules on the Cisco 1905 or Cisco 1921 routers. The chassis cover should never be removed.

**Caution**

Power off the PoE before installing an EHWIC in the Cisco 1905 and Cisco 1921 ISRs.

[Table 1-2](#) summarizes the optional modules:

**Table 1-2 Summary of Cisco 1940 Series Removable and Interchangeable Modules**

External Modules (In chassis slots)		Internal Modules
CompactFlash <sup>1</sup>	Enhanced High-Speed WAN Interface Cards (EHWICs) <sup>2</sup>	Internal Service Module (ISM) <sup>3</sup>
2	2	1

1. Only Advanced Capability CompactFlash (CF) purchased from Cisco operate in Cisco 1900 series ISRs. Legacy CF will not operate in these routers. When legacy CF is inserted, the following error message appears:

WARNING: Unsupported compact flash detected. Use of this card during normal operation can impact and severely degrade performance of the system. Please use supported compact flash cards only.

2. HWICs, WICs, and VWICs (data only) are supported.
3. Non wireless models only.

## Memory

Cisco 1900 series routers contain the following types of memory:

- DRAM—Stores the running configuration and routing tables and is used for packet buffering by the network interfaces. Cisco IOS software executes from DRAM memory.
- Boot/NVRAM—Internal flash memory. Stores the bootstrap program (ROM monitor), the configuration register, and the startup configuration.
- Flash memory—External flash memory (1940 series only). Stores the operating system software image.

Table 1-3 summarizes the memory options for Cisco 1900 series routers. The default memory numbers for RAM represent the minimum usable memory. You can install additional RAM in multiples of the default amount, up to the maximum amount on the Cisco 1940 series ISRs. The Cisco 1905 and Cisco 1921 have factory installed, fixed memory modules and no expansion slots.

**Table 1-3 Router Memory Specifications**

DRAM	1940 Series	1905	1921
DRAM	Type—Unregistered DIMM (UDIMM) DIMM sizes—512 MB, 1 GB, 2 GB DIMM expansion slots—1 Default onboard memory—512 MB non ECC Maximum memory—2.5 GB Boot or NVRAM—Internal 16-MB flash memory.	Type—DDR2 DIMM expansion slots—0 Default onboard memory—256 <sup>1</sup> MB non ECC Maximum memory—512 MB <sup>2</sup> Boot or NVRAM—Internal 16 MB flash memory.	Type—DDR2 DIMM expansion slots—0 Default onboard memory—512 MB non ECC Maximum memory—512 MB Boot or NVRAM—Internal 16 MB flash memory.

1. 256 MB cannot support net boot or warm upgrade functions. Net boot and warm upgrade require 512 MB of memory.
2. 512 MB activation requires memory licensing feature. See the [Cisco IOS Software Activation Configuration Guide](#) for details.

## LED Indicators

Table 1-4 summarizes the LED indicators that are located in the router bezel or chassis, but not on the interface cards. Not all models have every LED.

**Table 1-4 Summary of Cisco 1900 Series LED Indicators**

LED	Color	Description	Location
SYS	Solid green	Solid green indicates normal operation.	Front panel
	Blinking green	System is booting or is in ROM monitor mode.	
	Amber	System error.	
	Off	Power is off or system board is faulty.	
ACT	Green	Solid or blinking when any packets are transmitted or received on any WAN or LAN, or when monitoring system activity.	Front panel
PoE	Green	PoE is available.	Front panel
	Amber	Power supply is not supplying PoE power.	

Table 1-4 Summary of Cisco 1900 Series LED Indicators (continued)

LED	Color	Description	Location
WLAN 2.4GHz (Wireless Models)	Green	On—Radio is connected, SSID <sup>1</sup> is configured, signal is being transmitted, and client is associated, but no data is being received or being transmitted.  Slow blinking—Radio is connected, SSID is configured, and beacons are being transmitted.  Fast blinking—Data is either being received or being transmitted.  Off—Radio is shut down, and no SSID is configured.	Front panel
WLAN 5GHz (Wireless Models)	Green	On—Radio is connected, SSID is configured, signal is being transmitted, and client is associated, but no data is being received or being transmitted.  Slow blinking—Radio is connected, SSID is configured, and beacons are being transmitted.  Fast blinking—Data is either being received or being transmitted.  Off—Radio is shut down, and no SSID is configured.	Front panel
WLAN	Green	<b>Autonomous Mode</b>  On—Wireless link is up.  Blinking—Ethernet link is up and data is either being received or being transmitted.  Off—Wireless link is down.  <b>Unified Mode</b>  On—Ethernet link is up, wireless access point is communicating with LWAPP controller.  Blinking—Ethernet link is up, wireless access point is not communicating with LWAPP controller.  Off—Ethernet link is down.	Front panel
ISM/WLAN	Green	Initialized.	Rear panel
	Amber	Initialized with error.	
Flash (1905 and 1921 only)	Green	Blinking means software is accessing the internal USB Flash (eUSB <sup>2</sup> ) device	Rear panel
	Amber	Initialized with error.	
CF 1	Green	Flash memory is busy.  <b>Note</b> Do not remove the CompactFlash memory card when this light is on.	Next to the CF1 slot
	Amber	Initialized with error.	
	Blinking Green then turns off	CompactFlash is ready for removal.  <b>Note</b> Remove the CompactFlash when the light turns off.	

Table 1-4 Summary of Cisco 1900 Series LED Indicators (continued)

LED	Color	Description	Location
CF 0	Green	Flash memory is busy. <b>Note</b> Do not remove the CompactFlash memory card when this light is on.	Next to the CF0 slot
	Amber	Initialized with error.	
	Blinking Green then turns off	CompactFlash is ready for removal. <b>Note</b> Remove the CompactFlash when the light turns off.	
S (Speed)	1 blink + pause	GE port operating at 10 Mb/s.	Rear panel
	2 blink + pause	GE port operating at 100 Mb/s.	
	3 blink + pause	GE port operating at 1000 Mb/s.	
L (Link)	Green	GE link is established.	Rear panel
	Off	No GE link is established.	
EN (RJ-45 console port)	Green	The RJ-45 console port is active.	Rear panel, next to the console port
EN (USB serial console port)	Green	The USB console port is active.	Rear panel, next to the USB console port

1. SSID = Service Set Identifier.

2. eUSB = embedded USB

## Chassis Ventilation

An internal fan provides chassis cooling. An onboard temperature sensor controls the fan speed. The fan is always on when power is applied to the router. Under most conditions, the fan operates at the slowest speed to conserve power and reduce fan noise. It operates at the higher speeds when necessary under conditions of higher ambient temperature. See the “[Chassis Airflow Diagram](#)” section on page 4-3.

## Real-Time Clock

An internal real-time clock with battery backup provides the system software with time of day on system power up. This allows the system to verify the validity of the certification authority (CA) certificate. The Cisco 1900 series router has a lithium battery. This battery lasts the life of the router under the operating environmental conditions specified for the router, and is not field-replaceable.

**Note**

If the lithium battery in a Cisco 1900 ISR should fail, the router must be returned to Cisco for repair.

Although the battery is not intended to be field-replaceable, the following warning must be heeded:

**Warning**

**Dispose of used batteries according to the manufacturer's instructions.** Statement 1015

## Chassis Security

The chassis of the router is constructed with a Kensington™ security slot on the back panel. It can be secured to a desktop or other surface by using Kensington™ lockdown equipment.

## Wireless LAN Connectivity

The embedded Wi-Fi CERTIFIED™, 802.11a/b/g/n-compliant wireless access point is preinstalled in the router as an optional feature. The Cisco 1900 series routers support both autonomous and unified features and network configurations.

The wireless access point does not have an external console port for connections. To configure the wireless device, you must use a console cable to connect a PC to the host router's console port as described in [Chapter 5, “Connecting to a Console Terminal or Modem,”](#) and then use the Cisco IOS command-line interface (CLI) to access the interface.

[Table 1-5](#) describes the radios and antennas for the Cisco 1900 series wireless routers.

The 5-GHz radio incorporates an Unlicensed National Information Infrastructure (UNII) radio transceiver operating in the UNII 1, 2, 3, 5-GHz frequency bands.

**Table 1-5** *Wireless Device Radios and Antennas*

Radio Module	Platform	Radio Band	Maximum Data Throughput <sup>1</sup>	Mode	Antenna
Dual-band 802.11a/b/g/n radio module	Cisco 1900 series wireless routers	2.4 GHz and 5 GHz	100 Mb/s per radio, up to 200 Mb/s total	Autonomous and unified	Three dual-band removable 2.4-GHz/5-GHz omnidirectional dipole RP-TNC antennas <sup>2</sup>

1. Actual data rate is highly dependent on your wireless environment.
2. The antennas require some minor installation. They must be screwed onto the RP-TNC antenna connectors on the I/O side of the chassis. See the following document on Cisco.com for feature information:  
[http://cisco.com/en/US/products/ps5853/prod\\_installation\\_guide09186a00804399cd.html](http://cisco.com/en/US/products/ps5853/prod_installation_guide09186a00804399cd.html)

## Baud Reset Button

The Cisco 1905 and Cisco 1921 ISRs have a baud reset button on the back panel. When the button is pressed during power on, ROMMON resets the router to the default console port configuration. If the baud reset button is pressed for longer than 30 seconds, the router defaults to the read-only ROMMON image. The default console port configuration is 9600 baud, 8 data bits, 1 stop bit, no parity, and flow control is set to none.

## Interface Numbering

Each individual interface (port) on a Cisco 1900 series router is identified by a number. The Cisco 1900 series routers contains the following wide-area network (WAN) and local-area network (LAN) interface types:

- Two onboard Gigabit Ethernet (GE) LAN interfaces
- Two slots in which you can install WICs, VWICs (data only), and HWICs. The Cisco 1905 comes with a factory installed EHWIC in the right slot.

The numbering format for the slots is *interface-type 0/slot-number/interface-number*. [Table 1-6](#) summarizes the interface numbering. See [Figure 1-5](#) to identify the slot numbers.

**Table 1-6** Interface Numbering

Slot Number	Slot Type	Slot Numbering Range
Onboard Ports	10/100/1000 Ethernet	0/0 and 0/1
Slot 0	EHWIC/HWIC/WIC	0/0/0 to 0/0/0 (single-wide)
Slot 1	EHWIC/WIC/VWIC	0/1/0 to 0/1/0 (single or double-wide)



### Note

On the Cisco 1900 series router, the numbering format for configuring an async interface is *0/slot/port*. To configure the line associated with an async interface, simply use the interface number to specify the async line. For example, line 0/0/0 specifies the line associated with interface serial 0/0/0 on a WIC-2A/S in slot 0. Similarly, line 0/1/1 specifies the line associated with interface async 0/1/1 on a WIC-2AM in slot 1.

## Specifications

[Table 1-7](#) lists the specifications for Cisco 1905 and Cisco 1921 series routers. [Table 1-8](#) lists the specifications for Cisco 1940 series routers.

**Table 1-7** Cisco 1905 and 1921 Series Router Specifications<sup>1</sup>

Description	Specification
<b>Physical</b>	
Dimensions without rubber feet (H x W x D)	1.75 in x 13.5 in x 11.5 in (4.4 cm x 34.3 x 29.2 cm), 1 RU <sup>2</sup> height

**Table 1-7 Cisco 1905 and 1921 Series Router Specifications<sup>1</sup>**

Description	Specification
Rack-mount 19 in. (48.3 cm) EIA	Optional
Weight (no modules installed)	Approximately 12 lbs
Weight with PoE	12.8 lbs
Maximum Weight-Fully Configured	14 lbs
<b>Power</b>	
AC input power	
• Input voltage	100 to 240 VAC, autoranging
• Frequency	47 to 63 Hz
• Input current (max)	1.5 to 0.6 A
• Typical power (no modules)	25 W
• Power (max) with AC	60 W
• Power (max) with PoE (platform only)	70 W
• Maximum PoE device power capacity with PoE power supply	80 W
• Surge current	<50 A
<b>Ports</b>	
Console	One RJ-45 connector and one USB mini Type B, USB 2.0 compliant. Baud rates: 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200.
Auxiliary ports	RJ-45 connector. Baud rates: 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200.
USB port	One USB Type A, USB 2.0 compliant, 2.5 W (500 mA) max. <sup>3</sup>
10/100/1000 Gigabit Ethernet	Two RJ-45 connectors (GE0/GE1), Auto-MDIX <sup>4</sup>
<b>Environmental</b>	
Operating humidity	10 to 85% RH
Operating temperature - up to 5906 ft (1800 m) elevation	32 to 104°F (0 to 40°C)
Operating temperature - up to 9843 ft (3000 m) elevation	32 - 77°F (0 - 25°C)
Operating altitude maximum	10,000 ft (3000 m)
<b>Transportation and Storage Environment</b>	
Nonoperating temperature	-40 to 158°F (-40 to 70°C)
Nonoperating humidity	5 to 95% RH
Nonoperating altitude	15,000 ft (4570 m)
<b>Acoustic</b>	

**Table 1-7 Cisco 1905 and 1921 Series Router Specifications<sup>1</sup>**

Description	Specification
Sound Pressure (Typ/Max)	32.9/58.3 dBa
Sound Power (Typ/Max)	41.9/67.2 dBA
<b>Regulatory</b>	
Electromagnetic compatibility (EMC)	47 CFR, Part 15 ICES-003 Class A EN55022 Class A CISPR22 Class A AS/NZS 3548 Class A VCCI V-3 EN 300-386 EN 61000 (Immunity) EN 55024, CISPR 24 EN50082-1  For detailed compliance information, see the <a href="#">Regulatory Compliance and Safety Information for Cisco 1900 Series Routers</a> document.
Safety compliance	UL 60950-1 CAN/CSA C22.2 No. 60950-1 EN 60950-1 AS/NZS 60950-1 IEC 60950-1  For detailed compliance information, see the <a href="#">Regulatory Compliance and Safety Information for Cisco 1900 Series Routers</a> document.
Telecom	TIA/EIA/IS-968 CS-03 ANSI T1.101 IEEE 802.3 RTTE Directive  For detailed compliance information, see the <a href="#">Regulatory Compliance and Safety Information for Cisco 1900 Series Routers</a> document.

1. Refer to the [Cisco 1900 Series Integrated Services Routers Data Sheet](#) for additional information.
2. Rack unit (RU)
3. 480 Mb/s individually, bandwidth is shared when both are used.
4. Auto-MDIX=auto media-dependent interface cross over.

**Table 1-8 Cisco 1940 Series Router Specifications<sup>1</sup>**

Description	Specification
<b>Physical</b>	
Dimensions without rubber feet (H x W x D)	3.5 x 13.5 x 11.5 in. (8.9 x 34.3 x 29.2 cm), 2 RU <sup>2</sup> height



**Table 1-8 Cisco 1940 Series Router Specifications<sup>1</sup>**

Description	Specification
Rack-mount 19 in. (48.3 cm) EIA	Included
Weight (no modules installed)	Approximately 12 lbs
Weight with PoE	12.8 lbs
Maximum Weight-Fully Configured	14.0 lbs
<b>Power</b>	
AC input power	
• Input voltage	100 to 240 VAC, autoranging
• Frequency	47 to 63 Hz
• Input current (max)	1.5 to 0.6 A
• Typical power (no modules)	35 W
• Power (max) with AC	110 W
• Power (max) with PoE (platform only)	110 W
• Maximum PoE device power capacity with PoE power supply	80 W
• Surge current	<50 A
Power consumption	110 W maximum platform only
<b>Ports</b>	
Console	One RJ-45 connector and one USB mini Type B, USB 2.0 compliant. Baud rates: 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200.
Auxiliary ports	RJ-45 connector. Baud rates: 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200.
USB ports	Two USB Type A, USB 2.0 compliant, 2.5 W (500 mA) max. <sup>3</sup>
10/100/1000 Gigabit Ethernet	Two RJ-45 connectors (GE0/GE1), Auto-MDIX <sup>4</sup>
<b>Environmental</b>	
Operating humidity	10 to 85% RH
Operating temperature - up to 5906 ft (1800 m) elevation	32 to 104°F (0 to 40°C)
Operating temperature - up to 9843 ft (3000 m) elevation	32 - 77°F (0 - 25°C)
Operating altitude maximum	10,000 ft (3000 m)
<b>Transportation and Storage Environment</b>	
Nonoperating temperature	-40 to 158°F (-40 to 70°C)
Nonoperating humidity	5 to 95% RH
Nonoperating altitude	15,000 ft (4570 m)

**Table 1-8 Cisco 1940 Series Router Specifications<sup>1</sup>**

Description	Specification
<b>Acoustic</b>	
Sound Pressure (Typ/Max)	26/46
Sound Power (Typ/Max)	36/55 dBA
<b>Regulatory</b>	
Electromagnetic compatibility (EMC)	47 CFR, Part 15 ICES-003 Class A EN55022 Class A CISPR22 Class A AS/NZS 3548 Class A VCCI V-3 CNS 13438 EN 300-386 EN 61000 (Immunity) EN 55024, CISPR 24 EN50082-1  For detailed compliance information, see the <a href="#">Regulatory Compliance and Safety Information for Cisco 1900 Series Routers</a> document.
Safety compliance	UL 60950-1 CAN/CSA C22.2 No. 60950-1 EN 60950-1 AS/NZS 60950-1 IEC 60950-1  For detailed compliance information, see the <a href="#">Regulatory Compliance and Safety Information for Cisco 1900 Series Routers</a> document.
Telecom	TIA/EIA/IS-968 CS-03 ANSI T1.101 ITU-T G.823, G.824 IEEE 802.3 RTTE Directive  For detailed compliance information, see the <a href="#">Regulatory Compliance and Safety Information for Cisco 1900 Series Routers</a> document.

1. Refer to the [Cisco 1900 Series Integrated Services Routers Data Sheet](#) for additional information.

2. Rack unit (RU)

3. 480 Mb/s individually, bandwidth is shared when both are used.

4. Auto-MDIX=auto media-dependent interface cross over.

## Regulatory Compliance

For compliance information, refer to the [Regulatory Compliance and Safety Information for Cisco 1900 Series Routers](#) document.



## CHAPTER 2

# Preparing for Router Installation

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This chapter describes the site requirements and equipment needed to install your Cisco 1900 series integrated services router. It includes the following sections:

- [Safety Recommendations, page 2-1](#)
- [General Site Requirements, page 2-3](#)
- [Network Cabling Specifications, page 2-5](#)
- [Console and Auxiliary Port Considerations, page 2-5](#)
- [Preparing to Connect to a Network, page 2-7](#)
- [Inspecting the Router, page 2-10](#)
- [Installation Checklist, page 2-11](#)
- [Site Log, page 2-13](#)
- [Inspecting the Router, page 2-10](#)
- [Required Tools and Equipment for Installation and Maintenance, page 2-13](#)



### Note

To see translations of the warnings that appear in this publication, refer to the [Regulatory Compliance and Safety Information for Cisco 1900 Series Routers](#) document that accompanies your router.

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## Safety Recommendations

Follow these guidelines to ensure general safety:

- Keep the chassis area clear and dust-free during and after installation.
- If you remove the chassis cover, put it in a safe place.
- Keep tools and chassis components away from walk areas.
- Do not wear loose clothing that could get caught in the chassis. Fasten your tie or scarf, and roll up your sleeves.
- Wear safety glasses when working under conditions that might be hazardous to your eyes.
- Do not perform any action that creates a hazard to people or makes the equipment unsafe.



### Warning

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

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**Warning**

**Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place.** Statement 1029

**Warning**

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

**Warning**

**Ultimate disposal of this product should be handled according to all national laws and regulations.** Statement 1040

## Safety with Electricity

Follow these guidelines when working on equipment powered by electricity.

**Warning**

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

**Warning**

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

**Warning**

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

- Locate the emergency power-off switch in the room in which you are working. Then, if an electrical accident occurs, you can quickly turn off the power.
- Disconnect all power before doing the following:
  - Installing or removing a chassis
  - Working near power supplies
  - Removing the top cover of a chassis
- Look carefully for possible hazards in your work area, such as moist floors, ungrounded power extension cables, frayed power cords, and missing safety grounds.
- Do not work alone if hazardous conditions exist.
- Never assume that power is disconnected from a circuit. Always check.
- Never open the enclosure of the router's internal power supply.
- If an electrical accident occurs, proceed as follows:
  - Use caution; do not become a victim yourself.
  - Turn off power to the device.

- If possible, send another person to get medical aid. Otherwise, assess the victim's condition and then call for help.
- Determine whether the person needs rescue breathing or external cardiac compressions; then take appropriate action.

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

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for it.
- Never touch uninsulated telephone wires or terminals unless the telephone line is disconnected at the network interface.
- Use caution when installing or modifying telephone lines.

## Preventing Electrostatic Discharge Damage

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

- Ensure that the router chassis is electrically connected to earth ground.
- Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. Connect the clip to an unpainted surface of the chassis frame to channel unwanted ESD voltages safely to ground. To guard against ESD damage and shocks, the wrist strap and cord must operate effectively.
- If no wrist strap is available, ground yourself by touching a metal part of the chassis.



### Caution

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

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## General Site Requirements

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

## Power Supply Considerations

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



**Warning**

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**The device is designed for connection to TN and IT power systems.** Statement 1007

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The AC power supply includes the following features:

- Autoselects either 110 V or 220 V operation.
- All units include a 6-foot (1.8-meter) electrical power cord. (A label near the power cord indicates the correct voltage, frequency, current draw, and power dissipation for the unit.)

## Site Environment

The Cisco 1900 series router is designed for placement on a desktop, rack-mounted or wall mounted.

The location of your router is an extremely important consideration for proper operation. Equipment placed too close together, inadequate ventilation, and inaccessible panels can cause malfunctions and shutdowns, and can also make maintenance difficult. Plan for access to both front and back panels of the router.

When planning your site layout and equipment locations, remember the precautions described in the [“Site Configuration” section on page 2-4](#) to help avoid equipment failures and reduce the possibility of environmentally caused shutdowns. If you are currently experiencing shutdowns or an unusually high number of errors with your existing equipment, these precautions may help you isolate the cause of the failures and prevent future problems.

## Site Configuration

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

- Make sure that the room where your router operates has adequate circulation. Electrical equipment generates heat. Without adequate circulation, ambient air temperature may not cool equipment to acceptable operating temperatures. See the [“Chassis Airflow Diagram” section on page 4-3](#).
- Always follow the ESD-prevention procedures described in the [“Preventing Electrostatic Discharge Damage” section on page 2-3](#) to avoid damage to equipment. Damage from static discharge can cause immediate or intermittent equipment failure.
- Make sure that the chassis cover and module back panels are secure. All empty interface card slots must have filler panels installed. The chassis is designed to allow cooling air to flow within it, through specially designed cooling slots. A chassis with uncovered openings creates air leaks, which may interrupt and reduce the flow of air across internal components.

## Wireless LAN Considerations

Wireless communication is dependent upon the propagation of radio waves. Many environmental factors influence radio waves. The Cisco Multiband Swivel-Mount Dipole Antenna document Installation Notes section describes factors affecting this. Prior to determining a location for the router it is advisable you review these factors.

<http://www.cisco.com/en/US/docs/routers/access/wireless/hardware/notes/antdip.html#wp1009743>

The type of antenna used with your wireless router and its location greatly impact the quality of wireless connections to the router. Cisco 1900 series wireless routers are compatible with three different antenna types—swivel-mount dipole antennas that mounts on the back panel of the router, a wall-mount antenna, and a ceiling-mount antenna.

For more information about antenna coverage and optimal usage, see the following documents:

- [Cisco Multiband Swivel-Mount Dipole Antenna](#)
- [Cisco Multiband Diversity Omnidirectional Ceiling-Mount Antenna](#)

## Network Cabling Specifications

The following sections describe the cables needed to install your Cisco 1900 series ISR in the following sections:

- [Console and Auxiliary Port Considerations, page 2-5](#)
- [Preparing to Connect to a Network, page 2-7](#)

For cable connection procedures, see the “[Cable Connection Procedures for Cisco 1900 Series Routers](#)” document.

## Console and Auxiliary Port Considerations

The router includes USB, asynchronous serial and auxiliary ports. The console and auxiliary ports provide access to the router either locally using a console terminal connected to the console port, or remotely, using a modem connected to the auxiliary port. This section provides important cabling information to consider before connecting the router to a console terminal or modem.

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

## Console Port Connections

The router has an EIA/TIA-232 asynchronous serial console port (RJ-45) and at least one USB Type-A 2.0 compliant ports. See [Table 1-1 on page 1-8](#) for a list of ports.

## EIA/TIA-232 Port

Depending on the cable and the adapter used, this port will appear as a data terminal equipment (DTE) or data communications equipment (DCE) device at the end of the cable.

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

To connect the router to an ASCII terminal, use the RJ-45-to-DB-9 cable and a DB-9-to-DB-25 adapter (provided).

The default parameters for the console port are 9600 baud, 8 data bits, no parity, and 1 stop bit. The console port does not support mode control. For detailed information about installing a console terminal, see the [“Connecting to the Console Port with Microsoft Windows”](#) section on page 5-4 of the [“Cable Connection Procedures for Cisco 1900 Series Routers”](#) document.

For cable and port pinouts, refer to the online document [Cisco Modular Access Router Cable Specifications](#). This document is located on Cisco.com.

## USB Serial Console

The USB serial console port connects directly to the USB connector of a PC using a USB Type A to 5-pin mini Type-B cable. The USB Console supports full speed (12Mb/s) operation. The console port does not support hardware flow control.

The default parameters for the console port are 9600 baud, 8 data bits, no parity, and 1 stop bit. The console port does not support mode control. For detailed information about installing a console terminal, see the [“Connecting to the Console Port with Microsoft Windows”](#) section on page 5-4 of the [“Cable Connection Procedures for Cisco 1900 Series Routers”](#) document.

For operation with Microsoft Windows, the Cisco Windows USB Console Driver must be installed on any PC connected to the Console port. If it is not installed, prompts guide you through a simple installation process.

The Cisco Windows USB Console Driver allows plugging and unplugging the USB cable from the console port without affecting Windows HyperTerminal operations. No special drivers are needed for Mac OS X or Linux.

Only one console port can be active at a time. When a cable is plugged into the USB console port the RJ 45 port becomes inactive. Conversely, when the USB cable is removed from the USB port the RJ 45 port becomes active.

Baud rates for the USB console port are 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bps.



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**Note** 4-pin mini Type-B connectors are easily confused with 5-pin mini Type-B connectors. They are not compatible. Only the 5-pin mini Type-B can be used.

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### USB Console OS Compatibility

- Windows 2000, Windows XP 32- and 64-bit, Windows Vista 32- and 64-bit
- Mac OS X version 10.5.4
- Redhat / Fedora Core 10 with kernel 2.6.27.5-117
- Ubuntu 8.10 with kernel 2.6.27-11
- Debian 5.0 with kernel 2.6
- Suse 11.1 with kernel 2.6.27.7-9



## Auxiliary Port Connections

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

For connection to a modem, your router is provided with an RJ-45-to-DB-9 cable and a DB-9-to-DB-25 adapter.

For detailed information about connecting devices to the auxiliary port, see the [“Connecting to the Auxiliary Port” section on page 5-9](#).

For cable and port pinouts, refer to the [Cisco Modular Access Router Cable Specifications](#) document on Cisco.com.

## Preparing to Connect to a Network

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

The following sections describe network connection considerations for several types of network interfaces:

- [Ethernet Connections, page 2-7](#)
- [Serial Connections, page 2-7](#)
- [ISDN BRI Connections, page 2-9](#)
- [CSU/DSU Connections, page 2-10](#)

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

- [Cisco Modular Access Router Cable Specifications](#)

## Ethernet Connections

The IEEE has established Ethernet as standard IEEE 802.3. The Cisco 1941 Ethernet implementations are as follows:

- 100BASE-T—100 Mb/s full-duplex transmission over a Category 5 or better unshielded twisted-pair (UTP) cable. Supports the Ethernet maximum length of 328 feet (100 meters).
- 100BASE-T—100 Mb/s full-duplex transmission over a Category 5 or better unshielded twisted-pair (UTP) cable. Supports the Ethernet maximum length of 328 feet (100 meters).
- 10BASE-T—10 Mb/s full-duplex transmission over a Category 5 or better unshielded twisted-pair (UTP) cable. Supports the Ethernet maximum length of 328 feet (100 meters).

Refer to the [Cisco Modular Access Router Cable Specifications](#) online document for information about Ethernet cables, connectors, and pinouts. This document is available online.

## Serial Connections

Serial connections are provided by serial WAN interface cards (WICs). For more information on WICs, refer to [Cisco.com](#). This document can be accessed online.

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

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

## Configuring Serial Connections

The serial ports on the serial WICs use DB-60 connectors. Serial ports can be configured as DTEs or DCEs, depending on the serial cable used.

### Serial DTE or DCE Devices

A device that communicates over a synchronous serial interface is either a DTE or DCE device. A DCE device provides a clock signal that paces the communications between the device and the router. A DTE device does not provide a clock signal. DTE devices usually connect to DCE devices. The documentation for the device should indicate whether it is a DTE or DCE device. (Some devices have a jumper that allows you to select either DTE mode or DCE mode.) [Table 2-1](#) lists typical DTE and DCE devices.

**Table 2-1** Typical DTE and DCE Devices

Device Type	Gender	Typical Devices
DTE	Male <sup>1</sup>	<ul style="list-style-type: none"> <li>• Terminal</li> <li>• PC</li> </ul>
DCE	Female <sup>2</sup>	<ul style="list-style-type: none"> <li>• Modem</li> <li>• CSU/DSU</li> <li>• Multiplexer</li> </ul>

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

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

## Signaling Standards Supported

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

The synchronous serial port can be configured as DTE or DCE, depending on the attached cable (except EIA-530, which is DTE only). To order a shielded cable, contact customer service. See the [“Obtaining Documentation and Submitting a Service Request”](#) section on page -xvi.



#### Note

All serial ports configured as DTE require external clocking from a channel service unit/data service unit (CSU/DSU) or other DCE device.

Although we do not recommend manufacturing your own serial cables (because of the small size of the pins on the DB-60 serial connector), cable pinouts are provided in the [Cisco Modular Access Router Cable Specifications](#).

## Transmission Speeds and Distance Limitations

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

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

**Table 2-2 Serial Signal Transmission Speeds and Distances**

Rate (bps)	Distance for EIA/TIA-232		Distance for EIA/TIA-449, X.21, V.35, and EIA-530		Distance for USB	
	Feet	Meters	Feet	Meters	Feet	Meters
2400	200	60	4100	1250	16.4	5
4800	100	30	2050	625	16.4	5
9600	50	15	1025	312	16.4	5
19200	25	7.6	513	156	16.4	5
38400	12	3.7	256	78	16.4	5
56000	8.6	2.6	102	31	16.4	5
1544000 (T1)	—	—	50	15	16.4	5

Balanced drivers allow EIA/TIA-449 signals to travel greater distances than EIA/TIA-232 signals. Typically, EIA/TIA-449 and EIA-530 can support a 2-Mbps rate, and V.35 can support a 4-Mbps rate.

## Asynchronous/Synchronous Serial Module Baud Rates

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

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

## ISDN BRI Connections

The BRI WICs provide Integrated Services Digital Network (ISDN) Basic Rate Interface (BRI) connections. BRI WICs are available with either an S/T interface that requires an external Network Termination 1 (NT1), or a U interface that has a built-in NT1. You can install the BRI WICs in any available WIC slots in the chassis.

**Warning**

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

Statement 23

**Warning**

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

Use a BRI cable (not included) to connect the BRI WIC directly to an ISDN. Table 2-3 lists the specifications for ISDN BRI cables. For information about pinouts, refer to the [Cisco Modular Access Router Cable Specifications](#) online document, which is located on Cisco.com.

**Table 2-3 ISDN BRI Cable Specifications**

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

1. nF = nanofarad

For more information on BRI WICs, refer to Cisco.com.

## CSU/DSU Connections

CSU/DSU WICs are available that provide switched 56-kbps connections, or full or fractionalized T1 connections.

For more information on CSU/DSU WICs, refer to Cisco.com.

## Inspecting the Router

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

The router, cables, publications, and any optional equipment that you ordered may be shipped in more than one container.

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

# Installation Checklist

The sample installation checklist lists items and procedures for installing a new router. Make a copy of this checklist, and mark each item when you complete it. Include a copy of the checklist for each router in your Site Log (described in the [“Site Log”](#) section on page 2-13).

Installation Checklist for Site \_\_\_\_\_

Router Name \_\_\_\_\_

Task	Verified by	Date
Installation Checklist copied		
Background information placed in Site Log		
Site power voltages verified		
Installation site power check completed		
Required tools available		
Additional equipment available		
Router received		
Router quick start guide received		
<i>Cisco Regulatory Compliance and Safety Information Roadmap</i> document received		
Product registration card received		
Chassis components verified		
Initial electrical connections established		
ASCII terminal (for local configuration) or modem (for remote configuration) available		
Signal distance limits verified		
Startup sequence steps completed		
Initial operation verified		
Software image verified		

# Site Log

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

- Installation progress—Make a copy of the Installation Checklist, and insert it into the Site Log. Record the pertinent information as each procedure is completed.
- Upgrade and maintenance procedures—Use the Site Log as a record of ongoing router maintenance and expansion history. A Site Log might include the following events:
  - Installation of network modules
  - Removal or replacement of network modules and other upgrades
  - Configuration changes
  - Maintenance schedules and requirements
  - Maintenance procedures performed
  - Intermittent problems
  - Comments and notes

# Required Tools and Equipment for Installation and Maintenance

You need the following tools and equipment for installing and upgrading the router and its components:

- ESD-preventive cord and wrist strap
- Number 2 Phillips screwdriver for installing or removing modules, and a flat-blade screwdriver for removing CompactFlash cover, upgrading memory, or other components: small, 3/16-inch (0.48 centimeter) and medium, 1/4-inch (0.63 centimeter).
- A 1/4-inch (0.63 centimeter) nut driver
- Wire crimper
- AWG 14 wire for connecting the router chassis to earth ground

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

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



**Note** For more information on cable specifications, refer to the online document [Cisco Modular Access Router Cable Specifications](#), which is located on Cisco.com.

- Ethernet hub or PC with a network interface card for connection to Ethernet (LAN) ports
- Console terminal (an ASCII terminal or a PC running terminal emulation software) configured for 9600 baud, 8 data bits, no parity, and 1 stop bit
- Modem for connection to the auxiliary port for remote administrative access
- Data service unit (DSU) or channel service unit/data service unit (CSU/DSU) as appropriate for serial interfaces
- External CSU for any CT1/PRI modules without a built-in CSU

- NT1 device for ISDN BRI S/T interfaces (if not supplied by your service provider)





## CHAPTER 3

# Cable Information and Specifications for Cisco 1900 Series Routers

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This document gives cable information and specifications for the console port, auxiliary port, and network ports on your Cisco 1900 series integrated services router. It contains the following sections:

- [Console and Auxiliary Port Considerations, page 3-1](#)
- [Preparing to Connect to a Network, page 3-3](#)

For cable connection procedures, see the “[Cable Connection Procedures for Cisco 1900 Series Routers](#)” document.

## Console and Auxiliary Port Considerations

The router includes USB, asynchronous serial and auxiliary ports. The console and auxiliary ports provide access to the router either locally using a console terminal connected to the console port, or remotely, using a modem connected to the auxiliary port. This section provides important cabling information to consider before connecting the router to a console terminal or modem.

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

## Console Port Connections

The router has an EIA/TIA-232 asynchronous serial console port (RJ-45) and two USB Type-A 2.0 compliant ports.

### EIA/TIA-232 Port

Depending on the cable and the adapter used, this port will appear as a data terminal equipment (DTE) or data communications equipment (DCE) device at the end of the cable.

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

To connect the router to an ASCII terminal, use the RJ-45-to-DB-9 cable and a DB-9-to-DB-25 adapter (provided).

The default parameters for the console port are 9600 baud, 8 data bits, no parity, and 1 stop bit. The console port does not support mode control. For detailed information about installing a console terminal, see the [“Connecting to the Console Port with Microsoft Windows”](#) section on page 5-4 of the [“Cable Connection Procedures for Cisco 1900 Series Routers”](#) document.

For cable and port pinouts, refer to the online document [Cisco Modular Access Router Cable Specifications](#). This document is located on Cisco.com.

## USB Serial Console

The USB serial console port connects directly to the USB connector of a PC using a USB Type A to 5-pin mini Type-B cable. The USB Console supports full speed (12Mb/s) operation. The console port does not support hardware flow control.

The default parameters for the console port are 9600 baud, 8 data bits, no parity, and 1 stop bit. The console port does not support mode control. For detailed information about installing a console terminal, see the [“Connecting to the Console Port with Microsoft Windows”](#) section on page 5-4 of the [“Cable Connection Procedures for Cisco 1900 Series Routers”](#) document.

For operation with Microsoft Windows, the Cisco Windows USB Console Driver must be installed on any PC connected to the Console port. If it is not installed, prompts guide you through a simple installation process.

The Cisco Windows USB Console Driver allows plugging and unplugging the USB cable from the console port without affecting Windows HyperTerminal operations. No special drivers are needed for Mac OS X or Linux.

Only one console port can be active at a time. When a cable is plugged into the USB console port the RJ 45 port becomes inactive. Conversely, when the USB cable is removed from the USB port the RJ 45 port becomes active.

Baud rates for the USB console port are 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bps.




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**Note** 4-pin mini Type-B connectors are easily confused with 5-pin mini Type-B connectors. They are not compatible. Only the 5-pin mini Type-B can be used.

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### USB Console OS Compatibility

- Windows 2000, Windows XP 32- and 64-bit, Windows Vista 32- and 64-bit
- Mac OS X version 10.5.4
- Redhat / Fedora Core 10 with kernel 2.6.27.5-117
- Ubuntu 8.10 with kernel 2.6.27-11
- Debian 5.0 with kernel 2.6
- Suse 11.1 with kernel 2.6.27.7-9

## Auxiliary Port Connections

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

For connection to a modem, your router is provided with an RJ-45-to-DB-9 cable and a DB-9-to-DB-25 adapter.

For detailed information about connecting devices to the auxiliary port, see the [“Connecting to the Auxiliary Port” section on page 5-9](#).

For cable and port pinouts, refer to the [Cisco Modular Access Router Cable Specifications](#) document on Cisco.com.

## Preparing to Connect to a Network

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

The following sections describe network connection considerations for several types of network interfaces:

- [Ethernet Connections, page 3-3](#)
- [Serial Connections, page 3-3](#)
- [ISDN BRI Connections, page 3-5](#)
- [CSU/DSU Connections, page 3-6](#)

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

- [Cisco Modular Access Router Cable Specifications](#)

## Ethernet Connections

The IEEE has established Ethernet as standard IEEE 802.3. The Cisco 1941 Ethernet implementations are as follows:

- 100BASE-T—100 Mb/s full-duplex transmission over a Category 5 or better unshielded twisted-pair (UTP) cable. Supports the Ethernet maximum length of 328 feet (100 meters).
- 100BASE-T—100 Mb/s full-duplex transmission over a Category 5 or better unshielded twisted-pair (UTP) cable. Supports the Ethernet maximum length of 328 feet (100 meters).
- 10BASE-T—10 Mb/s full-duplex transmission over a Category 5 or better unshielded twisted-pair (UTP) cable. Supports the Ethernet maximum length of 328 feet (100 meters).

Refer to the [Cisco Modular Access Router Cable Specifications](#) online document for information about Ethernet cables, connectors, and pinouts. This document is available online.

## Serial Connections

Serial connections are provided by serial WAN interface cards (WICs). For more information on WICs, refer to [Cisco.com](#). This document can be accessed online.

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

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

## Configuring Serial Connections

The serial ports on the serial WICs use DB-60 connectors. Serial ports can be configured as DTEs or DCEs, depending on the serial cable used.

## Serial DTE or DCE Devices

A device that communicates over a synchronous serial interface is either a DTE or DCE device. A DCE device provides a clock signal that paces the communications between the device and the router. A DTE device does not provide a clock signal. DTE devices usually connect to DCE devices. The documentation for the device should indicate whether it is a DTE or DCE device. (Some devices have a jumper that allows you to select either DTE mode or DCE mode.) [Table 3-1](#) lists typical DTE and DCE devices.

**Table 3-1** Typical DTE and DCE Devices

Device Type	Gender	Typical Devices
DTE	Male <sup>1</sup>	<ul style="list-style-type: none"> <li>• Terminal</li> <li>• PC</li> </ul>
DCE	Female <sup>2</sup>	<ul style="list-style-type: none"> <li>• Modem</li> <li>• CSU/DSU</li> <li>• Multiplexer</li> </ul>

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

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

## Signaling Standards Supported

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

The synchronous serial port can be configured as DTE or DCE, depending on the attached cable (except EIA-530, which is DTE only). To order a shielded cable, contact customer service. See the [“Obtaining Documentation and Submitting a Service Request”](#) section on page -xvi.



### Note

All serial ports configured as DTE require external clocking from a channel service unit/data service unit (CSU/DSU) or other DCE device.

Although we do not recommend manufacturing your own serial cables (because of the small size of the pins on the DB-60 serial connector), cable pinouts are provided in the [Cisco Modular Access Router Cable Specifications](#).

## Transmission Speeds and Distance Limitations

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

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

**Table 3-2 Serial Signal Transmission Speeds and Distances**

Rate (bps)	Distance for EIA/TIA-232		Distance for EIA/TIA-449, X.21, V.35, and EIA-530		Distance for USB	
	Feet	Meters	Feet	Meters	Feet	Meters
2400	200	60	4100	1250	16.4	5
4800	100	30	2050	625	16.4	5
9600	50	15	1025	312	16.4	5
19200	25	7.6	513	156	16.4	5
38400	12	3.7	256	78	16.4	5
56000	8.6	2.6	102	31	16.4	5
1544000 (T1)	—	—	50	15	16.4	5

Balanced drivers allow EIA/TIA-449 signals to travel greater distances than EIA/TIA-232 signals. Typically, EIA/TIA-449 and EIA-530 can support a 2-Mbps rate, and V.35 can support a 4-Mbps rate.

## Asynchronous/Synchronous Serial Module Baud Rates

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

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

## ISDN BRI Connections

The BRI WICs provide Integrated Services Digital Network (ISDN) Basic Rate Interface (BRI) connections. BRI WICs are available with either an S/T interface that requires an external Network Termination 1 (NT1), or a U interface that has a built-in NT1. You can install the BRI WICs in any available WIC slots in the chassis.

**Warning**

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

Statement 23

**Warning**

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

Use a BRI cable (not included) to connect the BRI WIC directly to an ISDN. Table 3-3 lists the specifications for ISDN BRI cables. For information about pinouts, refer to the [Cisco Modular Access Router Cable Specifications](#) online document, which is located on Cisco.com.

**Table 3-3 ISDN BRI Cable Specifications**

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

1. nF = nanofarad

For more information on BRI WICs, refer to Cisco.com.

## CSU/DSU Connections

CSU/DSU WICs are available that provide switched 56-kbps connections, or full or fractionalized T1 connections.

For more information on CSU/DSU WICs, refer to Cisco.com.



# CHAPTER 4

## Installing and Connecting the Router

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This chapter tells how to physically set up Cisco 1900 series integrated services routers. It contains the following sections:

- [Safety Warnings, page 4-2](#)
- [Setting Up the Chassis, page 4-3](#)
- [Setting the Chassis on a Desktop, page 4-4](#)
- [Wall-Mounting the Chassis, page 4-4](#)
- [Rack-Mounting the Chassis, page 4-7](#)
- [Installing the Chassis Ground Connection, page 4-10](#)
- [Power Connections, page 4-12](#)
- [Connecting WAN and LAN Cables, page 4-13](#)
- [Connecting to a Console Terminal or Modem, page 4-16](#)

Cisco 1900 series routers are normally shipped with a complement of components that can be upgraded or replaced to expand and enhance the router's functionality. These components either are inserted internally into the router or are plugged into slots in the router chassis.



### Note

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To see translations of the warnings that appear in this publication, refer to the [Regulatory Compliance and Safety Information for Cisco 1900 Series Routers](#) document that accompanies your router.

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### Internal Modules



### Note

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The Cisco model 1905 and Cisco 1921 have no user accessible internal modules.

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The router's internal components include the following:

- DRAM
- Internal services module (ISM)

If you need to remove or upgrade either of these items, follow the procedures given in ["Installing and Upgrading Internal Modules and FRUs in Cisco 1900 Series ISRs"](#).

### Plug-In Modules

The following components plug into the router chassis:

- WAN interface cards (WICs)

- Voice/WAN interface cards (VWICs), data mode only
- High-speed WICs (HWICs)
- Enhanced High-speed WICs (EHWICs)
- CompactFlash memory card

If you need to remove or install WICs, VWICs, HWICs, or EHWICs follow the procedures in the *Installing Cisco Interface Cards in Cisco Access Routers* at the following URL:

[http://www.cisco.com/en/US/docs/routers/access/interfaces/ic/hardware/installation/guide/inst\\_ic.html](http://www.cisco.com/en/US/docs/routers/access/interfaces/ic/hardware/installation/guide/inst_ic.html)

If you need to remove or upgrade the CompactFlash memory card (1940 series only), follow the procedure in “*Installing and Upgrading Internal Modules and FRUs in Cisco 1900 Series ISRs*”.

## Safety Warnings



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



Warning

**No user-serviceable parts inside. Do not open.** Statement 1073



Warning

**Read the installation instructions before you connect the system to its power source.** Statement 1004



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.**

Statement 1040

## Safety Warnings for Finland, Norway and Sweden

Warning statement 1017 applies to the countries of Finland, Norway, and Sweden.



Warning

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

Statement 1017



# Setting Up the Chassis

The Cisco 1900 series router can be installed on a desktop, and can also be mounted on a wall. Select the setup that best meets the needs of your network. These setups are described in the following sections:

- [Setting the Chassis on a Desktop, page 4-4](#)
- [Wall-Mounting the Chassis, page 4-4](#)
- [Rack-Mounting the Chassis](#)

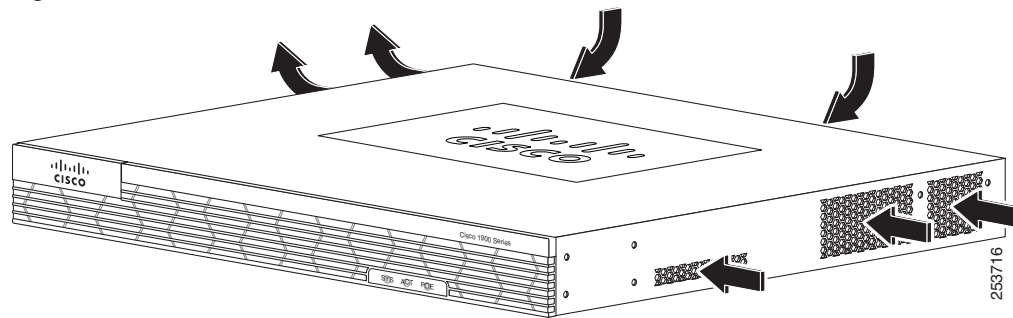
**Caution**

The front panel bezel must not be removed from the Cisco 1900 series router. It is part of the product's enclosure, and must be left in place to prevent damage from foreign parts entering the router, to provide a shield from internal electromagnetic interference (EMI), and to direct the flow of cooling air properly through the chassis.

## Chassis Airflow Diagram

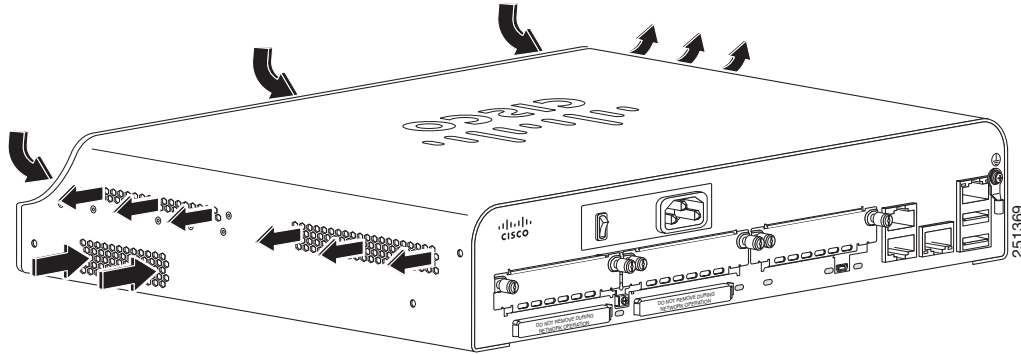
[Figure 4-2](#) shows the airflow through and around the Cisco 1905 and Cisco 1921 chassis.

**Figure 4-1** Cisco 1905 and Cisco 1921 Chassis Airflow



[Figure 4-2](#) shows the airflow through and around the Cisco 1940 series chassis.

Figure 4-2 Cisco 1940 Series Chassis Airflow



## Setting the Chassis on a Desktop

You can place Cisco 1900 series routers on a desktop or shelf. The Cisco 1900 series router is shipped with the rubber feet attached to the chassis to protect the desktop.



### Warning

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



### Caution

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

## Chassis Grounding

After the router has been installed, you must connect the chassis to a reliable earth ground. For the chassis ground connection procedure, see the [“Installing the Chassis Ground Connection”](#) section on page 4-10.

## Wall-Mounting the Chassis



### Warning

**Read the wall-mounting instructions carefully before beginning installation. Failure to use the correct hardware or to follow the correct procedures could result in a hazardous situation to people and damage to the system.** Statement 378

The Cisco 1900 series router can be wall-mounted by using two number six, 3/4-inch screws and the mounting features on the bottom of the router. You must provide the screws. We recommend using pan-head or round-head screws.

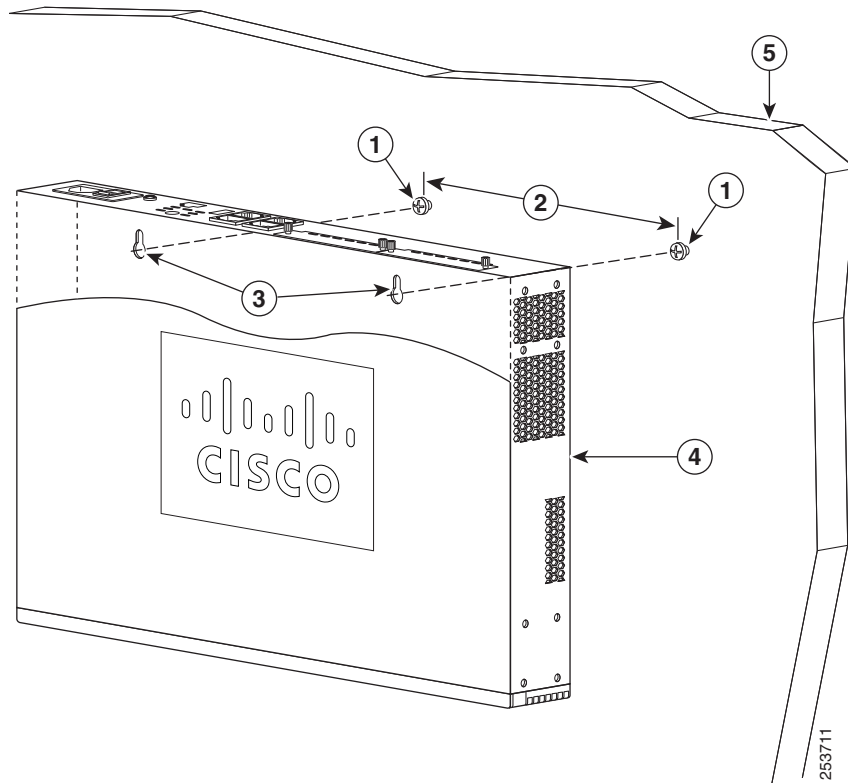


### Caution

The screws must go into a wall stud (wood) or a wall anchor of the appropriate type for the wall. Screws into drywall are not sufficient to mount the router.

Figure 4-3 shows the wall-mounting features on the Cisco 1905 and Cisco 1921 routers.

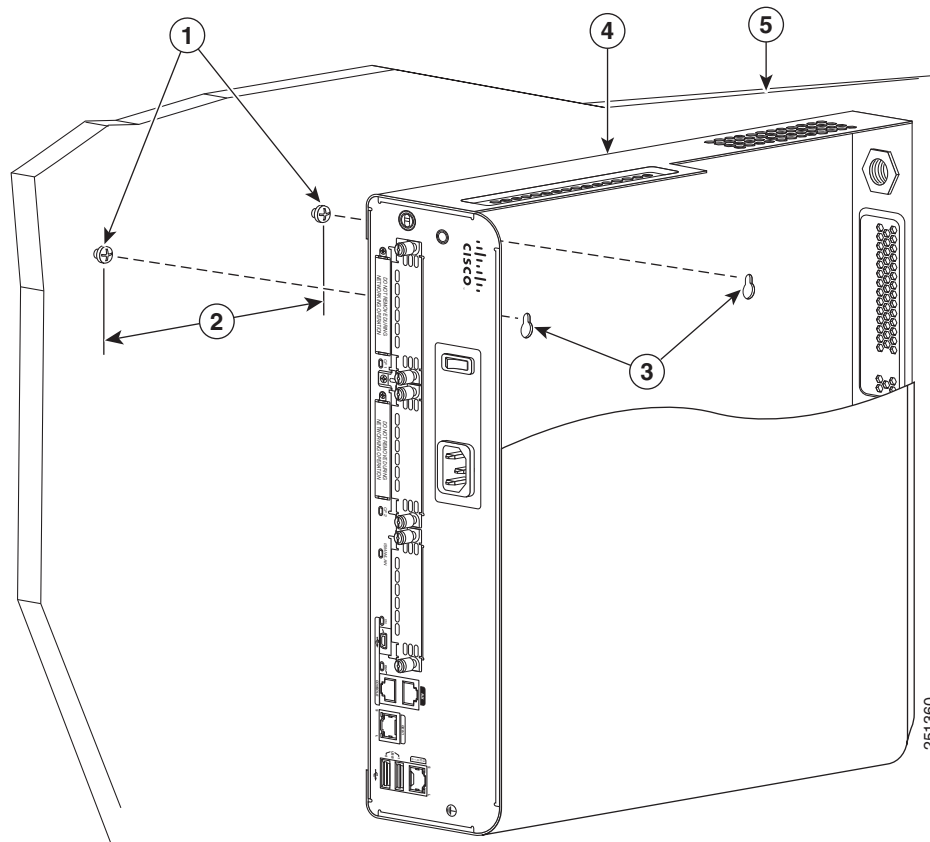
**Figure 4-3** Wall-Mounting Features on the Cisco 1905 and Cisco 1921 Routers



<b>1</b>	Wall screws	<b>2</b>	8 inches (20.3 cm)
<b>3</b>	Chassis mounting holes (on bottom)	<b>4</b>	Router chassis
<b>5</b>	Mounting surface		

Figure 4-4 shows the wall-mounting features on the Cisco 1941 series routers.

**Figure 4-4** Wall-Mounting Features on the Cisco 1941 Router



<b>1</b>	Wall screws	<b>2</b>	5 inches (12.7 cm)
<b>3</b>	Chassis mounting holes (on bottom)	<b>4</b>	Router chassis
<b>5</b>	Mounting surface		

To mount the router on a wall or other surface, follow these steps:

- 
- Step 1** Install the two screws 5.00 inches (12.7 centimeters) horizontally apart on a wall or other vertical surface.  
The screws should protrude 0.25 inch (0.6 centimeter) from the surface of the wall.
- Step 2** Remove the rubber feet from the router.
- Step 3** Hang the router on the screws. This is the appropriate orientation for safe use. (See [Figure 4-3](#) and [Figure 4-4](#).)



**Caution**

If you install the screws in drywall, use hollow-wall anchors (1/8 inch by 5/16 inch) to secure the screws. If the screws are not properly anchored, the strain of the cables connected to the router back panel could pull the router from the wall.

---

# Rack-Mounting the Chassis



**Warning**

Read the wall-mounting instructions carefully before beginning installation. Failure to use the correct hardware or to follow the correct procedures could result in a hazardous situation to people and damage to the system. Statement 378



**Warning**

Stability hazard. The rack stabilizing mechanism must be in place, or the rack must be bolted to the floor before you slide the unit out for servicing. Failure to stabilize the rack can cause the rack to tip over. Statement 1048

The Cisco 1900 series router can be installed in a 19-inch EIA rack. Mounting brackets allow installing in either a front and rear facing position.

You can mount the router in the following ways:

- Front mounting—Brackets attached at the front of the chassis with the front panel facing forward.
- Back mounting—Brackets attached at the back of the chassis with the back panel facing forward.



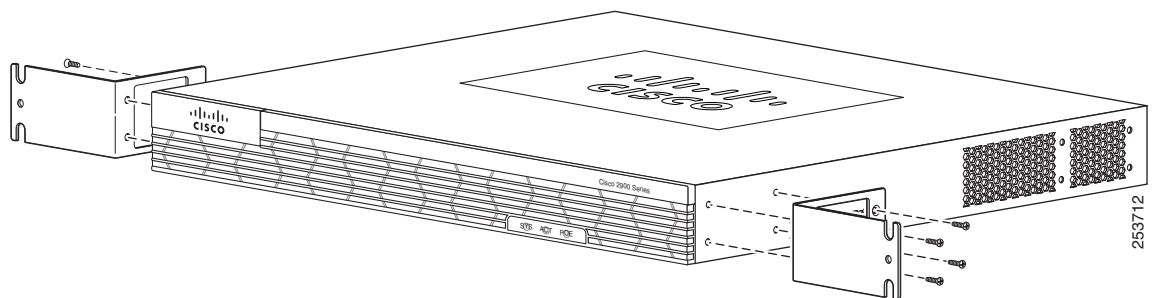
**Note**

The rubber feet need to be removed for rack mounting.

## Attaching Rack-Mount Brackets to Cisco 1900 Series Routers

Use four of the supplied number-8 Phillips screws to attach the long side of each bracket to the router. [Figure 4-5](#) shows how to attach the brackets to the sides of the router with the front panel forward. Torque the screws to 15 to 18 in-lb (1.7 to 2.0 N-m).

**Figure 4-5** Bracket Installation for Front Mounting the Cisco 1905 and Cisco 1921 ISRs



[Figure 4-6](#) shows how to attach the brackets to the sides of the router with the back panel forward.

**Figure 4-6** Bracket Installation for Back Mounting the Cisco 1905 and Cisco 1921 ISRs

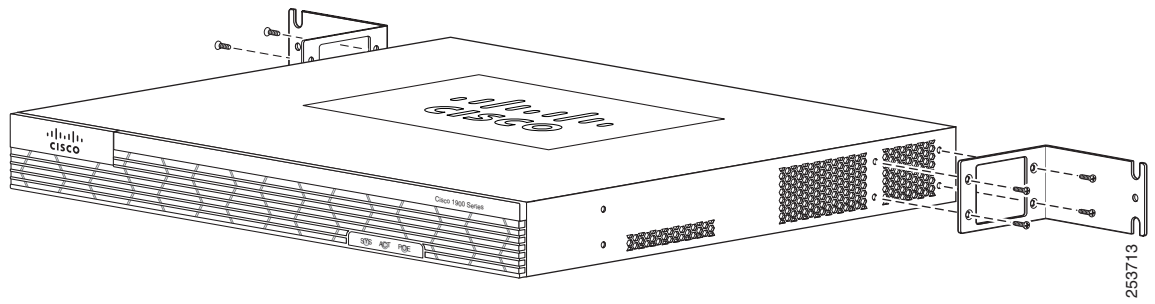


Figure 4-7 shows how to attach the brackets to the sides of the router with the front panel forward.

**Figure 4-7** Bracket Installation for Front Mounting the Cisco 1940 Series ISR

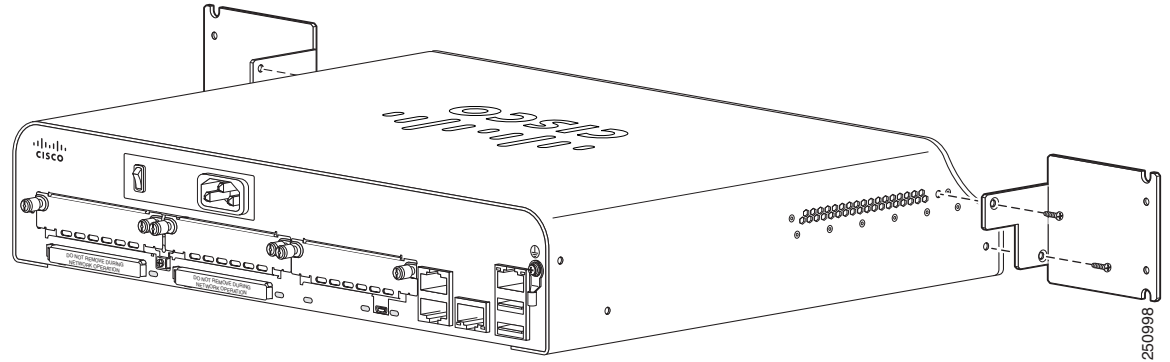


Figure 4-8 shows how to attach the brackets to the sides of the router with the back panel forward.

**Figure 4-8** Bracket Installation for Back Mounting the Cisco 1940 Series ISR

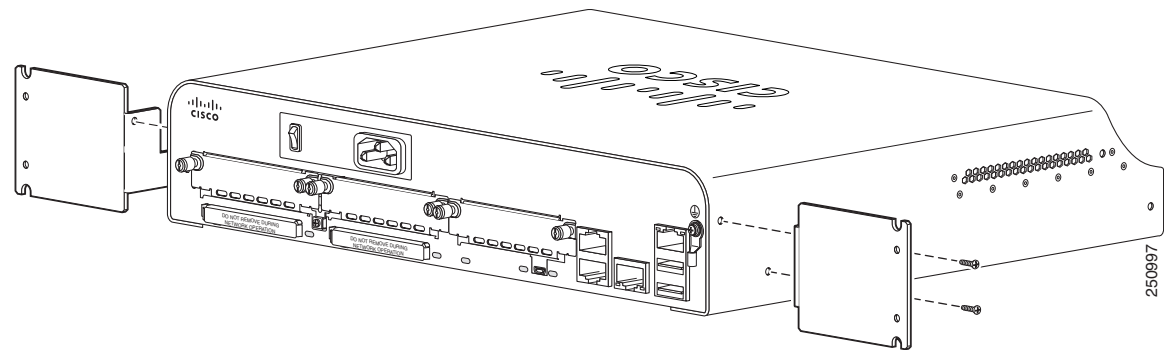
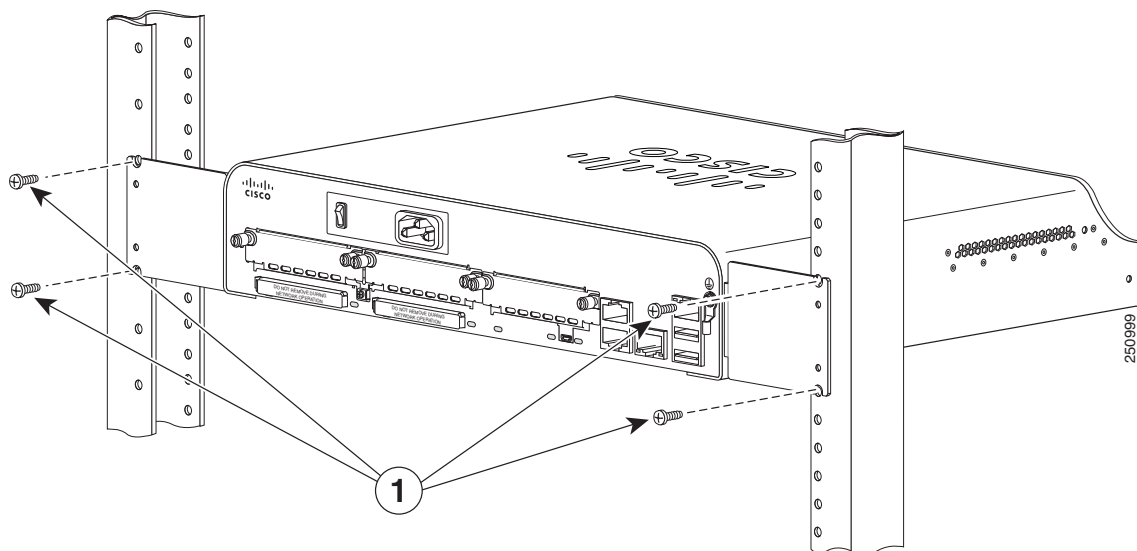


Figure 4-9 shows how to attach the brackets to the rack.

**Figure 4-9** Bracket Installation to Rack



## Installing the 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



**Warning**

**This equipment needs to be grounded. Use a green and yellow 12 to 14 AWG ground wire to connect the host to earth ground during normal use.** Statement 242

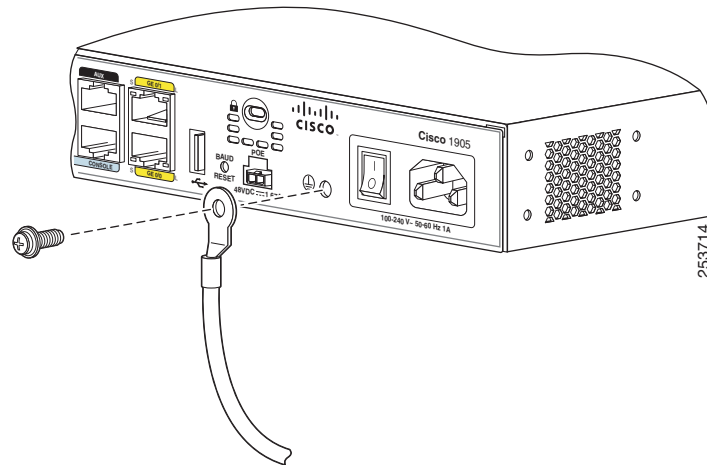
You must connect the chassis to a reliable earth ground, using a ground lug and size 14 AWG (2 mm<sup>2</sup>) wire. To install the ground connection for a Cisco 1900 series router, follow these steps:

- Step 1** Strip one end of the ground wire to expose approximately 0.75 in. (20 mm) of conductor.
- Step 2** Crimp the 14 AWG green ground wire to a UL Listed/CSA certified ring terminal that is suitably sized for the number 6 ground screw provided on the rear panel of the router. The crimping tool should be one that is recommended by the ring lug terminal manufacturer.

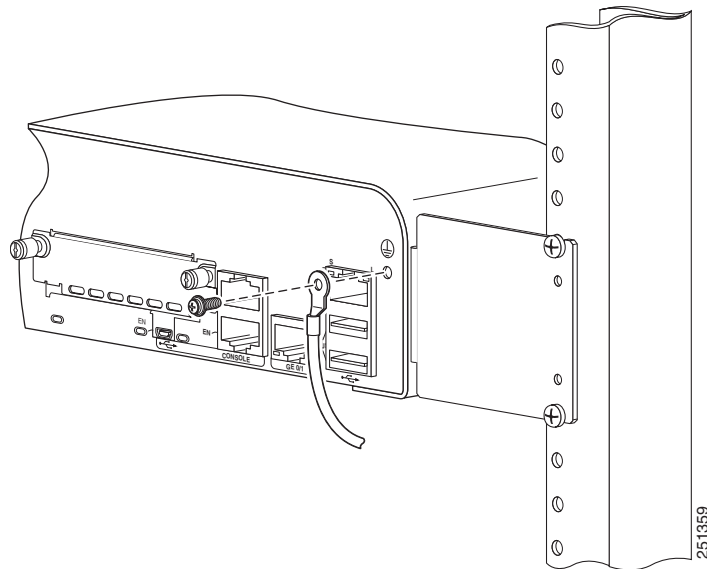


- Step 3** Attach the ring terminal to the chassis. The attachment points for the Cisco 1941 router are shown in [Figure 4-11](#). Use a number 2 Phillips screwdriver and the screw supplied with the ground lug. Tighten the screw to a torque of 8 to 10 in-lb. (0.9 to 1.1 N-m).

**Figure 4-10** Chassis Ground Connection on the Cisco 1905 and Cisco 1921 Routers



**Figure 4-11** Chassis Ground Connection on the Cisco 1941 Router



- Step 4** Connect the other end of the ground wire to a known good electrical ground point. Please consult with a licensed electrician if you have any questions about the suitability of the ground connection.

After the router is installed and properly grounded, you can connect the WAN and LAN cables as required for your installation. For cable connection procedures, see the [“Cable Connection Procedures for Cisco 1900 Series Routers”](#) chapter.

# Power Connections

**Warning**

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

**Note**

The installation must comply with all required electrical codes applicable at the installation site.

Connect your router to a 15 A, 120 VAC (10 A, 240 VAC) circuit with over current protection.

**Note**

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

**Warning**

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

**Warning**

**Take care when connecting units to the supply circuit so that wiring is not overloaded.** Statement 1018

This section explains how to connect AC or DC power to Cisco 1900 series routers and a console terminal. It covers the following topics:

- [Power Connections, page 4-12](#)
- [Connecting WAN and LAN Cables, page 4-13](#)
- [Connecting to a Console Terminal or Modem, page 4-16](#)

For cable information and specifications, see the “[Network Cabling Specifications](#)” section.

**Note**

To see translations of the warnings that appear in this publication, refer to the [Regulatory Compliance and Safety Information for Cisco 1900 Series Routers](#) document.

# Connecting WAN and LAN Cables

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

- [Ports and Cabling, page 4-15](#)
- [Connection Procedures and Precautions, page 4-16](#)

**Note**

You can order additional network connection cables and transceivers from Cisco. For ordering information, contact Cisco customer service. For cable pinouts, refer to the *Cisco Modular Access Router Cable Specifications* document, which is available online.

**Warning**

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

**Warning**

**Voice over IP (VoIP) service and the emergency calling service do not function if power fails or is disrupted. After power is restored, you might have to reset or reconfigure equipment to regain access to VoIP and the emergency calling service. In the USA, this emergency number is 911. You need to be aware of the emergency number in your country.** Statement 361

**Warning**

**Do not use this product near water; for example, near a bath tub, wash bowl, kitchen sink or laundry tub, in a wet basement, or near a swimming pool.** Statement 1035

**Warning**

**Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.** Statement 1036

**Warning**

**Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electric shock from lightning.** Statement 1038

**Warning**

**To report a gas leak, do not use a telephone in the vicinity of the leak.** Statement 1039

**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

**Warning**

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

**Warning**

**Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place.** Statement 1029

**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**

**Do not locate the antenna near overhead power lines or other electric light or power circuits, or where it can come into contact with such circuits. When installing the antenna, take extreme care not to come into contact with such circuits, because they may cause serious injury or death. For proper installation and grounding of the antenna, please refer to national and local codes (for example, U.S.:NFPA 70, National Electrical Code, Article 810, Canada: Canadian Electrical Code, Section 54).** Statement 1052

**Warning**

**Class I (CDRH) and Class 1M (IEC) laser products.** Statement 1055

**Warning**

**Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard.** Statement 1056

**Warning**

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

**Warning**

**This equipment contains a ring signal generator (ringer), which is a source of hazardous voltage. Do not touch the RJ-11 (phone) port wires (conductors), the conductors of a cable connected to the RJ-11 port, or the associated circuit-board when the ringer is active. The ringer is activated by an incoming call.** Statement 1042

## Ports and Cabling

Table 4-1 summarizes some typical WAN and LAN connections for Cisco 1900 series routers.

The connections summarized in Table 4-1 are also described in detail in the following documents:

- [Cisco Modular Access Router Cable Specifications](#)

**Table 4-1 WAN and LAN Connections**

Port or Connection	Port Type, Color <sup>1</sup>	Connected to:	Cable
Gigabit Ethernet (GE)	RJ-45, yellow	Ethernet switch or hub.	Crossover to connect to a router Straight-through to connect to a switch
T1/E1 WAN	RJ-48C	T1 or E1 network or CSU/DSU.	RJ-48 T1/E1 straight-through (Crossover to connect to a PBX or any other equipment)
Cisco serial (1T)	60-pin D-sub, blue	CSU/DSU and serial network or equipment.	Cisco serial transition cable that matches the signaling protocol (EIA/TIA-232, EIA/TIA-449, V.35, X.21, or EIA/TIA-530) and the serial port operating mode (DTE or DCE).
Cisco Smart serial (2T)	Cisco Smart compact connector, blue	CSU/DSU and serial network or equipment. For WIC-2T and WIC-2A/S only.	Refer to the <a href="#">Cisco Modular Access Router Cable Specifications</a> document for information about selecting these cables.
DSL	RJ-11C/RJ-14C	Network demarcation device for service provider's DSL interface.	RJ-11 straight-through for 2-wire RJ-14 straight-through for 4-wire
BRI S/T WAN (external NT1 <sup>2</sup> )	RJ-45, orange	NT1 device or PINX <sup>3</sup>	RJ-45 straight-through
BRI U WAN (built-in NT1)	RJ-49C/CA-A11, orange	ISDN network	RJ-49 straight-through
Analog modem	RJ-11	PSTN	RJ-11 straight-through
56/64-kbps CSU/DSU	8-pin modular	RJ-48S interface.	RJ-48 straight-through.

1. The color codes are specific to cables shipped by Cisco
2. NT1 = Network Termination 1
3. PINX = Private integrated network exchange

## Connection Procedures and Precautions

Connect each WAN and LAN cable to the appropriate connector on the chassis or interface card.

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

For cable pinouts, refer to the online document [Cisco Modular Access Router Cable Specifications](#).

## Connecting to a Console Terminal or Modem

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

The following cables and adapters may be used for connecting your router to a console terminal, PC, or modem:

- USB Console cable—USB 5-pin mini Type-B to USB Type-A. See “[USB Serial Console](#)” section on page 2-6 for port details and “[Specifications](#)” section on page 1-14.
- Console cable—EIA RJ-45 to DB-9
- Modem adapter—DB-9 to DB-25



### Note

The first time a Windows based PC is connected to the router, a USB device driver must be installed. See [Installing the Cisco Microsoft Windows USB Device Driver](#), page 4-18.

This section describes how to connect a console terminal or PC to the console port and how to connect a modem to the auxiliary port.

## Connecting to the Console Port with Microsoft Windows

To configure the router through the Cisco IOS command-line interface (CLI), you must connect the router console port to a terminal or PC. See “[Console and Auxiliary Port Considerations](#)” section on page 2-5.

A Microsoft Windows PC must have HyperTerminal or similar terminal emulation software installed. The software should be configured with the following parameters: 9600 baud, 8 data bits, no parity, 1 stop bit, and no flow control. Refer to the Cisco 3900 Series, 2900 Series, and 1900 Series Software Configuration Guide for detailed information about using Cisco IOS software for configuring the router.

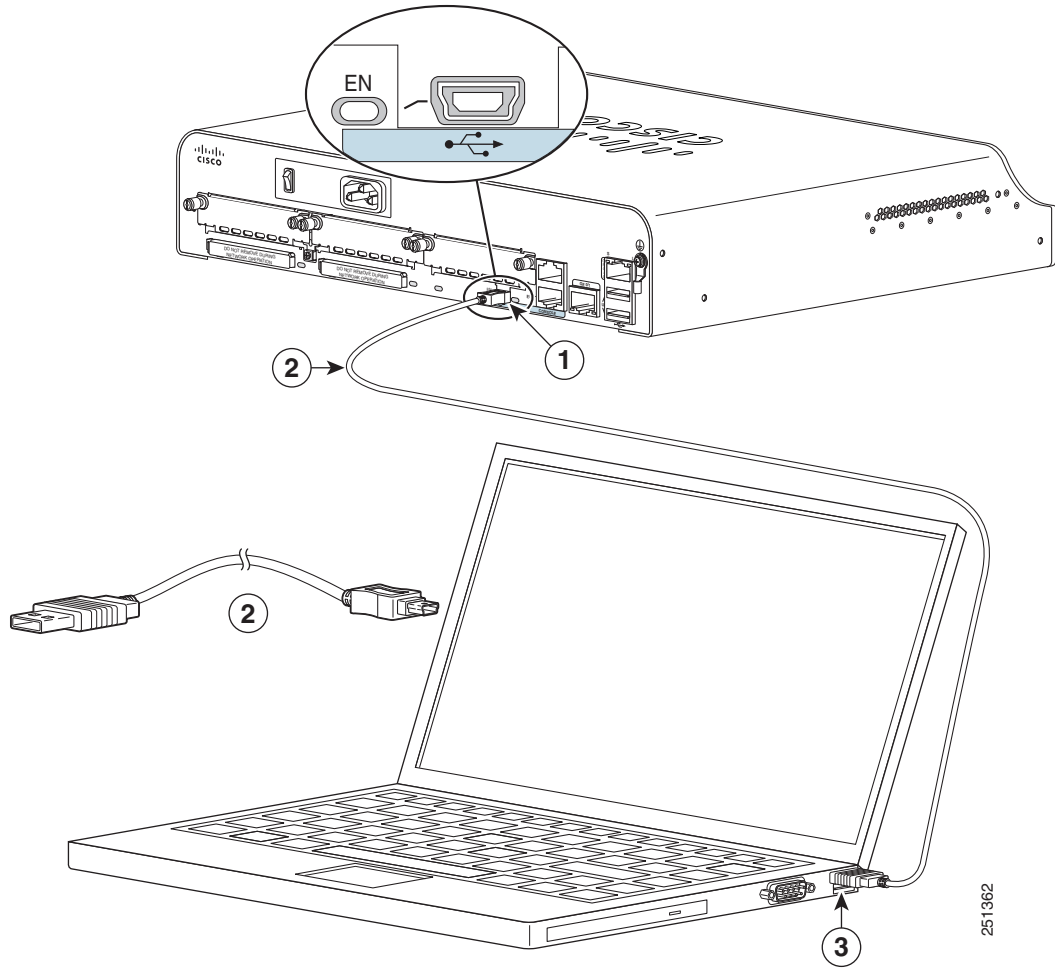
To connect the router to a terminal or PC, follow these steps:

- Step 1** Connect the end of the console cable with the RJ-45 connector to the light blue console port on the router, or USB 5-pin mini Type-B to the USB console port as shown in [Figure 4-12](#). If connecting the USB port for the first time on a Windows based PC, you must install the Windows USB driver. See “[Installing the Cisco Microsoft Windows USB Device Driver](#)” section on page 4-18.

 **Note**

You must use either the USB port or the RJ-45 port. Not both simultaneously. See “[USB Serial Console](#)” section on page 2-6. When the USB port is used it takes priority over the RJ-45 EIA port.

**Figure 4-12** Connecting the Console Cable to the Router



1	USB 5-pin mini Type-B console port	2	USB 5-pin mini Type-B to USB Type-A console cable
3	USB Type-A connector		

**Step 2** Connect the end of the cable with the DB-9 connector (or USB Type-A) to the terminal or PC. If your terminal or PC has a console port that does not accommodate a DB-9 connector, you must provide an appropriate adapter for that port.

**Step 3** To communicate with the router, start a terminal emulator application.

## Connecting to the Console Port with Mac OS X

This procedure shows how to connect a Mac OS X system USB port to the console using the built in OS X Terminal utility.

- 
- Step 1** Use the Finder to go to **Applications > Utilities > Terminal**.
  - Step 2** Connect the OS X USB port to the router.
  - Step 3** Enter the following commands to find the OS X USB port number

```
macbook:user$ cd /dev
macbook:user$ ls -ltr /dev/*usb*
crw-rw-rw-  1 root  wheel          9,  66 Apr  1 16:46 tty.usbmodem1a21
DT-ullals-macbook:dev user$
```

- Step 4** Connect to the USB port with the following command followed by the router USB port speed

```
macbook:user$ screen /dev/tty.usbmodem1a21 9600
```

**To disconnect the OS X USB console from the Terminal window**

Enter **Ctrl-a** followed by **Ctrl-\**

---

## Connecting to the Console Port with Linux

This procedure shows how to connect a Linux system USB port to the console using the built in Linux Terminal utility.

- 
- Step 1** Open the Linux Terminal window.
  - Step 2** Connect the Linux USB port to the router.
  - Step 3** Enter the following commands to find the Linux USB port number

```
root@usb-suse# cd /dev
root@usb-suse /dev# ls -ltr *ACM*
crw-r--r--  1 root  root    188,  0 Jan 14 18:02 ttyACM0
root@usb-suse /dev#
```

- Step 4** Connect to the USB port with the following command followed by the router USB port speed

```
root@usb-suse /dev# screen /dev/ttyACM0 9600
```

**To disconnect the Linux USB console from the Terminal window**

Enter **Ctrl-a** followed by **:** then **quit**

---

## Installing the Cisco Microsoft Windows USB Device Driver

The first time a Microsoft Windows based PC is connected to the router, a USB driver must be installed.



## Installing the Cisco Microsoft Windows XP USB Driver

This procedure shows how to install the Microsoft Windows XP USB driver. Download the driver for your router model from the Tools and Resources Download Software site, USB Console Software category, at the following URL:

<http://tools.cisco.com/support/downloads/go/Redirect.x?mdfid=268437899>

- 
- Step 1** Unzip the file `cisco_usbconsole_driver_X_X.zip` (where X is a revision number).
  - Step 2** Double-click the file `setup.exe`.
  - Step 3** The Cisco Virtual Com InstallShield Wizard begins. Click **Next**.
  - Step 4** The Ready to Install the Program window appears, Click **Install**.
  - Step 5** The InstallShield Wizard Completed window appears. Click **Finish**.
  - Step 6** Connect the USB cable to the PC and router USB console ports. See [Table 4-1 on page 4-17](#). The EN LED for the USB console port turns green, and within a few moments the Found New Hardware Wizard appears.
  - Step 7** The USB console is ready for use.
- 

## Installing the Cisco Microsoft Windows 2000 USB Driver

This procedure shows how to install the Microsoft Windows 2000 USB driver.

- 
- Step 1** Obtain the file `cisco_usbconsole.zip` from the Cisco.com web site and unzip it.
  - Step 2** Double-click the file `setup.exe`.
  - Step 3** The Cisco Virtual Com InstallShield Wizard begins. Click **Next**.
  - Step 4** The Ready to Install the Program window appears, Click **Install**.
  - Step 5** The InstallShield Wizard Completed window appears. Click **Finish**.
  - Step 6** Connect the USB cable to the PC and router USB console ports. See [Table 4-1 on page 4-17](#). The EN LED for the USB console port turns green, and within a few moments a series of Found New Hardware Wizard windows appear.
  - Step 7** The USB console is ready for use.
- 

## Installing the Cisco Microsoft Windows Vista USB Driver

This procedure shows how to install the Microsoft Windows Vista USB driver.

- 
- Step 1** Obtain the file `cisco_usbconsole.zip` from the Cisco.com web site and unzip it.
  - Step 2** Double-click the file `setup.exe`.
  - Step 3** The Cisco Virtual Com InstallShield Wizard begins. Click **Next**.
  - Step 4** The Ready to Install the Program window appears, Click **Install**.




---

**Note** If a User Account Control warning appears, click “Allow - I trust this program...” to proceed.

---

- Step 5** The InstallShield Wizard Completed window appears. Click **Finish**.
- Step 6** Connect the USB cable to the PC and router USB console ports. See [Table 4-1 on page 4-17](#). The EN LED for the USB console port turns green, and within a few moments a pop up window stating “Installing device driver software” appears.
- Step 7** The USB console is ready for use.
- 

## Uninstalling the Cisco USB Driver

### Uninstalling the Cisco Microsoft Windows XP and 2000 USB Driver

This procedure shows how to uninstall both the Microsoft Windows XP and 2000 USB driver. The driver can be removed using the Windows Add Remove Programs utility or the setup.exe program.

#### Using the Add Remove Programs utility




---

**Note** Disconnect the router console terminal before uninstalling the driver.

---

- Step 1** Click **Start > Control Panel > Add or Remove Programs**.
- Step 2** Scroll to Cisco Virtual Com and click **Remove**.
- Step 3** When the Program Maintenance window appears, select the **Remove** radio button. Click **Next**.
- 

#### Using the Setup.exe program




---

**Note** Disconnect the router console terminal before uninstalling the driver.

---

- Step 1** Run the setup.exe program. Click **Next**.
- Step 2** The InstallShield Wizard for Cisco Virtual Com appears. Click **Next**.
- Step 3** When the Program Maintenance window appears, select the **Remove** radio button. Click **Next**.
- Step 4** When the Remove the Program window appears, click **Remove**.
- Step 5** When the InstallShield Wizard Completed window appears click **Finish**.
- 

### Uninstalling the Cisco Microsoft Windows Vista USB Driver

This procedure shows how to uninstall the Microsoft Windows Vista USB driver.



---

**Note** Disconnect the router console terminal before uninstalling the driver.

---

- Step 1** Run the setup.exe program. Click **Next**.
- Step 2** The InstallShield Wizard for Cisco Virtual Com appears. Click **Next**.
- Step 3** When the Program Maintenance window appears, select the **Remove** radio button. Click **Next**.
- Step 4** When the Remove the Program window appears, click **Remove**.



---

**Note** If a User Account Control warning appears, click “Allow - I trust this program...” to proceed.

---

- Step 5** When the InstallShield Wizard Completed window appears click **Finish**.
- 

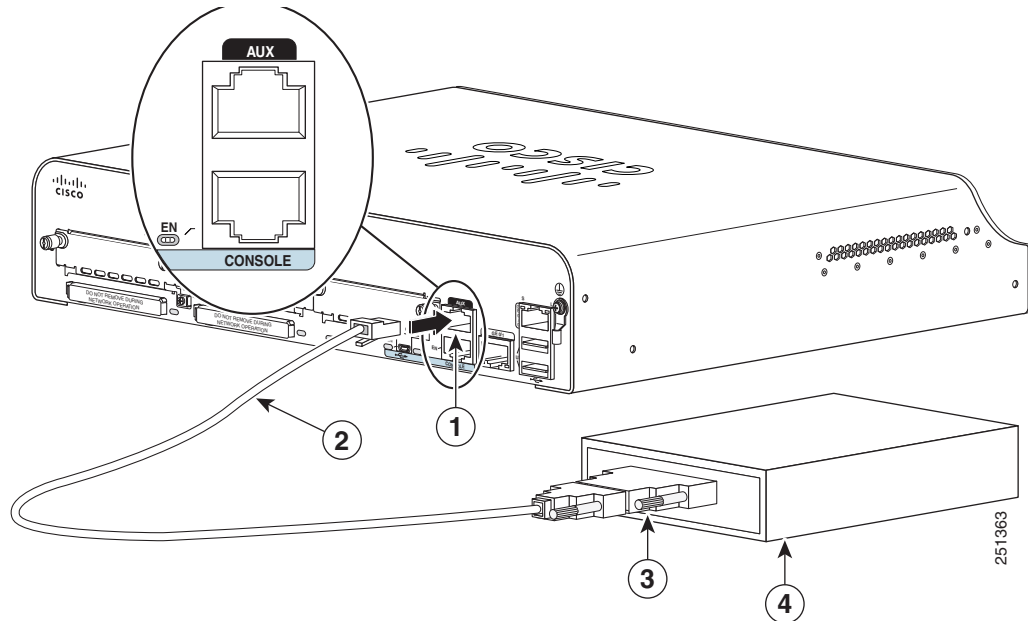
## Connecting to the Auxiliary Port

When a modem is connected to the auxiliary port, a remote user can dial in to the router and configure it. Use the light blue console cable and the DB-9-to-DB-25 connector adapter that came in the router accessory kit.

To connect a modem to the router, follow these steps:

- 
- Step 1** Connect the RJ-45 end of the adapter cable to the black AUX port on the router. (See [Figure 4-13](#).)

Figure 4-13 Connecting a Modem to the Router



1	Aux port (RJ-45)	3	DB-9-to-DB-25 modem adapter
2	Light blue console cable	4	Modem

- Step 2** Connect the DB-9 end of the console cable to the DB-9 end of the modem adapter.
- Step 3** Connect the DB-25 end of the modem adapter to the modem.
- Step 4** Make sure that your modem and the router auxiliary port are configured for the same transmission speed (up to 115200 bps is supported) and for mode control with data carrier detect (DCD) and data terminal ready (DTR) operations.



## CHAPTER 5

# Cable Connection Procedures for Cisco 1900 Series Routers

---

This document describes how to connect your Cisco 1941 integrated services router to a power source and to networks and external devices. It includes the following sections:

- [Power Connections, page 5-1](#)
- [Connecting WAN and LAN Cables, page 5-2](#)
- [Connecting to a Console Terminal or Modem, page 5-3](#)

For cable information and specifications, see the “[Cable Information and Specifications for Cisco 1900 Series Routers](#)” document.



**Note**

---

To see translations of the warnings that appear in this publication, refer to the [Regulatory Compliance and Safety Information for Cisco 1900 Series Routers](#) document.

---

## Power Connections



**Warning**

---

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

---



**Note**

---

The installation must comply with all required electrical codes applicable at the installation site.

---

Connect your router to a 15 A, 120 VAC (10 A, 240 VAC) circuit with over current protection.



**Note**

---

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

---



**Warning**

---

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

---

# Connecting WAN and LAN Cables

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

- [Ports and Cabling, page 5-2](#)
- [Connection Procedures and Precautions, page 5-3](#)



## Note

You can order additional network connection cables and transceivers from Cisco. For ordering information, contact Cisco customer service. For cable pinouts, refer to the [Cisco Modular Access Router Cable Specifications](#) document, which is available online.



## Warning

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

## Ports and Cabling

[Table 5-1](#) summarizes some typical WAN and LAN connections for Cisco 1941 routers.

The connections summarized in [Table 5-1](#) are also described in detail in the following documents:

- [Cisco Modular Access Router Cable Specifications](#)

**Table 5-1** WAN and LAN Connections

Port or Connection	Port Type, Color <sup>1</sup>	Connected to:	Cable
Gigabit Ethernet (GE)	RJ-45, yellow	Ethernet switch or hub.	Crossover to connect to a router Straight-through to connect to a switch
T1/E1 WAN	RJ-48C	T1 or E1 network or CSU/DSU.	RJ-48 T1/E1 straight-through (Crossover to connect to a PBX or any other equipment)
Cisco serial (1T)	60-pin D-sub, blue	CSU/DSU and serial network or equipment.	Cisco serial transition cable that matches the signaling protocol (EIA/TIA-232, EIA/TIA-449, V.35, X.21, or EIA/TIA-530) and the serial port operating mode (DTE or DCE).
Cisco Smart serial (2T)	Cisco Smart compact connector, blue	CSU/DSU and serial network or equipment. For WIC-2T and WIC-2A/S only.	Refer to the <a href="#">Cisco Modular Access Router Cable Specifications</a> document for information about selecting these cables.

**Table 5-1 WAN and LAN Connections (continued)**

Port or Connection	Port Type, Color <sup>1</sup>	Connected to:	Cable
DSL	RJ-11C/RJ-14C	Network demarcation device for service provider's DSL interface.	RJ-11 straight-through for 2-wire RJ-14 straight-through for 4-wire
BRI S/T WAN (external NT1 <sup>2</sup> )	RJ-45, orange	NT1 device or PINX <sup>3</sup>	RJ-45 straight-through
BRI U WAN (built-in NT1)	RJ-49C/CA-A11, orange	ISDN network	RJ-49 straight-through
Analog modem	RJ-11	PSTN	RJ-11 straight-through
56/64-kbps CSU/DSU	8-pin modular	RJ-48S interface.	RJ-48 straight-through.

1. The color codes are specific to cables shipped by Cisco
2. NT1 = Network Termination 1
3. PINX = Private integrated network exchange

## Connection Procedures and Precautions

Connect each WAN and LAN cable to the appropriate connector on the chassis or interface card.

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

For cable pinouts, refer to the online document [Cisco Modular Access Router Cable Specifications](#).

## Connecting to a Console Terminal or Modem

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

The following cables and adapters may be used for connecting your router to a console terminal, PC, or modem:

- USB Console cable—USB 5-pin mini Type-B to USB Type-A. See “[USB Serial Console](#)” section on page 3-2 for port details and “[Specifications](#)” section on page 1-14.
- Console cable—EIA RJ-45 to DB-9
- Modem adapter—DB-9 to DB-25



### Note

The first time a Windows based PC is connected to the router, a USB device driver must be installed. See [Installing the Cisco Microsoft Windows USB Device Driver](#), page 5-6.

This section describes how to connect a console terminal or PC to the console port and how to connect a modem to the auxiliary port.

## Connecting to the Console Port with Microsoft Windows

To configure the router through the Cisco IOS command-line interface (CLI), you must connect the router console port to a terminal or PC. See [“Console and Auxiliary Port Considerations” section on page 3-1](#).

A Microsoft Windows PC must have HyperTerminal or similar terminal emulation software installed. The software should be configured with the following parameters: 9600 baud, 8 data bits, no parity, 1 stop bit, and no flow control. Refer to the Cisco 3900 Series, 2900 Series, and 1900 Series Software Configuration Guide for detailed information about using Cisco IOS software for configuring the router.

To connect the router to a terminal or PC, follow these steps:

- 
- Step 1** Connect the end of the console cable with the RJ-45 connector to the light blue console port on the router, or USB 5-pin mini Type-B to the USB console port as shown in [Figure 5-1](#). If connecting the USB port for the first time on a Windows based PC, you must install the Windows USB driver. See [“Installing the Cisco Microsoft Windows USB Device Driver” section on page 5-6](#).



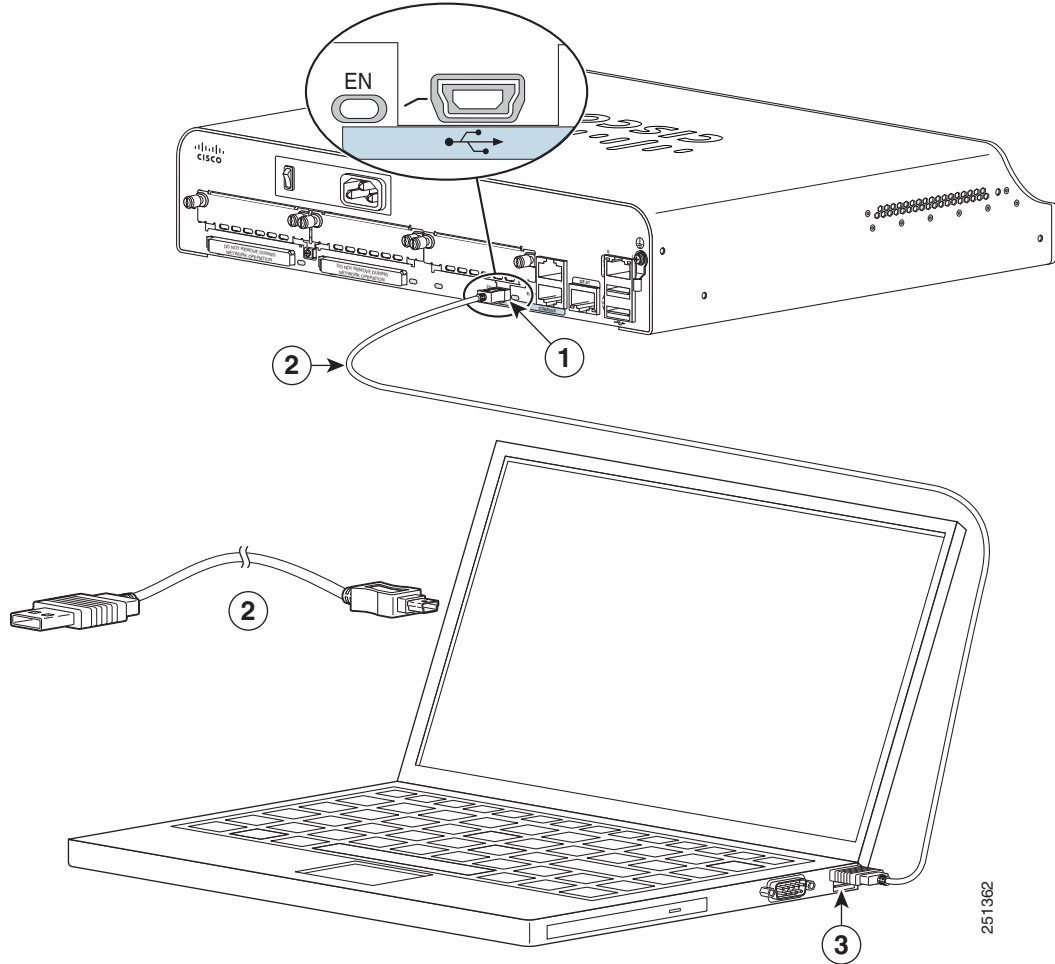
---

**Note** You must use either the USB port or the RJ-45 port. Not both simultaneously. See [“USB Serial Console” section on page 3-2](#). When the USB port is used it takes priority over the RJ-45 EIA port.

---



Figure 5-1 Connecting the Console Cable to the Router



1	USB 5-pin mini Type-B console port	2	USB 5-pin mini Type-B to USB Type-A console cable
3	USB Type-A connector		

**Step 2** Connect the end of the cable with the DB-9 connector (or USB Type-A) to the terminal or PC. If your terminal or PC has a console port that does not accommodate a DB-9 connector, you must provide an appropriate adapter for that port.

**Step 3** To communicate with the router, start a terminal emulator application.

## Connecting to the Console Port with Mac OS X

This procedure shows how to connect a Mac OS X system USB port to the console using the built in OS X Terminal utility.

**Step 1** Use the Finder to go to **Applications > Utilities > Terminal**.

- Step 2** Connect the OS X USB port to the router.
- Step 3** Enter the following commands to find the OS X USB port number
- ```
macbook:user$ cd /dev
macbook:user$ ls -ltr /dev/*usb*
crw-rw-rw- 1 root  wheel      9,  66 Apr  1 16:46 tty.usbmodem1a21
DT-ullals-macbook:dev user$
```
- Step 4** Connect to the USB port with the following command followed by the router USB port speed
- ```
macbook:user$ screen /dev/tty.usbmodem1a21 9600
```

**To disconnect the OS X USB console from the Terminal window**

Enter **Ctrl-a** followed by **Ctrl-\**

---

## Connecting to the Console Port with Linux

This procedure shows how to connect a Linux system USB port to the console using the built in Linux Terminal utility.

---

- Step 1** Open the Linux Terminal window.
- Step 2** Connect the Linux USB port to the router.
- Step 3** Enter the following commands to find the Linux USB port number
- ```
root@usb-suse# cd /dev
root@usb-suse /dev# ls -ltr *ACM*
crw-r--r-- 1 root  root      188,  0 Jan 14 18:02 ttyACM0
root@usb-suse /dev#
```
- Step 4** Connect to the USB port with the following command followed by the router USB port speed
- ```
root@usb-suse /dev# screen /dev/ttyACM0 9600
```

**To disconnect the Linux USB console from the Terminal window**

Enter **Ctrl-a** followed by **:** then **quit**

---

## Installing the Cisco Microsoft Windows USB Device Driver

The first time a Microsoft Windows based PC is connected to the router, a USB driver must be installed.

### Installing the Cisco Microsoft Windows XP USB Driver

This procedure shows how to install the Microsoft Windows XP USB driver. Download the driver for your router model from the Tools and Resources Download Software site, USB Console Software category, at the following URL:

<http://tools.cisco.com/support/downloads/go/Redirect.x?mdfid=268437899>

---

- Step 1** Unzip the file `cisco_usbconsole_driver_X_X.zip` (where X is a revision number).

- Step 2** Double-click the file setup.exe.
  - Step 3** The Cisco Virtual Com InstallShield Wizard begins. Click **Next**.
  - Step 4** The Ready to Install the Program window appears, Click **Install**.
  - Step 5** The InstallShield Wizard Completed window appears. Click **Finish**.
  - Step 6** Connect the USB cable to the PC and router USB console ports. See [Table 5-1 on page 5-5](#). The EN LED for the USB console port turns green, and within a few moments the Found New Hardware Wizard appears.
  - Step 7** The USB console is ready for use.
- 

## Installing the Cisco Microsoft Windows 2000 USB Driver

This procedure shows how to install the Microsoft Windows 2000 USB driver.

- Step 1** Obtain the file cisco\_usbconsole.zip from the Cisco.com web site and unzip it.
  - Step 2** Double-click the file setup.exe.
  - Step 3** The Cisco Virtual Com InstallShield Wizard begins. Click **Next**.
  - Step 4** The Ready to Install the Program window appears, Click **Install**.
  - Step 5** The InstallShield Wizard Completed window appears. Click **Finish**.
  - Step 6** Connect the USB cable to the PC and router USB console ports. See [Table 5-1 on page 5-5](#). The EN LED for the USB console port turns green, and within a few moments a series of Found New Hardware Wizard windows appear.
  - Step 7** The USB console is ready for use.
- 

## Installing the Cisco Microsoft Windows Vista USB Driver

This procedure shows how to install the Microsoft Windows Vista USB driver.

- Step 1** Obtain the file cisco\_usbconsole.zip from the Cisco.com web site and unzip it.
- Step 2** Double-click the file setup.exe.
- Step 3** The Cisco Virtual Com InstallShield Wizard begins. Click **Next**.
- Step 4** The Ready to Install the Program window appears, Click **Install**.



**Note** If a User Account Control warning appears, click “Allow - I trust this program...” to proceed.

---

- Step 5** The InstallShield Wizard Completed window appears. Click **Finish**.
- Step 6** Connect the USB cable to the PC and router USB console ports. See [Table 5-1 on page 5-5](#). The EN LED for the USB console port turns green, and within a few moments a pop up window stating “Installing device driver software” appears.

**Step 7** The USB console is ready for use.

---

## Uninstalling the Cisco USB Driver

### Uninstalling the Cisco Microsoft Windows XP and 2000 USB Driver

This procedure shows how to uninstall both the Microsoft Windows XP and 2000 USB driver. The driver can be removed using the Windows Add Remove Programs utility or the setup.exe program.

#### Using the Add Remove Programs utility



**Note** Disconnect the router console terminal before uninstalling the driver.

---

- Step 1** Click **Start > Control Panel > Add or Remove Programs**.
  - Step 2** Scroll to Cisco Virtual Com and click **Remove**.
  - Step 3** When the Program Maintenance window appears, select the **Remove** radio button. Click **Next**.
- 

#### Using the Setup.exe program



**Note** Disconnect the router console terminal before uninstalling the driver.

---

- Step 1** Run the setup.exe program. Click **Next**.
  - Step 2** The InstallShield Wizard for Cisco Virtual Com appears. Click **Next**.
  - Step 3** When the Program Maintenance window appears, select the **Remove** radio button. Click **Next**.
  - Step 4** When the Remove the Program window appears, click **Remove**.
  - Step 5** When the InstallShield Wizard Completed window appears click **Finish**.
- 

### Uninstalling the Cisco Microsoft Windows Vista USB Driver

This procedure shows how to uninstall the Microsoft Windows Vista USB driver.



**Note** Disconnect the router console terminal before uninstalling the driver.

---

- Step 1** Run the setup.exe program. Click **Next**.
- Step 2** The InstallShield Wizard for Cisco Virtual Com appears. Click **Next**.
- Step 3** When the Program Maintenance window appears, select the **Remove** radio button. Click **Next**.
- Step 4** When the Remove the Program window appears, click **Remove**.



**Note** If a User Account Control warning appears, click “Allow - I trust this program...” to proceed.

**Step 5** When the InstallShield Wizard Completed window appears click **Finish**.

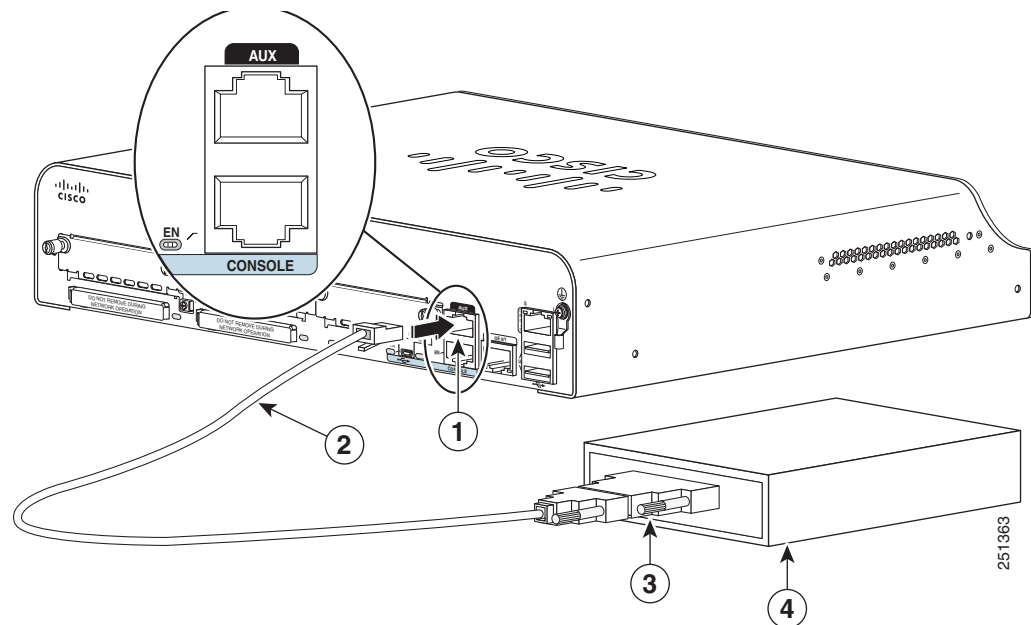
## Connecting to the Auxiliary Port

When a modem is connected to the auxiliary port, a remote user can dial in to the router and configure it. Use the light blue console cable and the DB-9-to-DB-25 connector adapter that came in the router accessory kit.

To connect a modem to the router, follow these steps:

**Step 1** Connect the RJ-45 end of the adapter cable to the black AUX port on the router. (See [Figure 5-2](#).)

**Figure 5-2** Connecting a Modem to the Router



1	Aux port (RJ-45)	3	DB-9-to-DB-25 modem adapter
2	Light blue console cable	4	Modem

**Step 2** Connect the DB-9 end of the console cable to the DB-9 end of the modem adapter.

**Step 3** Connect the DB-25 end of the modem adapter to the modem.

**Step 4** Make sure that your modem and the router auxiliary port are configured for the same transmission speed (up to 115200 bps is supported) and for mode control with data carrier detect (DCD) and data terminal ready (DTR) operations.





# CHAPTER 6

## Configuring the Router

---

This chapter describes how to power up the router and perform the initial configuration in the following sections:

- [Powering up the Router, page 6-1](#)
- [Performing the Initial Configuration on the Router, page 6-4](#)
  - [Using the Cisco Setup Command Facility, page 6-4](#)
  - [Using Cisco Configuration Professional Express, page 6-8](#)
  - [Using the Cisco CLI—Manual Configuration, page 6-9](#)
- [Verifying the Initial Configuration, page 6-25](#)

## Powering up the Router



**Warning**

---

**Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place.** Statement 1029

---

This section covers the following topics:

- [Checklist for Power Up, page 6-1](#)
- [Power Up Procedure, page 6-2](#)
- [Verifying the Front Panel LED Indications, page 6-3](#)
- [Performing the Initial Configuration on the Router, page 6-4](#)

## Checklist for Power Up

Check the following items before powering up the router:

- Chassis is securely mounted and grounded.
- Power and interface cables are connected.

- The external CompactFlash memory card is properly seated into its slot. For installation instructions, see *“Installing and Upgrading Internal Modules and FRUs in Cisco 1900 Series ISRs”*.
- PC with terminal emulation program (HyperTerminal or equivalent) is connected to the console port and configured for 9600 baud, 8 data bits, 1 stop bit, no parity, and flow control is set to “none.”
- Suitable PC COM port is selected in the terminal emulation program.
- You have selected passwords for access control.
- You have determined the IP addresses for the Ethernet and serial interfaces.

## Power Up Procedure

To power up your Cisco router, follow this procedure to verify the router has performed the initialization and self-test. When the procedure is finished, the router is ready to configure.

If you encounter problems while powering on the router, see the routers' Troubleshooting page on Cisco.com.

For information about the ROM monitor and the bootstrap program, see the *Using the ROM Monitor* document in the router's software configuration guide. For information about the configuration register, see the *Changing the Configuration Register Settings* in the router's software configuration guide.



### Note

To view the boot sequence, you must establish console connection to the Cisco router *before* it powers up.

**Step 1** Make sure that your PC is powered up and connected as described in the *“Checklist for Power Up”* section on page 6-1.

**Step 2** Move the power switch to the ON position.

- The SYS LED on the front of the chassis begins blinking green.
- The fans begin operating.
- Startup messages appear in your Console window. When the startup messages finish, the SYS LED appears solid green.



### Caution

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



### Note

Depending on your installation, some LEDs at the rear of the chassis and on installed modules might also illuminate.

If you encounter a problem during the power up process see *Troubleshooting Cisco 3900 Series, 2900 Series, and 1900 Series ISRs* on Cisco.com.

**Step 3** Use any of the following tools to perform the initial configuration.

- [Cisco Configuration Professional Express, page 6-3](#)





**Note** Cisco recommends using Cisco Configuration Professional Express to perform the initial configuration on the router because it provides a web-based graphical-user interface. See [Cisco Configuration Professional Express](#), page 6-3.

- [Cisco Setup Command Facility](#), page 6-3
- [Cisco Command Line Interface](#), page 6-3

### Cisco Setup Command Facility

Cisco Setup Command Facility lets you configure the initial router settings through a configuration dialog. If you see the following messages, the router has booted and is ready for initial configuration using the setup command facility.

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

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

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

To follow the Cisco Setup command facility, see the [“Performing the Initial Configuration on the Router”](#) section on page 6-4.



**Note** If the system configuration dialog message does not appear, a default configuration file was installed on the router prior to shipping. See the [“Using Cisco Configuration Professional Express”](#) section on page 6-8 to configure the router.

### Cisco Configuration Professional Express

Use Cisco Configuration Professional Express web-based application to configure the initial router settings. See the *Cisco Configuration Professional Express User Guide* document on Cisco.com for detailed instructions, [http://www.cisco.com/en/US/docs/net\\_mgmt/cisco\\_configuration\\_professional\\_express/version1\\_1/online\\_help/CCPE11.pdf](http://www.cisco.com/en/US/docs/net_mgmt/cisco_configuration_professional_express/version1_1/online_help/CCPE11.pdf)

For help with interface and port numbering, see the [“Interface Numbering”](#) section on page 1-14.

### Cisco Command Line Interface

Cisco Command Line Interface (CLI) lets you configure the initial router settings manually. If you see the following messages, the router has booted and is ready for initial configuration using the CLI. To learn how to use the CLI to configure the router, see the [“Using the Cisco CLI—Manual Configuration”](#) section on page 6-9.



**Note** If the `rommon 1>` prompt appears, your system has booted in ROM monitor mode. For information on the ROM monitor, see the [Using the ROM Monitor](#) document.

## Verifying the Front Panel LED Indications

The front-panel indicator LEDs described in [Table 1-4](#) provide power, activity, and status information useful during power up.

# Performing the Initial Configuration on the Router

Use the following tools to perform the initial configuration on the router:

- “Using the Cisco Setup Command Facility” section on page 6-4
- “Using Cisco Configuration Professional Express” section on page 6-8
- “Using the Cisco CLI—Manual Configuration” section on page 6-9

## Using the Cisco Setup Command Facility

The setup command facility prompts you to enter the information that is needed to configure a router quickly. The facility steps you through a initial configuration, including LAN and WAN interfaces. For more general information about the setup command facility, see the following document:

*Cisco IOS Configuration Fundamentals Configuration Guide*, Release 12.4, Part 2: Cisco IOS User Interfaces:Using AutoInstall and Setup

[http://www.cisco.com/en/US/docs/ios/fundamentals/configuration/guide/12\\_4/cf\\_12\\_4\\_book.html](http://www.cisco.com/en/US/docs/ios/fundamentals/configuration/guide/12_4/cf_12_4_book.html)

This section explains how to configure a hostname for the router, set passwords, and configure an interface for communication with the management network.



### Note

The messages that are displayed will vary based on your router model, the installed interface modules, and the software image. The following example and the user entries (in **bold**) are shown as examples only.



### Note

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

**Step 1** Enter the setup command facility by using one of the following methods:

- From the Cisco IOS CLI, enter the **setup** command in privileged EXEC mode:

```
Router> enable
Password: <password>
Router# setup

    --- System Configuration Dialog ---
Continue with configuration dialog? [yes/no]:
```

You are now in the Setup Configuration Utility.

The prompts in the setup command facility vary; depending on your router model, on the installed interface modules, and on the software image. The following steps and the user entries (in **bold**) are shown as examples only.

**Note**

If you make a mistake while using the setup command facility, you can exit and run the setup command facility again. Press Ctrl-C, and enter the setup command at the privileged EXEC mode prompt (Router#). For more information on using the setup command facility, see *The Setup Command* chapter in *Cisco IOS Configuration Fundamentals Command Reference*, Release 12.2T, [http://www.cisco.com/en/US/docs/ios/12\\_2t/fun/command/reference/122tfr.html](http://www.cisco.com/en/US/docs/ios/12_2t/fun/command/reference/122tfr.html)

**Step 2** To proceed using the setup command facility, enter **yes**.

```
Continue with configuration dialog? [yes/no]:
```

At any point you may enter a question mark '?' for help.

```
Use ctrl-c to abort configuration dialog at any prompt.
Default settings are in square brackets '[]'.
```

**Step 3** Basic management setup configures only enough connectivity

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

**Step 4** Enter a hostname for the router (this example uses myrouter):

```
Configuring global parameters:
Enter host name [Router]: myrouter
```

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

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

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

```
The enable password is used when you do not specify an
enable secret password, with some older software versions, and
some boot images.
Enter enable password: cisco123
```

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

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

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

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

A summary of the available interfaces is displayed.

**Note**

The interface summary includes interface numbering, which is dependent on the router model and the installed modules and interface cards.

```
Current interface summary
```

Interface	IP-Address	OK?	Method	Status	Protocol
GigabitEthernet0/0	unassigned	YES	NVRAM	administratively down	down
GigabitEthernet0/1	10.10.10.12	YES	DHCP	up	up
GigabitEthernet0/2	unassigned	YES	NVRAM	administratively down	down
SSLVPN-VIF0	unassigned	NO	unset	up	

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

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

```
Enter interface name used to connect to the
management network from the above interface summary: gigabitethernet0/1
```

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

```
Configuring interface GigabitEthernet0/1:
  Configure IP on this interface? [yes]: yes
  IP address for this interface [10.10.10.12]:
  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
```

The following configuration command script was created:

```
hostname myrouter
enable secret 5 $1$t/Dj$yAeGKviLLZNOBX0b9eif00 enable password cisco123 line vty 0 4
password cisco snmp-server community public !
no ip routing

!
interface GigabitEthernet0/0
shutdown
no ip address
!
interface GigabitEthernet0/1
no shutdown
ip address 10.10.10.12 255.255.255.0
!
interface GigabitEthernet0/2
shutdown
no ip address
!
end
```

**Step 11** Respond to the following prompts. Select [2] to save the initial configuration:

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

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

Press RETURN to get started! **RETURN**

The user prompt is displayed:

```
myrouter>
```

## Completing the Configuration

When using the Cisco Setup, and after you have provided all the information requested by the facility, the final configuration appears. To complete your router configuration, follow these steps:

**Step 1** The facility prompts you to save the configuration.

- If you answer no, the configuration information you entered is *not* saved, and you return to the router enable prompt (Router#). Enter **setup** to return to the System Configuration Dialog.

- If you answer yes, the configuration is saved, and you are returned to the user EXEC prompt (Router>).

```
Use this configuration? {yes/no} : yes
Building configuration...
Use the enabled mode 'configure' command to modify this configuration.
```

Press RETURN to get started!

```
%LINK-3-UPDOWN: Interface Ethernet0/0, changed state to up
%LINK-3-UPDOWN: Interface Ethernet0/1, changed state to up
%LINK-3-UPDOWN: Interface Serial0/0/0, changed state to up
%LINK-3-UPDOWN: Interface Serial0/0/1, changed state to down
%LINK-3-UPDOWN: Interface Serial0/2, changed state to down
%LINK-3-UPDOWN: Interface Serial1/0, changed state to up
%LINK-3-UPDOWN: Interface Serial1/1, changed state to down
%LINK-3-UPDOWN: Interface Serial1/2, changed state to down
```

<Additional messages omitted.>

- Step 2** When the messages stop appearing on your screen, press **Return** to get the Router> prompt.




---

**Note** If you see the next message, it means that no other routers were found on the network attached to the port.

---

```
%AT-6-ONLYROUTER: Ethernet0/0: AppleTalk port enabled; no neighbors found
```

- Step 3** The Router> prompt indicates that you are now at the command-line interface (CLI) and you have just completed a initial router configuration. Nevertheless, this is *not* a complete configuration. At this point, you have two choices:

- Run the setup command facility again, and create another configuration.

```
Router> enable
Password: password
Router# setup
```

- Modify the existing configuration or configure additional features by using the CLI:

```
Router> enable
Password: password
Router# configure terminal
Router(config)#
```

---

## Using Cisco Configuration Professional Express

Use Cisco Configuration Professional Express web-based application to configure the initial router settings. See the *Cisco Configuration Professional Express User Guide* document on Cisco.com for detailed instructions, [http://www.cisco.com/en/US/docs/net\\_mgmt/cisco\\_configuration\\_professional\\_express/version1\\_1/online\\_help/CCPE11.pdf](http://www.cisco.com/en/US/docs/net_mgmt/cisco_configuration_professional_express/version1_1/online_help/CCPE11.pdf)

For help with interface and port numbering, see the “Interface Numbering” section on page 1-14.

## Using the Cisco CLI—Manual Configuration

This section shows you how to access the command-line interface (CLI) to perform the initial configuration on the router.

If the system configuration dialog message does not appear, a default configuration file was installed on the router prior to shipping. See the “[Using Cisco Configuration Professional Express](#)” section on page 6-8 to configure the router.

For help with interface and port numbering, see the “[Interface Numbering](#)” section on page 1-14.

---

**Step 1** Enter the following answer when the system message appears on the router.

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

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

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

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

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

Several messages are displayed, ending with a line similar to the following:

```
...  
Copyright (c) 1986-2004 by cisco Systems, Inc.  
Compiled <date> <time> by <person>
```

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

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

**Step 4** Type **enable** to enter privileged EXEC mode:

```
Router> enable  
Router#
```

- [Configuring the Router Hostname, page 6-10](#) (Optional)
- [Configuring the Enable and Enable Secret Passwords, page 6-11](#) (Required)
- [Configuring the Console Idle Privileged EXEC Timeout, page 6-12](#) (Optional)
- [Configuring Gigabit Ethernet Interfaces, page 6-14](#) (Required)
- [Specifying a Default Route or Gateway of Last Resort, page 6-16](#) (Required)
- [Configuring IP Routing and IP Protocols, page 6-16](#) (Required)
- [Configuring Virtual Terminal Lines for Remote Console Access, page 6-19](#) (Required)
- [Configuring the Auxiliary Line, page 6-20](#) (Optional)
- [Verifying Network Connectivity, page 6-22](#) (Required)
- [Saving Your Router Configuration, page 6-23](#) (Required)
- [Saving Backup Copies of Configuration and System Image, page 6-23](#) (Optional)

## Configuring the Router Hostname

The hostname is used in CLI prompts and default configuration filenames. If you do not configure the router hostname, the router uses the factory-assigned default hostname “Router.”

Do not expect capitalization and lower casing to be preserved in the hostname. Uppercase and lowercase characters are treated as identical by many Internet software applications. It may seem appropriate to capitalize a name as you would ordinarily do, but conventions dictate that computer names appear in all lowercase characters. For more information, see the RFC 1178, *Choosing a Name for Your Computer*.

The name must also follow the rules for Advanced Research Projects Agency Network (ARPANET) hostnames. They must start with a letter, end with a letter or digit, and have as interior characters only letters, digits, and hyphens. Names must be 63 characters or fewer. For more information, see the RFC 1035, *Domain Names—Implementation and Specification*.

### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **hostname name**
4. Verify that the router prompt displays your new hostname.
5. **end**

### DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
Step 2	<b>configure terminal</b>  <b>Example:</b> Router# configure terminal	Enters global configuration mode.
Step 3	<b>hostname name</b>  <b>Example:</b> Router(config)# hostname myrouter	Specifies or modifies the hostname for the network server.
Step 4	Verify that the router prompt displays your new hostname.  <b>Example:</b> myrouter(config)#	—
Step 5	<b>end</b>  <b>Example:</b> myrouter# end	(Optional) Returns to privileged EXEC mode.



## Configuring the Enable and Enable Secret Passwords

To provide an additional layer of security, particularly for passwords that cross the network or are stored on a TFTP server, you can use either the **enable password** command or **enable secret** command. Both commands accomplish the same thing—they allow you to establish an encrypted password that users must enter to access privileged EXEC (enable) mode.

We recommend that you use the **enable secret** command because it uses an improved encryption algorithm. Use the **enable password** command only if you boot an older image of the Cisco IOS software or if you boot older boot ROMs that do not recognize the **enable secret** command.

For more information, see the “Configuring Passwords and Privileges” chapter in the *Cisco IOS Security Configuration Guide*. Also see the [Cisco IOS Password Encryption Facts](#) tech note and the [Improving Security on Cisco Routers](#) tech note.

### Restrictions

If you configure the **enable secret** command, it takes precedence over the **enable password** command; the two commands cannot be in effect simultaneously.

### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **enable password** *password*
4. **enable secret** *password*
5. **end**
6. **enable**
7. **end**

### DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
Step 2	<b>configure terminal</b>  <b>Example:</b> Router# configure terminal	Enters global configuration mode.
Step 3	<b>enable password</b> <i>password</i>  <b>Example:</b> Router(config)# enable password pswd2	(Optional) Sets a local password to control access to various privilege levels. <ul style="list-style-type: none"> <li>• We recommend that you perform this step only if you boot an older image of the Cisco IOS software or if you boot older boot ROMs that do not recognize the <b>enable secret</b> command.</li> </ul>

	Command or Action	Purpose
Step 4	<b>enable secret</b> <i>password</i>  <b>Example:</b> Router(config)# enable secret <i>greentree</i>	Specifies an additional layer of security over the <b>enable password</b> command. <ul style="list-style-type: none"> <li>Do not use the same password that you entered in <a href="#">Step 3</a>.</li> </ul>
Step 5	<b>end</b>  <b>Example:</b> Router(config)# end	Returns to privileged EXEC mode.
Step 6	<b>enable</b>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>Verify that your new enable or enable secret password works.</li> </ul>
Step 7	<b>end</b>  <b>Example:</b> Router(config)# end	(Optional) Returns to privileged EXEC mode.

## Configuring the Console Idle Privileged EXEC Timeout

This section describes how to configure the console line's idle privileged EXEC timeout. By default, the privileged EXEC command interpreter waits 10 minutes to detect user input before timing out.

When you configure the console line, you can also set communication parameters, specify autobaud connections, and configure terminal operating parameters for the terminal that you are using. For more information on configuring the console line, see the *Cisco IOS Configuration Fundamentals and Network Management Configuration Guide*. In particular, see the “Configuring Operating Characteristics for Terminals” and “Troubleshooting and Fault Management” chapters.

### SUMMARY STEPS

- enable**
- configure terminal**
- line console 0**
- exec-timeout** *minutes* [*seconds*]
- end**
- show running-config**

## DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>Enter your password if prompted.</li> </ul>
Step 2	<b>configure terminal</b>  <b>Example:</b> Router# configure terminal	Enters global configuration mode.
Step 3	<b>line console 0</b>  <b>Example:</b> Router(config)# line console 0	Configures the console line and starts the line configuration command collection mode.
Step 4	<b>exec-timeout minutes [seconds]</b>  <b>Example:</b> Router(config-line)# exec-timeout 0 0	Sets the idle privileged EXEC timeout, which is the interval that the privileged EXEC command interpreter waits until user input is detected. <ul style="list-style-type: none"> <li>The example shows how to specify no timeout. Setting the exec-timeout value to 0 will cause the router to never log out once logged in. This could have security implications if you leave the console without manually logging out using the disable command.</li> </ul>
Step 5	<b>end</b>  <b>Example:</b> Router(config)# end	Returns to privileged EXEC mode.
Step 6	<b>show running-config</b>  <b>Example:</b> Router(config)# show running-config	Displays the running configuration file. <ul style="list-style-type: none"> <li>Verify that you properly configured the idle privileged EXEC timeout.</li> </ul>

## Examples

The following example shows how to set the console idle privileged EXEC timeout to 2 minutes 30 seconds:

```
line console
  exec-timeout 2 30
```

The following example shows how to set the console idle privileged EXEC timeout to 10 seconds:

```
line console
  exec-timeout 0 10
```

## Configuring Gigabit Ethernet Interfaces

This section shows how to assign an IP address and interface description to an Ethernet interface on your router.

For comprehensive configuration information on Gigabit Ethernet interfaces, see the “Configuring LAN Interfaces” chapter of the *Cisco IOS Interface and Hardware Component Configuration Guide*, [http://www.cisco.com/en/US/docs/ios/12\\_2/interface/configuration/guide/icflanin.html](http://www.cisco.com/en/US/docs/ios/12_2/interface/configuration/guide/icflanin.html)

For information on interface numbering, see the software configuration guide for your router.

### SUMMARY STEPS

1. **enable**
2. **show ip interface brief**
3. **configure terminal**
4. **interface {fastethernet | gigabitethernet} 0/port**
5. **description string**
6. **ip address ip-address mask**
7. **no shutdown**
8. **end**
9. **show ip interface brief**

### DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
Step 2	<b>show ip interface brief</b>  <b>Example:</b> Router# show ip interface brief	Displays a brief status of the interfaces that are configured for IP. <ul style="list-style-type: none"> <li>• Learn which type of Ethernet interface is on your router.</li> </ul>
Step 3	<b>configure terminal</b>  <b>Example:</b> Router# configure terminal	Enters global configuration mode.
Step 4	<b>interface {fastethernet   gigabitethernet} 0/port</b>  <b>Example:</b> Router(config)# interface gigabitethernet 0/0	Specifies the Ethernet interface and enters interface configuration mode.  <b>Note</b> For information on interface numbering, see the software configuration guide.

	Command or Action	Purpose
Step 5	<p><b>description</b> <i>string</i></p> <p><b>Example:</b> Router(config-if)# description GE int to 2nd floor south wing</p>	<p>(Optional) Adds a description to an interface configuration.</p> <ul style="list-style-type: none"> <li>The description helps you remember what is attached to this interface. The description can be useful for troubleshooting.</li> </ul>
Step 6	<p><b>ip address</b> <i>ip-address mask</i></p> <p><b>Example:</b> Router(config-if)# ip address 172.16.74.3 255.255.255.0</p>	<p>Sets a primary IP address for an interface.</p>
Step 7	<p><b>no shutdown</b></p> <p><b>Example:</b> Router(config-if)# no shutdown</p>	<p>Enables an interface.</p>
Step 8	<p><b>end</b></p> <p><b>Example:</b> Router(config)# end</p>	<p>Returns to privileged EXEC mode.</p>
Step 9	<p><b>show ip interface brief</b></p> <p><b>Example:</b> Router# show ip interface brief</p>	<p>Displays a brief status of the interfaces that are configured for IP.</p> <ul style="list-style-type: none"> <li>Verify that the Ethernet interfaces are up and configured correctly.</li> </ul>

## Examples

### Configuring the GigabitEthernet Interface: Example

```
!
interface GigabitEthernet0/0
description GE int to HR group
ip address 172.16.3.3 255.255.255.0
duplex auto
speed auto
no shutdown
!
```

### Sample Output for the show ip interface brief Command

```
Router# show ip interface brief
```

```
Interface                IP-Address      OK? Method Status          Protocol
GigabitEthernet0/0      172.16.3.3     YES NVRAM  up              up
GigabitEthernet0/1      unassigned      YES NVRAM  administratively down down
Router#
```

## Specifying a Default Route or Gateway of Last Resort

This section describes how to specify a default route with IP routing enabled. For alternative methods of specifying a default route, see the *Configuring a Gateway of Last Resort Using IP Commands* tech note.

The Cisco IOS software uses the gateway (router) of last resort if it does not have a better route for a packet and if the destination is not a connected network. This section describes how to select a network as a default route (a candidate route for computing the gateway of last resort). The way in which routing protocols propagate the default route information varies for each protocol.

## Configuring IP Routing and IP Protocols

For comprehensive configuration information about IP routing and IP routing protocols, see the *Cisco IOS IP Routing Protocols Configuration Guide, Release 12.4T* on Cisco.com at the following URL, [http://www.cisco.com/en/US/docs/ios/iproute/configuration/guide/12\\_4t/irp\\_12\\_4t\\_book.html](http://www.cisco.com/en/US/docs/ios/iproute/configuration/guide/12_4t/irp_12_4t_book.html).

### IP Routing

You can configure integrated routing and bridging (IRB) so the router can route and bridge simultaneously. The router will act as an IP host on the network whether routing is enabled or not. To read more about IRB see the following URL on Cisco.com, [http://www.cisco.com/en/US/tech/tk389/tk815/tk855/tsd\\_technology\\_support\\_sub-protocol\\_home.html](http://www.cisco.com/en/US/tech/tk389/tk815/tk855/tsd_technology_support_sub-protocol_home.html)

IP routing is automatically enabled in the Cisco IOS software. When IP routing is configured, the system will use a configured or learned route to forward packets, including a configured default route.

**Note**

This task section does not apply when IP routing is disabled. To specify a default route when IP routing is disabled, refer to the *Configuring a Gateway of Last Resort Using IP Commands* tech note on Cisco.com.

## Default Routes

A router might not be able to determine the routes to all other networks. To provide complete routing capability, the common practice is to use some routers as smart routers and give the remaining routers default routes to the smart router. (Smart routers have routing table information for the entire internetwork.) These default routes can be passed along dynamically, or can be configured into the individual routers.

Most dynamic interior routing protocols include a mechanism for causing a smart router to generate dynamic default information that is then passed along to other routers.

## Default Network

If a router has an interface that is directly connected to the specified default network, the dynamic routing protocols running on the router will generate or source a default route. In the case of RIP, the router will advertise the pseudonetwork 0.0.0.0. In the case of IGRP, the network itself is advertised and flagged as an exterior route.

A router that is generating the default for a network also may need a default of its own. One way a router can generate its own default is to specify a static route to the network 0.0.0.0 through the appropriate device.

## Gateway of Last Resort

When default information is being passed along through a dynamic routing protocol, no further configuration is required. The system periodically scans its routing table to choose the optimal default network as its default route. In the case of RIP, there is only one choice, network 0.0.0.0. In the case of IGRP, there might be several networks that can be candidates for the system default. The Cisco IOS software uses both administrative distance and metric information to determine the default route (gateway of last resort). The selected default route appears in the gateway of last resort display of the **show ip route EXEC** command.

If dynamic default information is not being passed to the software, candidates for the default route are specified with the **ip default-network** global configuration command. In this usage, the **ip default-network** command takes an unconnected network as an argument. If this network appears in the routing table from any source (dynamic or static), it is flagged as a candidate default route and is a possible choice as the default route.

If the router has no interface on the default network, but does have a route to it, it considers this network as a candidate default path. The route candidates are examined and the best one is chosen, based on administrative distance and metric. The gateway to the best default path becomes the gateway of last resort.

### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip routing**
4. **ip route** *dest-prefix mask next-hop-ip-address* [*admin-distance*] [**permanent**]
5. **ip default-network** *network-number*  
or  
**ip route** *dest-prefix mask next-hop-ip-address*
6. **end**
7. **show ip route**

### DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
Step 2	<b>configure terminal</b>  <b>Example:</b> Router# configure terminal	Enters global configuration mode.
Step 3	<b>ip routing</b>  <b>Example:</b> Router(config)# ip routing	Enables IP routing.

	Command or Action	Purpose
Step 4	<pre>ip route dest-prefix mask next-hop-ip-address [admin-distance] [permanent]</pre> <p><b>Example:</b> Router(config)# ip route 192.168.24.0 255.255.255.0 172.28.99.2</p>	Establishes a static route.
Step 5	<pre>ip default-network network-number or ip route dest-prefix mask next-hop-ip-address</pre> <p><b>Example:</b> Router(config)# ip default-network 192.168.24.0</p> <p><b>Example:</b> Router(config)# ip route 0.0.0.0 0.0.0.0 172.28.99.1</p>	<p>Selects a network as a candidate route for computing the gateway of last resort.</p> <p>Creates a static route to network 0.0.0.0 0.0.0.0 for computing the gateway of last resort.</p>
Step 6	<pre>end</pre> <p><b>Example:</b> Router(config)# end</p>	Returns to privileged EXEC mode.
Step 7	<pre>show ip route</pre> <p><b>Example:</b> Router# show ip route</p>	<p>Displays the current routing table information.</p> <ul style="list-style-type: none"> <li>Verify that the gateway of last resort is set.</li> </ul>

## Examples

### Specifying a Default Route: Example

```
!
ip routing
!
ip route 192.168.24.0 255.255.255.0 172.28.99.2
!
ip default-network 192.168.24.0
!
```

### Sample Output for the show ip route Command

```
Router# show ip route

Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, * - candidate default
Gateway of last resort is 172.28.99.2 to network 192.168.24.0

    172.24.0.0 255.255.255.0 is subnetted, 1 subnets
C       172.24.192.0 is directly connected, FastEthernet0
S       172.24.0.0 255.255.0.0 [1/0] via 172.28.99.0
S*     192.168.24.0 [1/0] via 172.28.99.2
    172.16.0.0 255.255.255.0 is subnetted, 1 subnets
C       172.16.99.0 is directly connected, FastEthernet1
Router#
```



## Configuring Virtual Terminal Lines for Remote Console Access

Virtual terminal (vty) lines are used to allow remote access to the router. This section shows you how to configure the virtual terminal lines with a password, so that only authorized users can remotely access the router.

The router has five virtual terminal lines by default. However, you can create additional virtual terminal lines as described in the Cisco IOS Terminal Services Configuration Guide, Release 12.4. See the [Configuring Terminal Operating Characteristics for Dial-In Sessions](#) section.

Line passwords and password encryption is described in the Cisco IOS Security Configuration Guide, Release 12.4. See the [Security with Passwords, Privilege Levels, and Login Usernames for CLI Sessions on Networking Devices](#) section. If you want to secure the vty lines with an access list, see the [Access Control Lists: Overview and Guidelines](#). Also see the [Cisco IOS Password Encryption Facts](#) tech note.

### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **line vty** *line-number* [*ending-line-number*]
4. **password** *password*
5. **login**
6. **end**
7. **show running-config**
8. From another network device, attempt to open a Telnet session to the router.

### DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
Step 2	<b>configure terminal</b>  <b>Example:</b> Router# configure terminal	Enters global configuration mode.
Step 3	<b>line vty</b> <i>line-number</i> [ <i>ending-line-number</i> ]  <b>Example:</b> Router(config)# line vty 0 4	Starts the line configuration command collection mode for the virtual terminal lines (vty) for remote console access. <ul style="list-style-type: none"> <li>• Make sure that you configure all vty lines on your router.</li> </ul> <p><b>Note</b> To verify the number of vty lines on your router, use the <b>line vty ?</b> command.</p>

	Command or Action	Purpose
Step 4	<code>password password</code>  <b>Example:</b> Router(config-line)# <code>password guessagain</code>	Specifies a password on a line.
Step 5	<code>login</code>  <b>Example:</b> Router(config-line)# <code>login</code>	Enables password checking at login.
Step 6	<code>end</code>  <b>Example:</b> Router(config-line)# <code>end</code>	Returns to privileged EXEC mode.
Step 7	<code>show running-config</code>  <b>Example:</b> Router# <code>show running-config</code>	Displays the running configuration file. <ul style="list-style-type: none"> <li>Verify that you properly configured the virtual terminal lines for remote access.</li> </ul>
Step 8	From another network device, attempt to open a Telnet session to the router.  <b>Example:</b> Router# <code>172.16.74.3</code> Password:	Verifies that you can remotely access the router and that the virtual terminal line password is correctly configured.

## Examples

The following example shows how to configure virtual terminal lines with a password:

```
!
line vty 0 4
  password guessagain
  login
!
```

## What to Do Next

After you configure the vty lines, follow these steps:

- (Optional) To encrypt the virtual terminal line password, see the “Configuring Passwords and Privileges” chapter in the *Cisco IOS Security Configuration Guide*. Also see the [Cisco IOS Password Encryption Facts](#) tech note.
- (Optional) To secure the VTY lines with an access list, see the “Part 3: Traffic Filtering and Firewalls” in the *Cisco IOS Security Configuration Guide*.

## Configuring the Auxiliary Line

This section describes how to enter line configuration mode for the auxiliary line. How you configure the auxiliary line depends on your particular implementation of the auxiliary (AUX) port. See the following documents for information on configuring the auxiliary line:

*Configuring a Modem on the AUX Port for EXEC Dialin Connectivity*, tech note

[http://www.cisco.com/en/US/tech/tk801/tk36/technologies\\_tech\\_note09186a0080094bbc.shtml](http://www.cisco.com/en/US/tech/tk801/tk36/technologies_tech_note09186a0080094bbc.shtml)

*Configuring Dialout Using a Modem on the AUX Port*, sample configuration

[http://www.cisco.com/en/US/tech/tk801/tk36/technologies\\_configuration\\_example09186a0080094579.shtml](http://www.cisco.com/en/US/tech/tk801/tk36/technologies_configuration_example09186a0080094579.shtml)

*Configuring AUX-to-AUX Port Async Backup with Dialer Watch*, sample configuration

[http://www.cisco.com/en/US/tech/tk801/tk36/technologies\\_configuration\\_example09186a0080093d2b.shtml](http://www.cisco.com/en/US/tech/tk801/tk36/technologies_configuration_example09186a0080093d2b.shtml)

*Modem-Router Connection Guide*, tech note

[http://www.cisco.com/en/US/tech/tk801/tk36/technologies\\_tech\\_note09186a008009428b.shtml](http://www.cisco.com/en/US/tech/tk801/tk36/technologies_tech_note09186a008009428b.shtml)

## SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **line aux 0**
4. See the tech notes and sample configurations to configure the line for your particular implementation of the AUX port.

## DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
Step 2	<b>configure terminal</b>  <b>Example:</b> Router# configure terminal	Enters global configuration mode.
Step 3	<b>line aux 0</b>  <b>Example:</b> Router(config)# line aux 0	Starts the line configuration command collection mode for the auxiliary line.
Step 4	See the tech notes and sample configurations to configure the line for your particular implementation of the AUX port.	—

# Verifying Network Connectivity

This section describes how to verify network connectivity for your router.

## Prerequisites

- Complete all previous configuration tasks in this chapter.
- The router must be connected to a properly configured network host.

## SUMMARY STEPS

1. **enable**
2. **ping** [*ip-address* | *hostname*]
3. **telnet** {*ip-address* | *hostname*}

## DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
Step 2	<b>ping</b> [ <i>ip-address</i>   <i>hostname</i> ]  <b>Example:</b> Router# ping 172.16.74.5	Diagnoses initial network connectivity. <ul style="list-style-type: none"> <li>• To verify connectivity, ping the next hop router or connected host for each configured interface to.</li> </ul>
Step 3	<b>telnet</b> { <i>ip-address</i>   <i>hostname</i> }  <b>Example:</b> Router# telnet 10.20.30.40	Logs in to a host that supports Telnet. <ul style="list-style-type: none"> <li>• If you want to test the vty line password, perform this step from a different network device, and use your router's IP address.</li> </ul>

## Examples

The following display shows sample output for the ping command when you ping the IP address 192.168.7.27:

```
Router# ping

Protocol [ip]:
Target IP address: 192.168.7.27
Repeat count [5]:
Datagram size [100]:
Timeout in seconds [2]:
Extended commands [n]:
Sweep range of sizes [n]:
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.7.27, timeout is 2 seconds:
!!!!
Success rate is 100 percent, round-trip min/avg/max = 1/2/4 ms
```

The following display shows sample output for the ping command when you ping the IP hostname donald:

```
Router# ping donald

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.7.27, timeout is 2 seconds:
!!!!
Success rate is 100 percent, round-trip min/avg/max = 1/3/4 ms
```

## Saving Your Router Configuration

This section describes how to avoid losing your configuration at the next system reload or power cycle by saving the running configuration to the startup configuration in NVRAM. The NVRAM provides 256KB of storage on the router.

### SUMMARY STEPS

1. **enable**
2. **copy running-config startup-config**

### DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
Step 2	<b>copy running-config startup-config</b>  <b>Example:</b> Router# copy running-config startup-config	Saves the running configuration to the startup configuration.

## Saving Backup Copies of Configuration and System Image

To aid file recovery and minimize downtime in case of file corruption, we recommend that you save backup copies of the startup configuration file and the Cisco IOS software system image file on a server.

## SUMMARY STEPS

1. **enable**
2. **copy nvram:startup-config {ftp: | rcp: | tftp:}**
3. **show {flash0|flash1}:**
4. **copy {flash0|flash1}: {ftp: | rcp: | tftp:}**

## DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
Step 2	<b>copy nvram:startup-config {ftp:   rcp:   tftp:}</b>  <b>Example:</b> Router# copy nvram:startup-config ftp:	Copies the startup configuration file to a server. <ul style="list-style-type: none"> <li>• The configuration file copy can serve as a backup copy.</li> <li>• Enter the destination URL when prompted.</li> </ul>
Step 3	<b>show {flash0 flash1}:</b>  <b>Example:</b> Router# show {flash0 flash1}:	Displays the layout and contents of a flash memory file system. <ul style="list-style-type: none"> <li>• Learn the name of the system image file.</li> </ul>
Step 4	<b>copy {flash0 flash1}: {ftp:   rcp:   tftp:}</b>  <b>Example:</b> Router# copy {flash0 flash1}: ftp:	Copies a file from flash memory to a server. <ul style="list-style-type: none"> <li>• Copy the system image file to a server to serve as a backup copy.</li> <li>• Enter the filename and destination URL when prompted.</li> </ul>

## Examples

**Copying the Startup Configuration to a TFTP Server: Example**

The following example shows the startup configuration being copied to a TFTP server:

```
Router# copy nvram:startup-config tftp:
Remote host[]? 172.16.101.101
Name of configuration file to write [rtr2-config]? <cr>
Write file rtr2-config on host 172.16.101.101?[confirm] <cr>
! [OK]
```

**Copying from Flash Memory to a TFTP Server: Example**

The following example shows the use of the **show {flash0|flash1}:** command in privileged EXEC to learn the name of the system image file and the use of the **copy {flash0|flash1}: tftp:** privileged EXEC command to copy the system image (c3900-2is-mz) to a TFTP server. The router uses the default username and password.

```
Router# show {flash0|flash1}:

System flash directory:
File Length Name/status
1 4137888 c3900-c2is-mz
[4137952 bytes used, 12639264 available, 16777216 total]
16384K bytes of processor board System flash (Read/Write)\

Router# copy {flash0|flash1}: tftp:

IP address of remote host [255.255.255.255]? 172.16.13.110
filename to write on tftp host? c3900-c2is-mz
writing c3900-c2is-mz !!!!!...
successful ftp write.
```



---

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

---

## Verifying the Initial Configuration

Enter the following commands in the Cisco IOS to verify the initial configuration on the router:

- **show version**—Displays the system hardware version; the installed software version; the names and sources of configuration files; the boot images; and the amount of installed DRAM, NVRAM, and flash memory.
- **show diag**—Lists and displays diagnostic information about the installed controllers, interface processors, and port adapters.
- **show interfaces**— Shows interfaces are operating correctly and that the interfaces and line protocol are in the correct state—up or down
- **show ip interface brief**— Displays a summary status of the interfaces configured for IP protocol.
- **show configuration**— Verify that you have configured the correct hostname and password.

When you have completed and verified the initial configuration, the specific features and functions are ready to be configured. See the Cisco 1900 Series, 2900 Series, and 3900 Series Software Configuration Guide.



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**Note** If you need help with the interface and port numbering, see the [“Interface Numbering” section on page 1-14](#).

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## CHAPTER 7

# Getting Software Licenses for the Router

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The Integrated Services Router Generation 2 (ISR G2) platforms offer a new Universal Cisco Internet Operating System (IOS) software image. The Universal image and its licensing provisions provide greater flexibility to deploy new features while also improving visibility and management of existing licenses on routers in the network.

When you order a new ISR G2, it is shipped with the software image and the corresponding permanent licenses for the packages and features that you specified, preinstalled. The software does not need to be activated or registered prior to use.

Use the Cisco management application such as Cisco License Manager (CLM), or use the Cisco IOS command **show license feature** to determine the licenses activated on your system. CLM is a free software application available at <http://www.cisco.com/go/clm>.

~~Your~~ The router comes with an evaluation license, also known as a temporary license, for most packages and features supported on the router. To try a new software package or feature, activate the evaluation license for that package or feature.

## Activating a New Software Package or Feature

Complete the following steps to permanently activate a software package or feature on the ~~your~~ router:

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- Step 1** Purchase the software package or feature you want to install. You will receive a product activation key (PAK) with your purchase.
  - Step 2** If you do not have a Cisco.com username and password, register for an account at the following URL, <https://tools.cisco.com/RPF/register/register.do>.
  - Step 3** Get the license file using one of the following options:



### Note

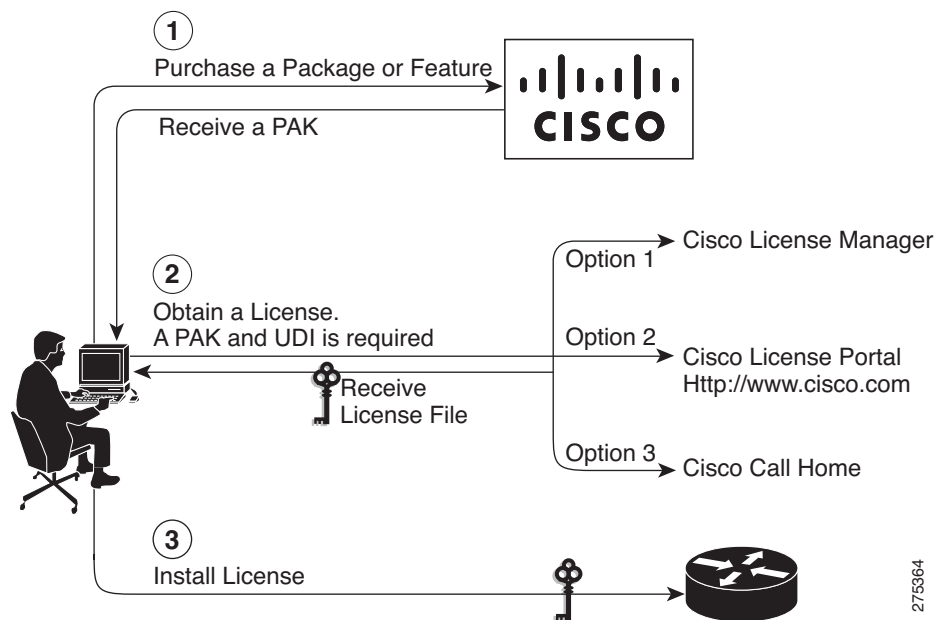
You will require the serial number (SN) and product ID (PID) of the router where the license should be installed. See the [Product Serial Number Location](#), page 1-6 for the location of the SN and PID.

- **Cisco License Manager (CLM)** - CLM is a free software application available at <http://www.cisco.com/go/clm>.
- **Cisco License Registration Portal** - Cisco license registration portal is a web-based portal for getting and registering individual software licenses, available at <http://www.cisco.com/go/license>
- **Cisco License Call Home** - Use the Cisco License Call Home interface on the router to directly interact with the Cisco Product License Registration portal.

- Step 4** Install the license file using one of the following options:
- **Cisco License Manager (CLM)** - CLM is a free software application available at <http://www.cisco.com/go/clm>.
  - **Cisco License Call Home** - Use the Cisco License Call Home interface on the router to directly interact with the Cisco Product License Registration portal.
  - **Cisco IOS CLI** - Use the Cisco IOS command line interface (CLI) to install and manage licenses.
  - **Simple Network Management Protocol (SNMP)** - Use SNMP to install and manage software licenses.

Figure 1 - shows the steps for software activation.

**Figure 1** Steps for Software Activation



## RMA License Transfer

To transfer a software license from a failed device to a new device, go to the Cisco licensing portal at <http://www.cisco.com/go/license>.



**Note**

You will need the SN and PID of the defective device, as well as the RMA router to initiate an RMA replacement license.

## Additional Information

See the [Software Activation on Cisco Integrated Services Routers and Cisco Integrated Service Routers Generation 2](#) document on Cisco.com for detailed information ~~on~~ about software activation on Cisco ISR G2 platforms.

