



## **Cisco IR829 Integrated Services Router Hardware Installation Guide**

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# 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:

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## Objective

This guide provides an overview and explains how to install, connect, and perform initial configuration for the Cisco IR829.

## Audience

This guide is intended for people who have a high level of technical ability, although they may not have experience with Cisco software.

# Organization

This guide is organized into the following chapters.

Chapter	Name	Description
Chapter 1	<a href="#">Chapter 1, “Product Overview”</a>	Describes the router models and the hardware features available.
Chapter 2	<a href="#">Chapter 2, “Installing the Router”</a>	Lists the items shipped with the router, the equipment and tools necessary for installing the router, the safety warnings and guidelines, and the procedures for installing the router.
Chapter 3	<a href="#">Chapter 3, “Connecting the Router”</a>	Describes typical connections for the router, procedures for connecting the router to various devices, and how to verify the connections.
Chapter 4	<a href="#">Chapter 4, “Initial Configuration”</a>	Provides the procedures for initially configuring the router settings.
Chapter 5	<a href="#">Chapter 5, “Guest Operating System (Guest OS) Installation and Configuration”</a>	Provides details Guest for Operating System (Guest OS) installation for the Cisco IR829.
Chapter 6	<a href="#">Chapter 6, “Technical Specifications”</a>	Provides the router, port, and cabling specifications.

# Conventions

This section describes the conventions used in this guide.



## Note

Means *reader take note*. Notes contain helpful suggestions or references to additional information and material.



## Caution

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



## Tip

Means *the following information will help you solve a problem*. The tip information might not be troubleshooting or even an action, but could be useful information.



# 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

Waarschuwing

## BELANGRIJKE VEILIGHEIDSINSTRUCTIES

Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van de standaard praktijken om ongelukken te voorkomen. Gebruik het nummer van de verklaring onderaan de waarschuwing als u een vertaling van de waarschuwing die bij het apparaat wordt geleverd, wilt raadplegen.

## BEWAAR DEZE INSTRUCTIES

Varoitus

## TÄRKEITÄ TURVALLISUUSOHJEITA

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

## SÄILYTÄ NÄMÄ OHJEET

Attention

## IMPORTANTES INFORMATIONS DE SÉCURITÉ

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

## CONSERVEZ CES INFORMATIONS

**Warnung WICHTIGE SICHERHEITSHINWEISE**

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

**BEWAHREN SIE DIESE HINWEISE GUT AUF.**

**Avvertenza IMPORTANTI ISTRUZIONI SULLA SICUREZZA**

Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di intervenire su qualsiasi apparecchiatura, occorre essere al corrente dei pericoli relativi ai circuiti elettrici e conoscere le procedure standard per la prevenzione di incidenti. Utilizzare il numero di istruzione presente alla fine di ciascuna avvertenza per individuare le traduzioni delle avvertenze riportate in questo documento.

**CONSERVARE QUESTE ISTRUZIONI**

**Advarsel VIKTIGE SIKKERHETSINSTRUKSJONER**

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

**TA VARE PÅ DISSE INSTRUKSJONENE**

**Aviso INSTRUÇÕES IMPORTANTES DE SEGURANÇA**

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

**GUARDE ESTAS INSTRUÇÕES**

**¡Advertencia! INSTRUCCIONES IMPORTANTES DE SEGURIDAD**

Este símbolo de aviso indica peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considere los riesgos de la corriente eléctrica y familiarícese con los procedimientos estándar de prevención de accidentes. Al final de cada advertencia encontrará el número que le ayudará a encontrar el texto traducido en el apartado de traducciones que acompaña a este dispositivo.

**GUARDE ESTAS INSTRUCCIONES**

**Varning! VIKTIGA SÄKERHETSANVISNINGAR**

Denna varningssignal signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanliga förfaranden för att förebygga olyckor. Använd det nummer som finns i slutet av varje varning för att hitta dess översättning i de översatta säkerhetsvarningar som medföljer denna anordning.

**SPARA DESSA ANVISNINGAR****Figyelem FONTOS BIZTONSÁGI ELOÍRÁSOK**

Ez a 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 للصدمة الكهربائية وكن على علم بالإجراءات القياسية للحيلولة دون وقوع أي حوادث. استخدم رقم البيان الموجود في آخر كل تحذير لتحديد مكان ترجمته داخل تحذيرات الأمان المترجمة التي تأتي مع الجهاز. قم بحفظ هذه الإرشادات

## Upozorenje

**VAŽNE SIGURNOSNE NAPOMENE**

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

**SAČUVAJTE OVE UPUTE**

## Upozornění

**DŮLEŽITÉ BEZPEČNOSTNÍ POKYNY**

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

**USCHOVEJTE TYTO POKYNY**

## Προειδοποίηση

**ΣΗΜΑΝΤΙΚΕΣ ΟΔΗΓΙΕΣ ΑΣΦΑΛΕΙΑΣ**

Αυτό το προειδοποιητικό σύμβολο σημαίνει κίνδυνο. Βρίσκεστε σε κατάσταση που μπορεί να προκαλέσει τραυματισμό. Πριν εργαστείτε σε οποιοδήποτε εξοπλισμό, να έχετε υπόψη σας τους κινδύνους που σχετίζονται με τα ηλεκτρικά κυκλώματα και να έχετε εξοικειωθεί με τις 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**

## предупреждение

**ВАЖНИ БЕЗБЕДНОСНИ НАПАТСТВИЈА**

Симболот за предупредување значи опасност. Се наоѓате во ситуација што може да предизвика телесни повреди. Пред да работите со опремата, бидете свесни за ризикот што постои кај електричните кола и треба да ги познавате стандардните постапки за спречување на несреќни случаи. Искористете го бројот на изјавата што се наоѓа на крајот на секое предупредување за да го најдете неговиот период во преведените безбедносни предупредувања што се испорачани со уредот.

**ЧУВАЈТЕ ГИ ОБИЕ НАПАТСТВИЈА**

## Ostrzeżenie

**WAŻNE INSTRUKCJE DOTYCZĄCE BEZPIECZEŃSTWA**

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

**NINIEJSZE INSTRUKCJE NALEŻY ZACHOWAĆ**

**Upozornenie 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****Opozorilo POMEMBNI VARNOSTNI NAPOTKI**

Ta opozorilni simbol pomeni nevarnost. Nahajate se v situaciji, kjer lahko pride do telesnih poškodb. Preden pričnete z delom na napravi, se morate zavedati nevarnosti udara električnega toka, ter tudi poznati preventivne ukrepe za preprečevanje takšnih nevarnosti. Uporabite obrazložitevno številko na koncu posameznega opozorila, da najdete opis nevarnosti v priloženem varnostnem priločniku.

**SHRANITE TE NAPOTKE!**

警告

重要安全性指示

此警告符號代表危險，表示可能造成人身傷害。使用任何設備前，請留心電路相關危險，並熟悉避免意外的標準作法。您可以使用每項警告後的聲明編號，查詢本裝置隨附之安全性警告譯文中的翻譯。請妥善保留此指示



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



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

**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**

**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**

**If the symbol of suitability with an overlaid cross appears above a port, you must not connect the port to a public network that follows the European Union standards. Connecting the port to this type of public network can cause severe personal injury or can damage the unit.** Statement 1031

**Warning**

**Connect the unit only to DC power source that complies with the safety extra-low voltage (SELV) requirements in IEC 60950 based safety standards.** Statement 1033

**Warning**

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

**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**

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

**Warning**

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

**Warning**

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

**Warning**

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

**Warning**

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

**Warning**

**The covers are an integral part of the safety design of the product. Do not operate the unit without the covers installed.** Statement 1077

**Warning****Hot surface.** Statement 1079

---

## Related Documentation

- [Regulatory Compliance and Safety Information for Cisco 800 Series and SOHO Series Routers](#)
- [Cisco IOS Release Notes](#)
- [Cisco 800 Series Integrated Services Routers Software Configuration Guide.](#)

## Searching Cisco Documents

To search an 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

## Product Overview

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This chapter provides an overview of the features available for the Cisco IR829 Integrated Services Routers (ISRs) and contains the following sections:

- [General Description, page 1-1](#)
- [SKU Information, page 1-6](#)
- [Hardware Features, page 1-6](#)



**Note**

For compliance and safety information, see [Regulatory Compliance and Safety Information for Cisco 800 Series and SOHO Series Routers](#).

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## General Description

The Cisco IR829 Integrated Services Router, part of the Cisco Integrated Services Routers Generation 2 (ISR G2) Family, is designed as a next generation ruggedized fixed form factor router. It is a small-form factor cellular router targeting mobile/vehicle applications and includes WiFi to provide connectivity in non-carpeted IT spaces, Industrials, Utilities, Transportation, Infrastructure, Industrial M2M application, asset monitoring, Smart Grid, and Utility Application.

[Figure 1-1](#) shows the IR829.

**Figure 1-1** Cisco IR829 Integrated Services Router

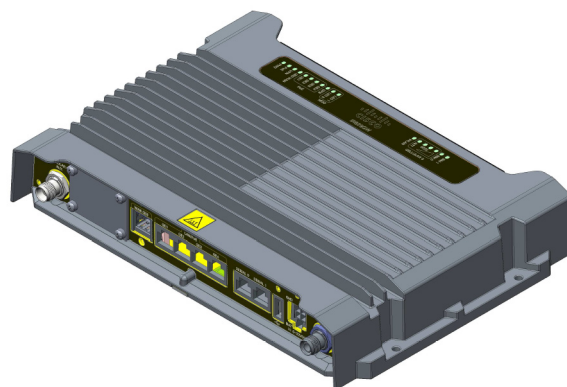
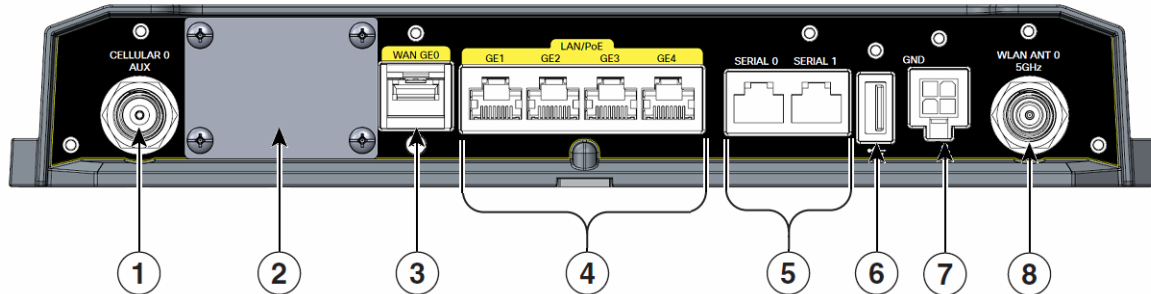


Figure 1-2 shows the front panel details of the Cisco IR829.

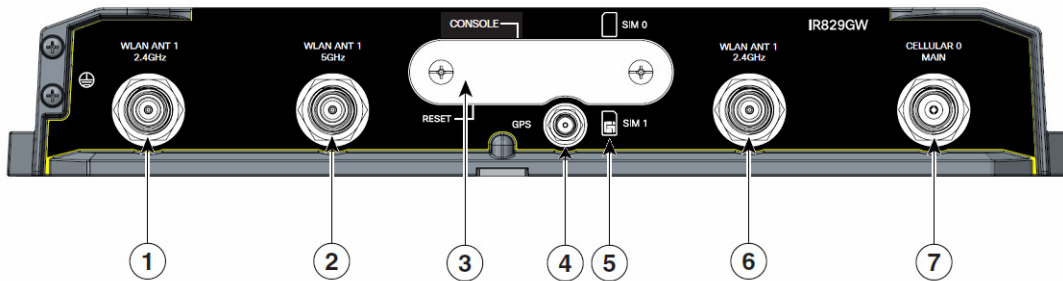
**Figure 1-2 Cisco IR829 Front Panel**



1	CELLULAR 0 AUX	5	Serial Ports
2	Limited Modularity Slot	6	USB-A Port
3	Gigabit WAN	7	Power Input, Battery, and Ignition connector. Refer to the DC Power section for pin-outs.
4	Gigabit LAN/PoE	8	WLAN ANT0 5GHz

Figure 1-3 shows the back panels details of the Cisco IR829.

**Figure 1-3 Cisco IR829 Back Panel**



1	WLAN ANT 0 2.4GHz	5	SIM connection 1 (SIM connection 0 is above)
2	WLAN ANT 1 5GHz	6	WLAN ANT 1 2.4GHz
3	SIM Door Assembly	7	CELLULAR 0 MAIN
4	GPS SMA		



**Note**

Behind the SIM Door Assembly, there is a reset switch, Mini USB Debug connection, and Dual SIM slots. See Figure 1-4 for details

Figure 1-4 Behind the SIM Door

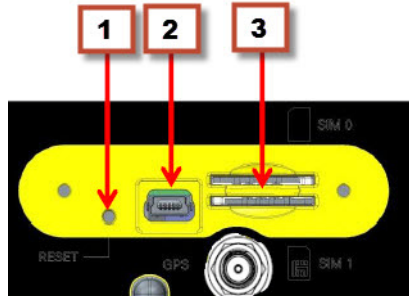


Figure 1-5 shows the top of the Cisco IR829.

Figure 1-5 Cisco IR829 Top Cover

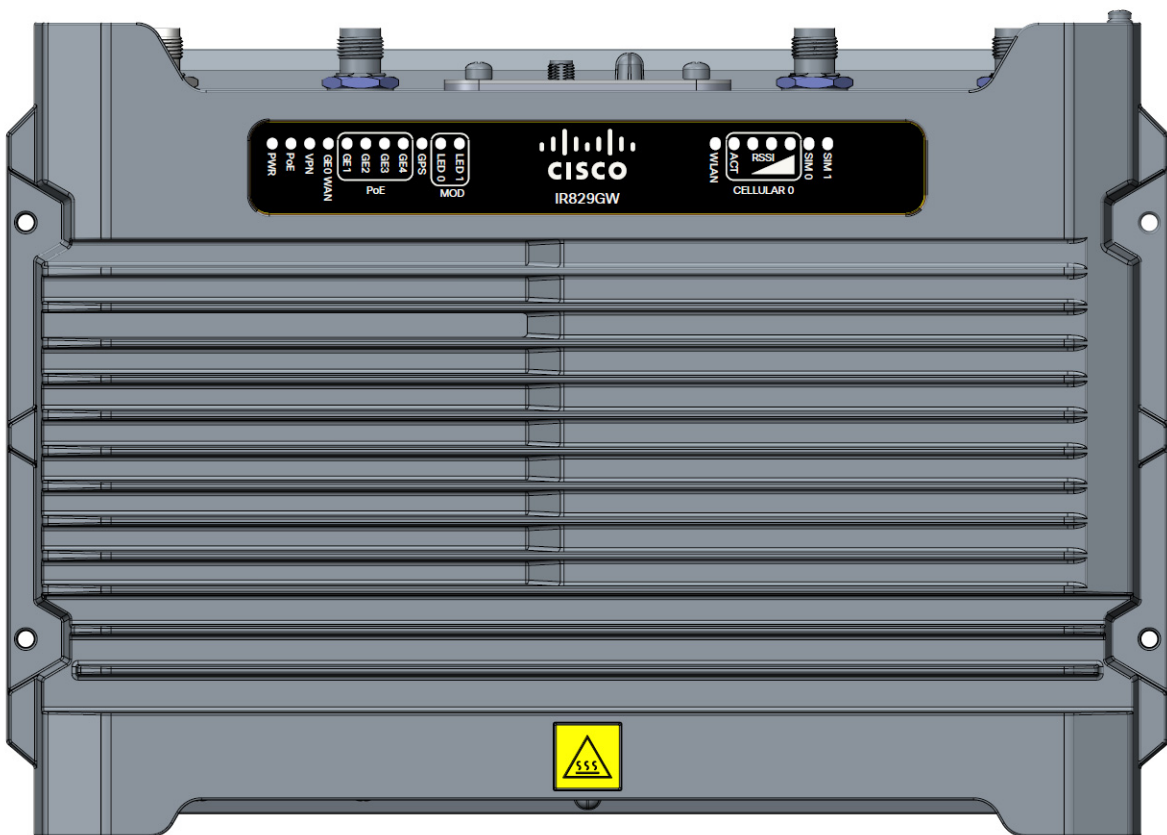


Figure 1-6 shows the LED detail.

Figure 1-6 Cisco IR829 LED Detail



The following section shows a detailed description of the LEDs.


## LEDs

The following table describes the LEDs for the Cisco IR829.

Table 1-1 LED Descriptions

LED	Activity	Description
PWR	Power Status	Off — No power Green Steady on — Normal operation Green Flashing — Boot up phase or in ROM Monitor mode Yellow Steady on — System shutdown due to under or over voltage conditions Yellow Flashing — System has an error, but has network connectivity
POE	POE Power Supply Status	Off — No -54V PoE power supply detected or no PoE board installed Green Steady on — 53.5V POE power supply good and all powered port operating normally Yellow Steady on — 53.5V POE power supply good, but one or more POE ports has a fault.
VPN	VPN	Off — No VPN tunnel Steady on — At least one VPN tunnel is up
GEO WAN	Link Status	Off — No link Steady on — Link is up Blink — Transmitting and Receiving data

**Table 1-1 LED Descriptions (continued)**

LED	Activity	Description
GPS	GPS Status	<p>Off — GPS not configured</p> <p>On — GPS configured</p> <p>Slow Flash — GPS Acquiring in Standalone GPS</p> <p>Fast Flash — GPS Acquiring in Assisted GPS</p> <p> <b>Note</b> Slow Flash is defined as the LED will be on for 0.25 seconds and off for 0.75 seconds. Fast Flash s defined as the LED will be on for 0.25 seconds and off for 0.25 seconds.</p>
MOD		
Ethernet LAN Switch Ports  GE1-GE4] Single LED per Port	Link Status/POE Status	<p>Off — No link</p> <p>Green Steady on — Link is up</p> <p>Green Blink — Transmitting and Receiving data</p> <p>Yellow — POE Fault, implies no link</p>
WLAN	2.4GHz  5GHz	<p>Off — Radio is down (no SSID configured)</p> <p>Flashing Green — Bootloader, IOS Ethernet Initialization, IOS Start Up after system initialization.</p> <p>Green to Red to Yellow — Discovery/Join process.</p> <p>Rapid Flashing Green — Joined to a controller</p> <p>Steady Green — One wireless client is associated.</p>
CELLULAR0/ CELLULAR1	ACT	<p>Off — Module not powered on</p> <p>On — Module is powered on and connected but not transmitting or receiving</p> <p>Slow Blink — Module is powered on and searching for connection</p> <p>Fast Blink — Module is transmitting or receiving.</p>
CELLULAR0/ CELLULAR1	RSSI	The RSSI LEDs are a 3 LED bar graph to indicate signal strength. Their functionality is described in the RSSI LED figure below.
SIM0/SIM1	Sim cards	<p>Off — No USIM</p> <p>Green — USIM installed and active</p>

**Figure 1-7 RSSI LED**

RSSI	RSSI (2)	RSSI (1)	RSSI (0)
	Green	Green	Green/Yellow
<110dBm	Off	Off	Off
-110 — 90dBm	Off	Off	On - Yellow

RSSI	RSSI (2)	RSSI (1)	RSSI (0)
-90 — 75dBm	Off	Off	On - Green
-75 — 60dBm	Off	On - Green	On - Green
>60dBm	On - Green	On - Green	On - Green

## Memory

The Cisco IR829 uses flash memory and main memory. The flash memory contains the Cisco IOS software image and the boot flash contains the ROMMON boot code. All memory components are factory default and not upgradeable by the end user.

[Table 1-2](#) shows the memory allocation.

**Table 1-2 Cisco IR829 Memory**

Memory	Capacity
DDR	2GB
Boot ROM	16MB
System Flash	4GB

## SKU Information

[Table 1-1](#) lists the different SKUs available for the Cisco ISRs. All SKUs support external antenna.

**Table 1-3 Supported SKUs for Cisco IR829s**

SKU ID	Description
IR829GW-LTE-VZ-AK9	C829 Hardened WAN GE 4G LTE secure platform multi-mode Verizon LTE/DoRa with 802.11n, FCC compliant
IR829GW-LTE-NA-AK9	C829 Hardened WAN GE 4G LTE secure platform multi-mode ATT and Canada LTE/HSPA+ with 802.11n, FCC compliant
IR829GW-LTE-GA-EK9	C829 Hardened WAN GE 4G LTE secure platform multi-mode Global (Europe) LTE/HSPA+ with 802.11n, ETSI Compliant
IR829GW-LTE-GA-ZK9	C829 Hardened WAN GE 4G LTE secure platform multi-mode Global (Australia) LTE/HSPA+ with 802.11n, Australia Compliant

## Hardware Features

This section provides an overview of the following hardware features for the Cisco IR829.

- [Platform Features for Cisco IR829, page 1-7](#)
- [Antennas, page 1-8](#)

- [Reset Button, page 1-8](#)
- [Supported Cisco Antennas and Cables, page 1-10](#)
- [Power Supply, page 1-22](#)

## Platform Features for Cisco IR829

The following lists the hardware platform features for the Cisco IR829.

- Intel Atom Dual-Core Rangeley CPU, 1250 MHz
- 2GB DDR3 memory capacity
- 64MB SPI BIOS NOR flash
- 8GB (4GB usable) “eMMC” bulk storage flash
- 4-port GE LAN switch, optional PoE 802.3at (30W max)
- WAN 1 GE SFP
- WWAN /WLAN
  - mini PCIe slots for 3G/4G/LTE modems, dual SIM
  - Single 802.11 a/b/n WiFi radio
- Optional Limited Modularity (BYOI) slot'
- One RJ45 RS232 port
- One RJ45 RS232/RS485 Serial port
- One USB 2.0 Type A external port
- One mini USB connector
- Lithium Ion battery backed-up RTC
- External Reset/Recovery Push Button
- External Power
  - Direct-wire 12/24VDC vehicle charging system input (9 — 32VDC)
  - 4-pin locking power connector
- External GPS SMA Connector
- Six External TNC/RP-TNC connectors (depends on the configuration) for connection to WWAN /WLAN internal modules
- Class A EMC compliance
- RoHS6 compliance
- Mechanical
  - Fanless operation
  - Form-factor with no cable cover = 11.00” x 7.70” x 1.73” (WDH)
  - Horizontal, Vertical, wall, floor, cabinet-mount and shelf-mount

## Reset Button

The Reset button resets the router configuration to the default configuration set by the factory. To restore the router configuration to the default configuration set by the factory, use a standard size #1 paper clip with wire gauge 0.033 inch or smaller and simultaneously press the reset button while applying power to the router.


**Note**


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The rear cover must be removed to expose the reset switch.

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## Antennas

The IR829 has 4 x Wi-Fi antennas (2.4GHz & 5GHz) + 2 antennas for cellular RP-TNC bulkhead connectors.

Standard antennas are:

- Two multiband swivel-mount dipole antennae (ANT-4G-DP-IN-TNC) and one extender (4G-AE010-R) are included with all the IR829s.
- WLAN: Three Cisco Multiband Swivel-Mount Dipole Antennae. (AIR-ANTM2050D-R) are included for all IR829 SKUs that have WLAN functionality.

For detailed information about Cisco Antennas, please refer to the following guides:

Connected Grid Antennas Installation Guide:

[http://www.cisco.com/c/en/us/td/docs/routers/connectedgrid/antennas/installing/cg\\_antenna\\_install\\_guide.html](http://www.cisco.com/c/en/us/td/docs/routers/connectedgrid/antennas/installing/cg_antenna_install_guide.html)

Antennas for the Cisco 800 Series Routers:

<http://www.cisco.com/c/en/us/support/routers/800-series-routers/products-installation-guides-list.html>

## Antennas and Installation Scenarios


**Note**


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Before choosing your antenna type and installation scenario, read through the following information.

---

### Coexistence of radio standards:

When operating and planning installation of products with WiFi, 4G LTE, and GPS wireless standards coexisting on the IR829 platform, the user needs to provision greater than 15dB isolation between the WiFi and LTE antennas at all frequencies of 4G LTE and WiFi operation for minimum impact to performance.

Ideally, isolation should be 20-25dB or more. Specifically, users should not install 4G LTE dipoles and WiFi dipoles on the chassis at the same time, since doing so would generally result in less than 15dB isolation and may have a strong impact on performance depending on frequency bands in question.

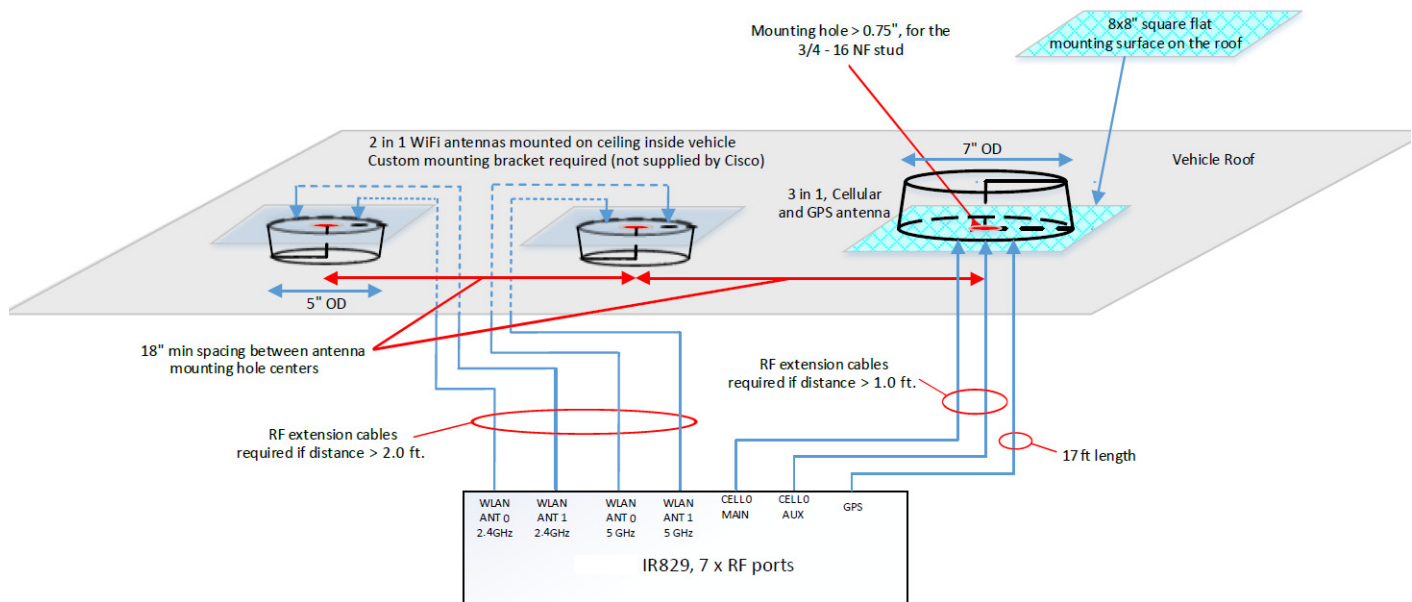
### Vehicular 5-in-1 and 2-in-1 installation and deployment notes

In the section that follows, the 5-in-1 antenna refers to ANT-5-4G2WL2G1-O, and 2-in-1 antenna refers to ANT-2-WLAN-D-O.



Figure 1-8 Sample Installation

IR829, 7 Port Vehicular Antennas Installation Diagram



### Installation

Users need to provision a 8 x 8" flat mounting surface with a mounting hole on the roof of the vehicle for the 5-in-1 antenna, and a 6 x 6" flat mounting surface with a mounting hole for the 2-in-1 WiFi antenna. Without a flat mounting surface, the antenna will not meet IP67 standards and may have reduced service life.

### Ground plane

Cisco recommends having a 1 foot ground plane under both the 5-in-1 and 2-in-1 antennas. In case of a metal vehicle roof, the roof itself shall be the ground plane. While Cisco has investigated the effects of ground plane and no ground plane, wireless performance was certified with the 1 foot ground plane.

### Isolation between 5-in-1 and 2-in-1 antennas

Cisco recommends 18" inch spacing between the 5-in-1 and the 2-in-1 antenna centers for optimal isolation.

Cisco recommends routing the 2.4GHz WLAN ports of the IR829 to the 2-in-1 antenna, and the 5GHz ports to the 5-in-1 antenna to optimize isolation between WiFi 2.4 GHz and cellular 4G LTE. The 5-in-1 antenna has been fully optimized for WiFi and cellular LTE coexistence and isolation. Connecting the 2.4GHz WiFi signals to a separate antenna simply allows to user to optimize the antenna isolation further. Both the 5-in-1 and 2-in-1 are dual band WiFi capable and fully support both 2.4 GHz or 5GHz WLAN signals.

**MIMO ports on 5-in-1 and 2-in-1**

Cellular and WLAN ports on the 5-in-1 and 2-in-1 antennas support MIMO technology. MIMO brings significant improvements in throughput and robustness of the wireless link in fading channels. Users choosing to connect only one wireless port on MIMO capable products are giving up significant wireless performance in both throughput and robustness of the link.

- The individual 4G antenna cables on the 5-in-1 antenna can be connected to either cellular port of IR829. There is no one-to-one assignment requirement.
- The individual WLAN antenna cables on the 5-in-1 antenna and the 2-in-1 antenna can be connected to any WLAN port of IR829. There is no one to one assignment requirement.

The following section shows some examples of different installation scenarios.

**Supported Cisco Antennas and Cables**

Table 1-4 lists the supported 4G/LTE Radio Modules/Cables/Antennas for Cisco IR829.

**Table 1-4 4G/LTE Radio Modules/Cables/Antennas**

Use Case	Radio Module	Indoor Cable	Lightning Arrestor or Adapter	Outdoor Cable	Antenna
<b>4G/LTE Case 1:</b> 1' 2', 5', 10', 15' or 20' cable to mast mounted antenna, Stick Omni or Directional Flat Panel antenna	IR829GW-LTE -GA-EK9	None	None	RA-TNC(m) to N(m), LMR-400-DB, 20', qty 2 <ul style="list-style-type: none"> <li>• 37-1378-01</li> <li>• "CAB-L400-20-TNC-N</li> </ul>	2x 4G Omni Stick, Standard Perf, 10" 2dBi, 1x N(f) each <ul style="list-style-type: none"> <li>• 07-1171-01</li> <li>• ANT-4G-OMNI-O UT-N</li> </ul>
	IR829GW-LTE -GA-ZK9	Router located in outdoor protective enclosure			
	IR829GW-LTE -NA-AK9				
	IR829GW-LTE -VZ-AK9				
	2x TNC(f)				1x 4G Panel Antenna, 2x N(f) each <ul style="list-style-type: none"> <li>• 07-1172-01</li> <li>• ANT-4G-PNL-OUT -N</li> </ul>
<b>4G/LTE Case 2:</b>	IR829GW-LTE -GA-EK9	R/A-TNC(m) to N(m),			1x 4G Panel Antenna, 2x N(f) each <ul style="list-style-type: none"> <li>• 07-1172-01</li> <li>• ANT-4G-PNL-OUT -N</li> </ul>
	IR829GW-LTE -GA-ZK9	LMR-240-FR/CMR, 2', qty 2 <ul style="list-style-type: none"> <li>• 37-100707-01</li> </ul>			
	IR829GW-LTE -NA-AK9	<b>Note</b> Not available from Cisco			
	IR829GW-LTE -VZ-AK9				
	2x TNC(f)				

Table 1-4 4G/LTE Radio Modules/Cables/Antennas

Use Case	Radio Module	Indoor Cable	Lightning Arrestor or Adapter	Outdoor Cable	Antenna
		R/A-TNC(m) to N(m), LMR-240-FR/CMR, 1', qty 2 <ul style="list-style-type: none"> <li>37-100705-01</li> </ul> <b>Note</b> Not available from Cisco			
		R/A-TNC(m) to N(m), LMR-240-FR/CMR, 5', qty 2 <ul style="list-style-type: none"> <li>37-100717-01</li> </ul> <b>Note</b> Not available from Cisco			
		R/A-TNC(m) to N(m), LMR-240-FR/CMR, 10', qty 2 <ul style="list-style-type: none"> <li>37-100754-01</li> </ul> <b>Note</b> Not available from Cisco			
		R/A-TNC(m) to N(m), LMR-240-FR/CMR, 15', qty 2 <ul style="list-style-type: none"> <li>37-100757-01</li> </ul> <b>Note</b> Not available from Cisco			
		R/A-TNC(m) to N(m), LMR-240-FR/CMR, 20', qty 2 <ul style="list-style-type: none"> <li>37-100758-01</li> </ul> <b>Note</b> Not available from Cisco			

Table 1-4 4G/LTE Radio Modules/Cables/Antennas

Use Case	Radio Module	Indoor Cable	Lightning Arrestor or Adapter	Outdoor Cable	Antenna
<b>4G/LTE Case 3:</b> Front Panel Swivel Mount 4G-LTE dipoles	IR829GW-LTE -GA-EK9 IR829GW-LTE -GA-ZK9 IR829GW-LTE -NA-AK9 IR829GW-LTE -VZ-AK9 2x TNC(f)	None —OR qty 2x PID: 4G-AE010-R CPN: 07-1144-01 10ft extension base for TNC dipole antennas —OR qty 2x PID: 4G-AE015-R CPN: 07-1145-01 15ft extension base for TNC dipole antennas	None	None	Qty 2 x 4G Indoor Swivel Mount Dipole, 0 dBi, TNC(m), white <ul style="list-style-type: none"> <li>07-1174-01</li> <li>ANT-4G-DP-IN-TNC</li> </ul>
<b>4G/LTE Case 4:</b> Front Panel Swivel Mount 4G-LTE dipoles	IR829GW-LTE -GA-EK9 IR829GW-LTE -GA-ZK9 IR829GW-LTE -NA-AK9 IR829GW-LTE -VZ-AK9 2x TNC(f)	None —OR qty 2x PID: 4G-AE010-R CPN: 07-1144-01 10ft extension base for TNC dipole antennas —OR qty 2x PID: 4G-AE015-R CPN: 07-1145-01 15ft extension base for TNC dipole antennas	None	None	Qty 2 x 4G Indoor Swivel Mount Dipole, 0 dBi, TNC(m), black <ul style="list-style-type: none"> <li>07-1137-01</li> <li>4G-LTE-ANTM-D</li> </ul>

Table 1-4 4G/LTE Radio Modules/Cables/Antennas

Use Case	Radio Module	Indoor Cable	Lightning Arrestor or Adapter	Outdoor Cable	Antenna
<b>4G/LTE Case 5:</b> 2x ceiling mount 4G-LTE antennas	IR829GW-LTE -GA-EK9 IR829GW-LTE -GA-ZK9 IR829GW-LTE -NA-AK9 IR829GW-LTE -VZ-AK9 2x TNC(f)	None	None	None	Qty 2 x 4G Indoor omni-directional Ceiling Mount 2 dBi, <ul style="list-style-type: none"> <li>• 07-1121-01</li> <li>• 4G-ANTM-OM-C M</li> </ul> — OR Qty 2 x 4G Dipole Ceiling Mount 2 dBi <ul style="list-style-type: none"> <li>• 07-1174-01</li> <li>• ANT-4G-DP-IP-TN C</li> </ul>
<b>GPS Case 1:</b> GPS Antenna with Integrated 15' coax cable, Mounted to top of Utility Cabinet Roof <ul style="list-style-type: none"> <li>• SMA(f), qty 1</li> </ul>					GPS Antenna. Need one with integrated coax cable and SMA(m) connector, 17ft, outdoor, IP67 qty 1 <ul style="list-style-type: none"> <li>• 07-1183-01</li> <li>• GPS-ACT-ANTM-S MA=</li> </ul>

Table 1-5 lists the supported Single Band Cisco WiFi antenna for the Cisco IR829.

**Table 1-5 Supported Single Band Cisco WiFi Antenna**

Use Case	Radio Module	Indoor Cable	Lightning Arrestor or Adapter	Outdoor Cable	Antenna
<b>WiFi Use Case 2:</b> Single Band, Front Panel Mounted Antennas	Dual Band Simultaneous 802.11n 2x2 MIMO WiFi  Connectors: 4x RP-TNC (jack)	N/A	N/A	N/A	2x Single Band, Swivel Mount Omni, RP-TNC(plug), 2.2dBi @ 2.4 GHz  07-1056-02  AIR-ANT4941  2x Single Band, Swivel Mount Omni, RP-TNC(plug), 3.5dBi @ 5 GHz  <ul style="list-style-type: none"> <li>07-1055-02</li> <li>AIR-ANT5135</li> </ul>
<b>WiFi Use Case 3:</b> Single Band, Single Element, Ceiling Mounted Antennas	Dual Band Simultaneous 802.11n 2x2 MIMO WiFi  Connectors: 4x RP-TNC (jack)	None  — OR  RP-TNC (jack) to RP-TNC (plug), Outdoor rated, Plenum rated, 0.195" O.D. cable, 5' long  <ul style="list-style-type: none"> <li>37-1067-01</li> <li>AIR-CAB005 PL-R</li> </ul>	N/A	N/A	2x Single Band, Ceiling Mount Omni, 36" LONG RG-58 cable with RP-TNC (plug), 5.2dBi @ 2.4 GHz  <ul style="list-style-type: none"> <li>74-1868-01</li> <li>AIR-ANT1728</li> </ul> 2x Single Band, Ceiling Mount Omni, 36" LONG RG-58 cable with RP-TNC (plug), 5.2dBi @ 5 GHz  <ul style="list-style-type: none"> <li>74-3733-01</li> <li>AIR-ANT5160V-R</li> </ul>
<b>WiFi Use Case 4:</b> 2.4 GHz, Dual Element, 5 GHz Single Element, Ceiling Mounted Antennas	Dual Band Simultaneous 802.11n 2x2 MIMO WiFi  Connectors: 4x RP-TNC (jack)	None  — OR  RP-TNC(jack) to RP-TNC(plug), Outdoor rated, Plenum rated, 0.195" O.D. cable, 5' long  37-1067-01  AIR-CAB005PL-R	N/A	N/A	1x Single Band, Ceiling Mount Omni, Dual Element, 36" LONG RG-58 cable with RP-TNC, 2.0dBi @ 2.4 GHz  <ul style="list-style-type: none"> <li>800-33316-01</li> <li>AIR-ANT24020V-R</li> </ul> 2x Single Band, Ceiling Mount Omni, 36" LONG RG-58 cable with RP-TNC (plug), 5.2dBi @ 5 GHz  <ul style="list-style-type: none"> <li>74-3733-01</li> <li>AIR-ANT5160V-R</li> </ul>

Table 1-5 Supported Single Band Cisco WiFi Antenna(continued)

Use Case	Radio Module	Indoor Cable	Lightning Arrestor or Adapter	Outdoor Cable	Antenna
<b>WiFi Use Case 5:</b> Single Band, Dual Element, Wall Mounted Antennas	Dual Band Simultaneous 802.11n 2x2 MIMO WiFi  Connectors: 4x RP-TNC (jack)	None	None — OR RP-TNC lightning arrestor, qty 4 <ul style="list-style-type: none"> <li>• 74-3722-01</li> <li>• AIR-AC C245L A-R</li> </ul>	None — OR RP-TNC(plug) to RP-TNC(jack) LMR-400-DB, 5' qty 4 <ul style="list-style-type: none"> <li>• 37-0766-01</li> <li>• AIR-CAB005LL-R</li> </ul> — OR  RP-TNC(plug) to RP-TNC(jack) LMR-400-DB, 20' qty 4 <ul style="list-style-type: none"> <li>• 72-2760-02</li> <li>• AIR-CAB020LL-R</li> </ul> — OR  RP-TNC(plug) to RP-TNC(jack) LMR-400-DB, 50' qty 4 <ul style="list-style-type: none"> <li>• 72-2761-02</li> <li>• AIR-CAB050LL-R</li> </ul> — OR  RP-TNC(plug) to RP-TNC(jack) LMR-600-DB, 100' qty 4 <ul style="list-style-type: none"> <li>• 72-2766-02</li> <li>• AIR-CAB100ULL-R</li> </ul>	1x Single Band, Dual Element, Wall Mount Patch, 18" LONG RG-58 cable with RP-TNC, 6.5dBi @ 2.4 GHz <ul style="list-style-type: none"> <li>• 800-27066-01</li> <li>• AIR-ANT2465P-R</li> </ul> 1x Single Band, Dual Element, Wall Mount Omni, 18" LONG RG-58 cables with RP-TNC, 4.5dBi @ 5 GHz (INDOOR ONLY) <ul style="list-style-type: none"> <li>• 800-25716-06</li> <li>• AIR-ANT5145V-R</li> </ul> — OR  1x Single Band, Dual Element, Wall Mount Patch, 18" LONG RG-58 cables with RP-TNC, 7.0dBi @ 5 GHz (INDOOR/OUTDOOR) <ul style="list-style-type: none"> <li>• 800-25718-05</li> <li>• AIR-ANT5170P-R</li> </ul>

**Table 1-5 Supported Single Band Cisco WiFi Antenna(continued)**

Use Case	Radio Module	Indoor Cable	Lightning Arrestor or Adapter	Outdoor Cable	Antenna
<b>WiFi Use Case 7:</b> Single Band, Dual Element, Wall Mounted Patch, Indoor/ Outdoor Antennas	Dual Band Simultaneous 802.11n 2x2 MIMO WiFi  Connectors: 4x RP-TNC (jack)		N(f) to N(f), RF-adapter qty 4 <ul style="list-style-type: none"> <li>29-1008 18-01</li> <li>AIR-AC C370-NF-N F</li> </ul>	RP-TNC(plug) to N(m)-R/A LMR-240-DB, 5' qty 4 <ul style="list-style-type: none"> <li>37-1492-01</li> <li>AIR-CAB005LL -R-N</li> </ul>	1x Single Band, Dual Element, Wall Mount Patch, 18" LONG RG-58 cable with N(m), 13dBi @ 2.4 GHz <ul style="list-style-type: none"> <li>07-1193-01</li> <li>AIR-ANT2413P2M-N</li> </ul> 1x Single Band, Dual Element, Wall Mount Patch, 18" LONG RG-58 cable with N(m), 14dBi @ 5 GHz <ul style="list-style-type: none"> <li>07-1192-01</li> <li>AIR-ANT5114P2M-N</li> </ul>

Table 1-6 lists the supported Dual Band Cisco WiFi antenna for Cisco IR829.

**Table 1-6 Supported Dual Band Cisco WiFi Antenna**

Use Case	Radio Module	Indoor Cable	Lightning Arrestor or Adapter	Outdoor Cable	Antenna
<b>WiFi Use Case 8:</b> Dual Band Front Panel Mounted Antennas	Dual Band Simultaneous 802.11n 2x2 MIMO WiFi  Connectors: 2x RP-TNC (jack)	N/A	N/A	N/A	2x Dual Band, Swivel Mount Omni, RP-TNC(plug), 2dBi @ 2.4 GHz, 4dBi @ 5 GHz <ul style="list-style-type: none"> <li>07-1146-01</li> <li>AIR-ANT2524DB-R</li> </ul>



**Table 1-6 Supported Dual Band Cisco WiFi Antenna(continued)**

Use Case	Radio Module	Indoor Cable	Lightning Arrestor or Adapter	Outdoor Cable	Antenna
<b>WiFi Use Case 9:</b> Dual Band, Dual Element, Wall Mounted Antennas	Dual Band Simultaneous 802.11n 2x2 MIMO WiFi Connectors: 2x RP-TNC (jack)	N/A	N/A	N/A	1x Dual Band, Dual Element per Band, Omni, 18" LONG RG-58 cables with RP-TNC (plug), 2.0dBi @ 2.4 GHz (2 ports), 3.0dBi @ 5 GHz (2 ports)  <ul style="list-style-type: none"> <li>07-1071-02</li> <li>AIR-ANT2451V-R</li> </ul>
<b>WiFi Use Case 10:</b> Dual Band Front Panel Mounted Antennas	Dual Band Simultaneous 802.11n 2x2 MIMO WiFi Connectors: 2x RP-TNC (jack)	N/A	N(f) to N(f), RF-adapter qty 2 <ul style="list-style-type: none"> <li>29-1008 18-01</li> <li>AIR-AC C370-NF-N F</li> </ul>	RP-TNC(plug) to N(m)-R/A LMR-240-DB, 5' qty 2 <ul style="list-style-type: none"> <li>37-1492-01</li> <li>AIR-CAB005LL -R-N</li> </ul>	2400-2484MHz, 5150-5875MHz, WiFi, omni-directional 4 dBi (2.4 GHz) 7 dBi (5 GHz) stick antenna indoor / outdoor with type N(m) connector, qty 2 Antennas are IP66, IP67 and -40 to +70C. <ul style="list-style-type: none"> <li>07-1126-01</li> <li>AIR-ANT2547V-N= White</li> </ul> — OR qty 2 <ul style="list-style-type: none"> <li>07-1285-01</li> <li>AIR-ANT2547VG-N= Gray</li> </ul>

Table 1-7 lists the supported 7 in 1 antenna configuration for transportation for Cisco IR829.

**Note**



In the following use cases, Lightning Arrestors are not required, and the Radio Modules are:  
 IR829GW-LTE-GA-EK9  
 IR829GW-LTE-GA-ZK9  
 IR829GW-LTE-NA-AK9  
 IR829GW-LTE-VZ-AK9

**Table 1-7** 7 in 1 Antenna Configuration for Transportation



Use Case	Extension Cable	Antenna
<p><b>Transportation Use Case 1:</b></p> <p>7 x RF ports, with the IR829 deployed in a transportation application.</p> <p>(Default Configuration)</p> <p>Quinta 5-in-1 antenna AND a WiFi 2-in-1 antenna to utilize all 7 ports.</p> <p>The 5-in1 Quinta antenna and the 2-in1 WiFi antennas need to be separated 18" between mounting hole centers of the two antennas.</p>	<p>No extension cables are required if the IR829 is located within ~1.0ft of 5-in-1 antenna, and ~2.0ft of WiFi 2-in-1 antenna.</p> <p>If these conditions are not met, this deployment requires the following extension cables:</p> <p><b>Cellular extension cables (2 ports)</b></p> <p>Qty 2X LMR-400-DB TNC(m)-R/A - TNC(f), 5ft</p> <ul style="list-style-type: none"> <li>• 4G-CAB-LMR400-5</li> <li>• 37-100842-01</li> </ul> <p>— OR</p> <p>Qty 2X LMR-400-DB TNC(m)-R/A - TNC(f), 10ft</p> <ul style="list-style-type: none"> <li>• G-CAB-LMR400-10</li> <li>• 37-100843-01</li> </ul> <p>— OR</p> <p>Qty 2X LMR-400-LLPL plenum / indoor only TNC(m)-R/A - TNC(f), 20ft</p> <ul style="list-style-type: none"> <li>• 4G-CAB-ULL-20</li> <li>• 37-1401-01</li> </ul> <p>— AND</p>	<p>Quinta 5 element 5-in-1 transportation antenna, black radome color, 2x 4G cellular, 2x dual band WiFi, 1xGPS</p> <ul style="list-style-type: none"> <li>• ANT-5-4G2WL2G1-O</li> <li>• 07-100261-01</li> </ul> <p>Has the following integrated cables:</p> <p>qty 2 x cellular, LMR-195, 2ft long, TNC(m)</p> <p>qty 2 x WiFi, 2ft long, LMR-195 RPTNC (plug)</p> <p>qty 1 x GPS, RG-174, 17ft long, SMA(m)</p> <p>— AND</p> <p>WiFi 2-in-1 2 element 2 in 1 transportation antenna, black radome color, 2x dual band WiFi</p> <ul style="list-style-type: none"> <li>• ANT-2-WLAN-D-O</li> <li>• 07-100265-01</li> </ul> <p>Has the following integrated cables:</p> <p>qty 2 x WiFi, 3ft long, LMR-240 RPTNC(plug)</p>

Use Case	Extension Cable	Antenna
<p><b>Transportation Use Case 1 Continued:</b></p>	<p>WiFi 2.4 GHz / 5GHz extension cables (4 ports, can mix and match lengths per installation requirements if needed)</p> <p>Qty 4x LMR-400-DB RPTNC(plug) - STR RPTNC(jack) - STR, 5ft</p> <ul style="list-style-type: none"> <li>• AIR-CAB005LL-R</li> <li>• 37-0766-01</li> </ul> <p>— OR</p> <p>Qty 4x LMR-400-DB RPTNC(plug)-R/A RPTNC(jack)-STR, 10ft</p> <ul style="list-style-type: none"> <li>• CAB-L400-10-R</li> <li>• 37-100844-01</li> </ul> <p>— OR</p> <p>Qty 4x LMR-400-DB RPTNC(plug)-STR RPTNC(jack)-STR, 20ft</p> <ul style="list-style-type: none"> <li>• AIR-CAB020LL-R</li> <li>• 72-2760-02</li> </ul> <p>— AND</p> <p>GPS port</p> <p>No extension cable required, 5-in-1 antenna comes with integrated active GPS antenna with 17ft cable.</p>	

Use Case	Extension Cable	Antenna
<p><b>Transportation Use Case 2:</b></p> <p>7 x RF ports, with the IR829 deployed in a transportation application.</p> <p>(Alternate Configuration, can be used in case the application calls for the WiFi antennas to be separate from the LTE antenna for example. a ceiling mount WLAN).</p> <p>This case describes a Tercia 3-in-1 transportation antenna (which covers MIMO cellular and GPS) together with qty 2 x 2-in-1 WiFi antennas.</p> <p> <b>Note</b> A CUSTOM CEILING MOUNT BRACKET IS REQUIRED FOR THE 2-in-1 antenna if installed in a ceiling mount configuration (NOT SUPPLIED BY CISCO)</p>	<p>No extension cables are required if the IR829 unit is located within ~1.0ft of 3-in-1 antenna, and ~2.0ft of WiFi 2-in-1 antenna.</p> <p>If these conditions are not met, this deployment requires the following extension cables:</p> <p>Cellular extension cables: (2 ports)</p> <p>Qty 2X LMR-400-DB TNC(m)-R/A - TNC(f), 5ft</p> <ul style="list-style-type: none"> <li>• 4G-CAB-LMR400-5</li> <li>• 37-100842-01</li> </ul> <p>— OR</p> <p>Qty 2X LMR-400-DB TNC(m)-R/A - TNC(f), 10ft</p> <ul style="list-style-type: none"> <li>• 4G-CAB-LMR400-10</li> <li>• 37-100843-01</li> </ul> <p>— OR</p> <p>Qty 2X LMR-400-LLPL plenum / indoor only</p> <p>TNC(m)-R/A - TNC(f), 20ft</p> <ul style="list-style-type: none"> <li>• 4G-CAB-ULL-20</li> <li>• 37-1401-01</li> </ul> <p>— AND</p> <p>WiFi 2.4 GHz / 5GHz extension cables (4 ports, can mix and match lengths per installation requirements if needed)</p> <p>Qty 4x LMR-400-DB RPTNC(plug) - STR RPTNC(jack) - STR, 5ft</p> <ul style="list-style-type: none"> <li>• AIR-CAB005LL-R</li> <li>• 37-0766-01</li> </ul> <p>— OR</p> <p>Qty 4x LMR-400-DB RPTNC(plug)-R/A RPTNC(jack)-STR, 10ft</p> <ul style="list-style-type: none"> <li>• CAB-L400-10-R</li> <li>• 37-100844-01</li> </ul> <p>— AND</p> <p>GPS port - No extension cable required, 3-in-1 antenna comes with integrated active GPS antenna with 17ft cable.</p>	<p>Tercia 3 element 3-in-1 transportation antenna, black radome color, 2x 4G cellular, 1xGPS</p> <ul style="list-style-type: none"> <li>• ANT-3-4G2G1-O</li> <li>• 07-100263-01</li> </ul> <p>Has the following integrated cables:</p> <p>qty 2 x cellular, LMR-195, 2ft long, TNC(m)</p> <p>qty 1 x GPS, RG-174, 17ft long, SMA(m)</p> <p>— AND</p> <p>QTY 2 of 2-in-1 antennas</p> <p>WiFi 2-in-1 2 element 2 in 1 transportation antenna, black radome color, 2x dual band WiFi</p> <ul style="list-style-type: none"> <li>• ANT-2-WLAN-D-O</li> <li>• 07-100265-01</li> </ul> <p>Has the following integrated cables:</p> <p>qty 2 x WiFi, 3ft long, LMR-240 RPTNC (plug)</p> <p> <b>Note</b> A CUSTOM CEILING MOUNT BRACKET IS REQUIRED FOR THE 2-in-1 antenna if installed in a ceiling mount configuration (NOT SUPPLIED BY CISCO)</p>

## Power Supply

The Cisco IR829 comes with an external power connector.

- Direct-wire 12/24VDC vehicle charging system input (9 — 32VDC).
- 4-pin locking power connector.

## SFP Modules

The router Ethernet SFP modules provide connections to other devices. These field-replaceable transceiver modules provide the uplink interfaces. Local connectors (LCs) provide the fiber-optic connection. RJ-45 connectors allow copper connections. You can use any combination of the supported SFP modules listed in the table that follows.

**Table 1-8** Maximum Operating Temperature

Type of SFP Module	Model
Rugged and Industrial SFPs –40 to 185°F (–40 to 85°C)	GLC-SX-MM-RGD with digital optical monitoring (DOM) support GLC-LX-SM-RGD with digital optical monitoring (DOM) support GLC-ZX-SM-RGD with digital optical monitoring (DOM) support

For minimum software requirements, refer to the Release Notes for your platform.

For the most up-to-date list of supported SFP models for Cisco Industrial Ethernet switches, see [http://www.cisco.com/en/US/docs/interfaces\\_modules/transceiver\\_modules/compatibility/matrix/OL\\_6981.html#wp138176](http://www.cisco.com/en/US/docs/interfaces_modules/transceiver_modules/compatibility/matrix/OL_6981.html#wp138176)



## CHAPTER 2

# Installing the Router

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This chapter describes the equipment and the procedures for successfully installing the Cisco IR829 and contains the following sections:

- [Equipment, Tools, and Connections, page 2-2](#)
- [Installing the Router, page 2-3](#)



**Caution**

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Do not place anything on top of the router that weighs more than 10 pounds (4.5 kilograms), and do not stack routers on a desktop. Excessive weight on top of the router could damage the chassis.

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**Caution**

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Do not install the router or power supplies next to a heat source of any kind, including heating vents.

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**Warning**

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

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**Warning**

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

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**Warning**

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

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**Warning**

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

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**Warning**

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**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

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**Warning**

**This product is not intended to be directly connected to the Cable Distribution System. Additional regulatory compliance and legal requirements may apply for direct connection to the Cable Distribution System. This product may connect to the Cable Distribution System ONLY through a device that is approved for direct connection.** Statement 1078

## Equipment, Tools, and Connections

This section describes the equipment, tools, and connections necessary for installing your Cisco IR829. It contains the following topics:

- [Items Shipped with your Router, page 2-2](#)
- [Additional Items, page 2-2](#)
- [Ethernet Devices, page 2-3](#)

### Items Shipped with your Router

Unpack the box and verify that all items listed on the invoice were shipped with the Cisco IR829.

The following items are shipped with your router:

- Getting Started Guide Part Number 78-100611
- Power Cable components
- Grounding Lug
- Ethernet Cable Part Number 75-1501-01

### Additional Items

The following items are not shipped with the router but are required for installation:

- ESD-preventive cord and wrist strap.
- Screws for mounting the router on a wall.
- Two number-10 wood screws (round- or pan-head) with number-10 washers or two number-10 washer-head screws, for mounting on a wall stud. The screws must be long enough to penetrate at least 3/4 inch (20 mm) into the supporting wood or metal wall stud.
- Two number-10 wall anchors with washers, for mounting the router on a hollow wall.
- Wire crimper for chassis grounding.
- Wire for connecting the chassis to an earth ground.
- AWG 14 (2 mm2) or larger wire for NEC-compliant chassis grounding.
- AWG 18 (1 mm2) or larger wire for EN/IEC 60950-compliant chassis grounding.
- Ethernet cables for connecting to the Fast Ethernet (FE) WAN and LAN ports.
- Ratcheting torque flathead screwdriver that exerts up to 15 in-lb (1.69 N-m) of pressure.
- A number-2 Phillips screwdriver.



## Ethernet Devices

Identify the Ethernet devices that you will connect to the router: hub, servers, and workstations or PCs. Ensure that each device has a network interface card (NIC) for connecting to Ethernet ports.

If you plan to configure the software using Cisco IOS commands through the console port, provide an ASCII terminal or a PC that is running terminal emulation software to connect to the console port.

## Installing the Router

This section describes how to install the Cisco IR829. This router can be installed on a table top or other flat horizontal surface mounted on a wall or DIN rail.

The recommended clearance when horizontally mounted is 1.5 inches on both sides for floor mount bracket clearance and 2 inches on top. Top clearance is not required but stacking heat-dissipating objects on top of the router is not allowed. I/O side clearance is needed as it is required to access the cable connections. Clearance is not required on the backside (opposite side from I/O face) unless DIN rail mounting is required. Clearance is required to attach and mount the DIN rail bracket. The same clearances apply when mounted vertically.

This section also describes how to attach external antennas to the routers and contains the following topics:

- [Warnings, page 2-3](#)
- [Accessing the SIM Cards, page 2-3](#)
- [Installing Antennas, page 2-5](#)
- [Mounting on a Wall, Table, or Other Flat Surface, page 2-5](#)
- [Installing the Router Ground Connection, page 2-7](#)

## Warnings



**Warning**

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**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

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## Accessing the SIM Cards

This section describes how to install and/or replace a SIM card. Ensure that the router is not mounted to a wall, floor, or DIN rail.



**Caution**

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Do not touch any part of the exposed PCB circuit area when the SIM cover is removed.

---



**Warning**

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**The covers are an integral part of the safety design of the product. Do not operate the unit without the covers installed.** Statement 1077

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**Warning**

**Hot surface.** Statement 1079

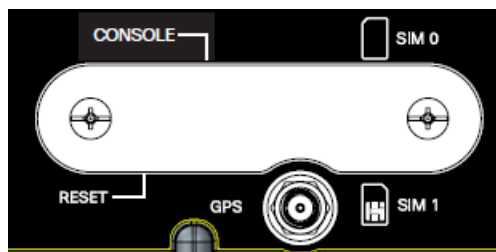
**Note**

High Temperature SIMs are required for 4G operations if the Ambient temperature is above 95F (35C)

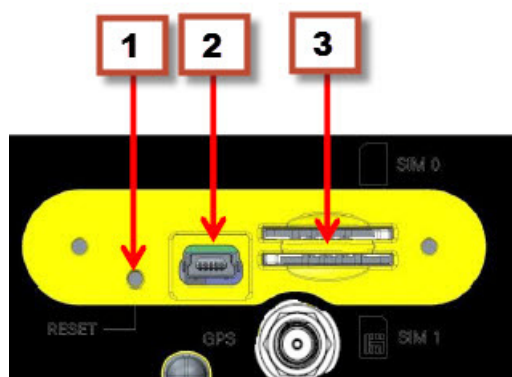
To access the SIM card in the Cisco IR829, follow these steps:

- Step 1** Place the router on its bottom and ensure that any installed antennas are carefully oriented.
- Step 2** Remove the SIM access panel using two Phillips head screws. (See [Figure 2-1](#).)
- Step 3** Locate the SIM card you wish to install/replace. Details are shown in [Figure 2-2](#).
- Step 4** Remove the SIM card (if present) and install the new card(s).

**Figure 2-1** Accessing the SIM Cards



**Figure 2-2** Sim Card Detail



1. Reset Switch
2. Mini USB Port
3. Dual Sim Slots

- Step 5** Replace the panel and the screws.

## Installing Antennas

**Note**

Before you install the Cisco IR829 Integrated Services Router on a table, wall, or DIN rail, install the antennas on the front panel. It is difficult to install the antennas after the router is installed.

There are four TNC connectors on the front side of the chassis. There are two TNC and one SMA connectors on the back side of the chassis. Two TNC connectors are used to connect to the 4G modem. The four TNC connectors at the back will be connected to the two 4G modems. The front two TNC connectors will be used for WiFi.

Orient the antennas. For optimum wireless performance, the antennas should be perpendicular with respect to the floor.

If the router is being mounted on a desk, orient the antennas straight up.

To attach the radio antennas to your wireless router, follow these steps:

- 
- Step 1** Manually screw the antenna tight to the TNC connectors on the back of the router.
- Step 2** Orient the antennas. For optimum wireless performance, antennas should be generally perpendicular to each other.
- 

## Mounting on a Wall, Table, or Other Flat Surface

The Cisco IR829 has mounting holes on the bottom of the chassis for mounting the unit on a wall or other vertical surface. The attachment hardware is provided.

**Tip**

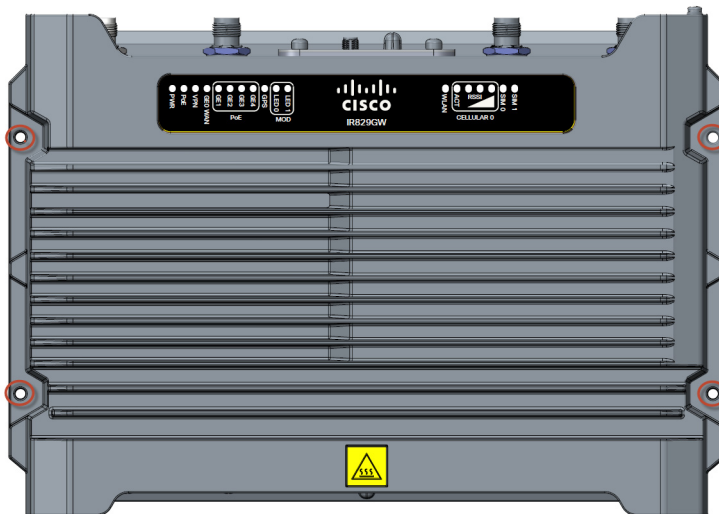
When choosing a location for wall-mounting the router, consider cable limitations and wall structure.

**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

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

- 
- Step 1** Locate the mounting holes on the router. There are 4 holes are shown circled in red in [Figure 2-3](#).

**Figure 2-3** Cisco IR829 Mounting Holes

- Step 2** Install the router to a wall stud using two number-10 wood screws, round- or pan-head, with number-10 washers or two number-10 washer-head screws. The screws must be long enough to penetrate at least 1.0 inch (25.4 mm) into the supporting wood or metal wall stud. (See [Figure 2-4](#).)

**Figure 2-4** Mounted to wall**Note**

For hollow-wall mounting, each bracket requires two wall anchors with washers. Wall anchors and washers must be size number 10.

**Step 3**

Route the cables so that they do not put a strain on the connectors or mounting hardware. Cables should be routed down relative to the router to prevent water from traveling on the cables.

## Installing the Router Ground Connection

The router must be connected to a reliable earth ground. Install the ground wire in accordance with local electrical safety standards.

- For NEC-compliant grounding, use size 14 AWG (2 mm<sup>2</sup>) or larger copper wire and a ring terminal with an inner diameter of 1/4 in. (5 to 7 mm).
- For EN/IEC 60950-compliant grounding, use size 18 AWG (1 mm<sup>2</sup>) or larger copper wire.



### 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



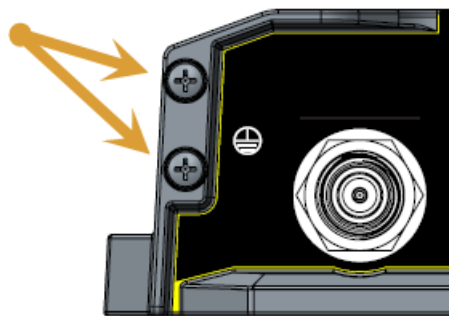
### Warning

**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

To install the ground connection, follow these steps:

- Step 1** Locate the grounding lug attached to the back of the Cisco IR829. It will be attached underneath two screws. Remove the screws holding it to the router and set it aside for reuse.
- Step 2** Strip one end of the ground wire to the length required for the terminal.
- Step 3** Crimp the ground wire to the grounding lug using the wire crimper.
- Step 4** Attach the grounding lug to the chassis using the screws set aside in step 1. Tighten the screw to a torque of 8 to 10 inch-pound (0.9 to 1.1 newton meter). (See [Figure 2-5](#).)

**Figure 2-5 Chassis Ground Connection Points**



- Step 5** Connect the other end of the ground wire to a known reliable earth ground point at your site.
- Step 6** If you are using this router in a vehicle, attach the ring terminal to the chassis using one of the screws provided and the green or green and yellow striped wire. Connect the other end of the wire to the vehicle ground.

After you install and properly ground the router, you can connect the power wiring, the LAN cables, and the cables for administrative access as required for your installation.





# CHAPTER 3

## Connecting the Router

---

This chapter describes how to connect Cisco IR829 Integrated Services Router (ISRs) to Ethernet devices and a network. The chapter contains the following sections:

- [Preparing to Connect the Router, page 3-1](#)
- [Connecting a PC, Server, or Workstation, page 3-2](#)
- [Connecting a Terminal or PC to the Console Port, page 3-3](#)
- [Connecting to DC Power, page 3-3](#)
- [Verifying Connections, page 3-6](#)



### Note

---

For compliance and safety information, see the Regulatory Compliance and Safety Information Roadmap that ships with the router and [Regulatory Compliance and Safety Information for Cisco 800 Series and SOHO Series Routers](#).

---

## Preparing to Connect the Router

Before you connect the router to the devices, install the router according to the instructions in [Chapter 2, “Installing the Router”](#).

## Preventing Damage to the Router

To prevent damage to your router, follow these guidelines when connecting devices to your router:

- Turn off power to the devices and to the router until all connections are completed.



### Caution

---

Do not turn on the devices until after you have completed all connections to the router.

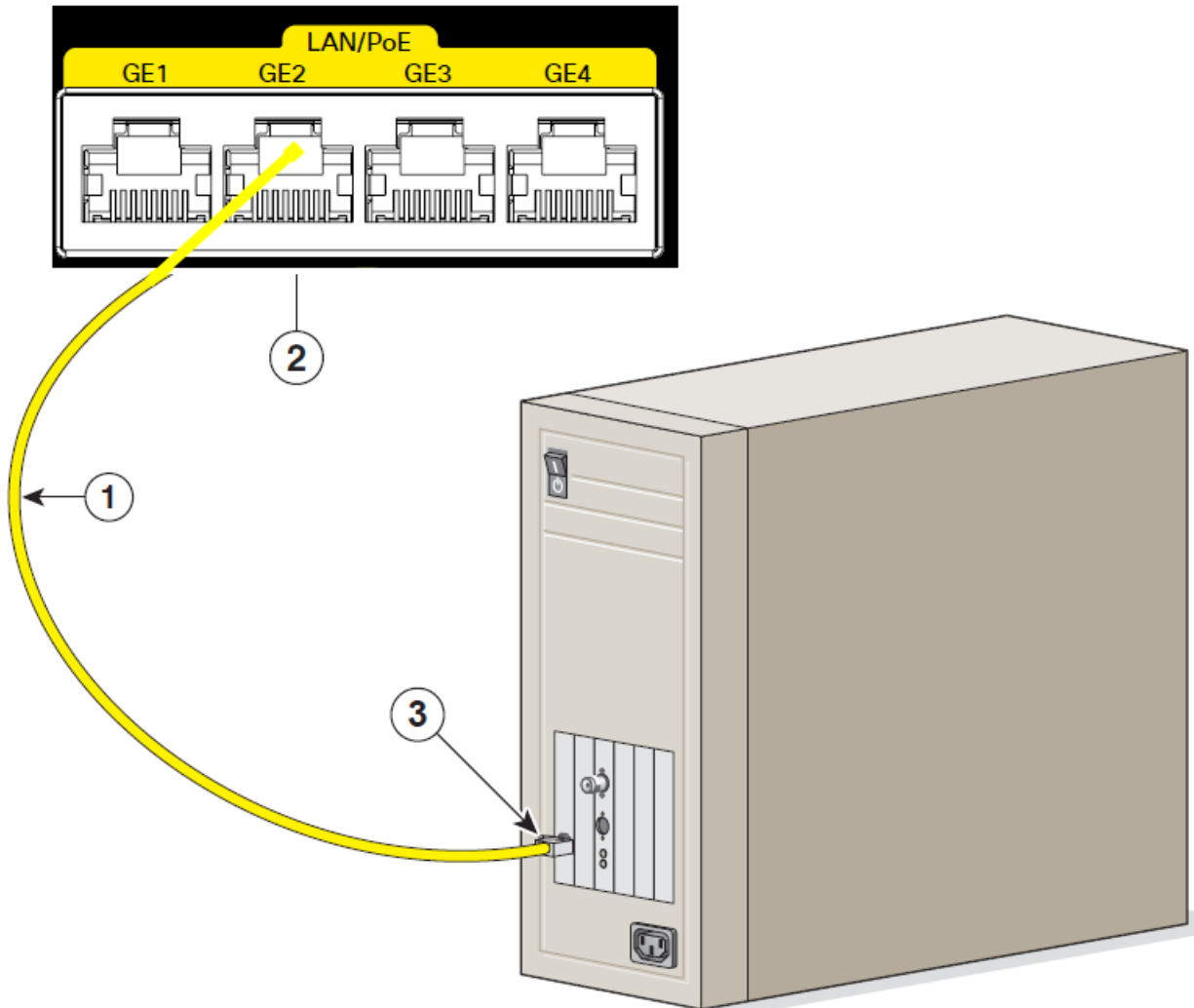
---

- If you must supply your own cable, see the [“Technical Specifications” section on page 6-1](#) for cabling specifications. If this appendix does not provide specifications for a particular cable, we strongly recommend ordering the cable from Cisco.

## Connecting a PC, Server, or Workstation

To connect a PC (or other Ethernet devices) to an Ethernet switch port on the router, follow these steps:

- Step 1** Connect one end of the Ethernet cable to an Ethernet switch port on the router. In this example a PC is being connected to GE LAN Port 2. See [Figure 3-1](#).



**Figure 3-1** Connecting a Server, PC, or Workstation

<b>1</b>	Ethernet cable	<b>3</b>	RJ-45 port on the PC, Server, or Workstation
<b>2</b>	Ethernet switch port on the router		

- Step 2** Connect the other end of the cable to the RJ-45 port on the network interface card (NIC) that is installed in the PC, server, or workstation.



- Step 3** (Optional) Connect additional servers, PCs, or workstations to the other Ethernet switch ports.
- 

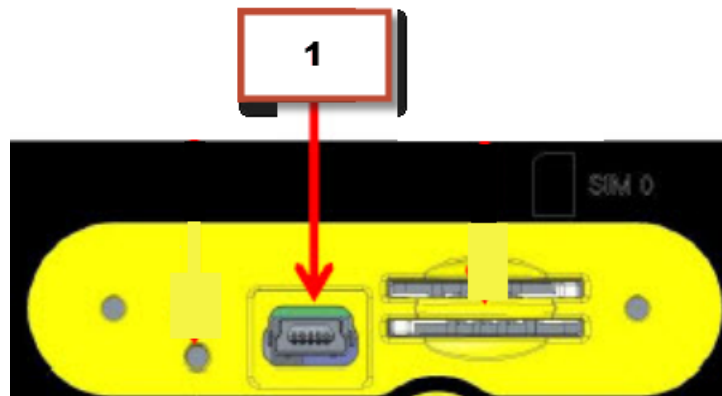
## Connecting a Terminal or PC to the Console Port

Connect a terminal or PC to the Console port either to configure the software by using the CLI or to troubleshoot problems with the router.

To connect a terminal or PC to the console port on the router and access the CLI, follow these steps:

---

- Step 1** Connect the mini-USB side of a cable to the USB Console port on the router. [Figure 3-2](#) shows the mini-USB location (1) for the Console port on the router.



**Figure 3-2** Connecting a Terminal or PC to the Console Port

- Step 2** Connect the opposite end of the mini-USB cable to the USB port on your laptop or PC.
- Step 3** To communicate with the router, wait for your laptop or PC to discover the new device.
- Step 4** If your laptop or PC warns you that you do not have the proper drivers to communicate with the router, you can obtain them from your computer's manufacturer, or go here: <https://www.silabs.com/products/mcu/Pages/USBtoUARTBridgeVCPDrivers.aspx>
- 

## Connecting to DC Power



**Warning**

This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than 36 VDC, 5A. Statement 1005

---



**Warning**

This product requires short-circuit (overcurrent) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations. Statement 1045

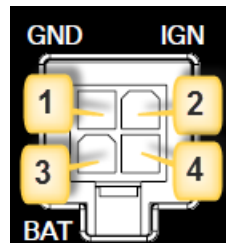
---

## Plugs and Pin-Outs

The IR829 ships with a DC power accessory kit that contains a 4-pin locking connector and pins to use for the power connections. Four contacts are supplied, but only three are used. One is a spare.

The power entry receptacle is on the IR829. The pin-outs are shown in [Figure 3](#).

**Figure 3** Power Connector Pin-outs



**Figure 4** Power connector Descriptions

Pin Number	Name	Description	Color
1	DC In -	DC Power Return (GND-)	Black
2	Ignition	Ignition Input (IGN)	Blue
3	DC In +	DC Power In (BAT+)	Red
4	N/A	N/A	N/A

## Constructing a Power cable

Special care should be taken when making the connections for DC power. It is easy to make a mistake when crimping connections, and there is a very good tutorial available at Molex:

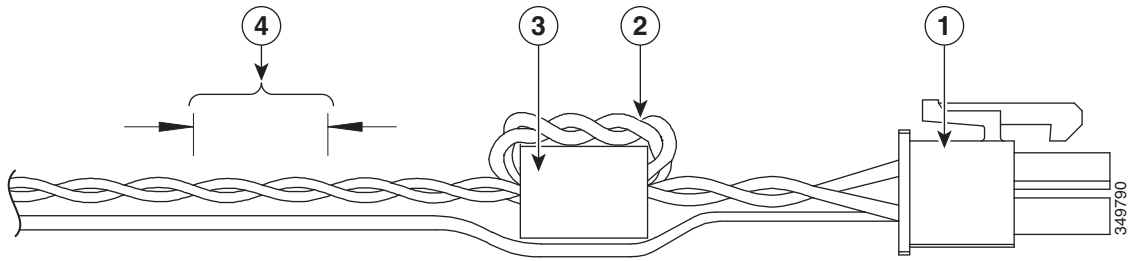
<http://www.molex.com/tnotes/crimp.html>

The specifications for the wiring are as follows:

- 16 AWG (1.02-to-1.29mm)
- UL1015 Rated
- Wires will be wound at 1 twist per inch

The example in [Figure 3-5](#) shows a cable constructed with a ferrite for a different certification. You can build your cable without the ferrite eliminating items 2 and 3 in the diagram.

Figure 3-5 Power cable




Details listed in the power cable example are:

1	4-pin locking connector	
2	2 loops of DC power and power return wires only. Other wires that may be used should run outside the Ferrite.	<b>Note</b> Ferrite bead and the loops of wire are not needed at this time.
3	Ferrite Bead	<b>Note</b> Ferrite bead and the loops of wire are not needed at this time.
4	Wires wound at 1 twist per inch	

## Wiring the DC Power

To connect the DC power on your Cisco IR829, follow these steps:

<b>Step 1</b>	Identify the DC power source and measure 4 strands of copper wire 16 AWG (1.29mm) long enough to connect to the DC power source.  <b>Note</b> The maximum length of the cable <b>before</b> twisting is 15 feet (4.6 meters).	
<b>Step 2</b>	Using an 16-gauge wire-stripping tool, strip each of the wires coming from each DC-input power source to 0.25 inch (6.3 mm) ± 0.02 inch (0.5 mm). Do not strip more than 0.27 inch (6.8 mm) of insulation from the wire. Stripping more than the recommended amount of wire can leave exposed wire from the power connector after installation.	333084

<b>Step 3</b>	Using the pins included in the kit, crimp each pin onto a wire.	
<b>Step 4</b>	Insert the pins into the power connector, referring to previous figures for guidance.	
<b>Step 5</b>	Plug the connector into the power entry receptacle.	

## Verifying Connections

To verify that all devices are properly connected to the router, first turn on all the connected devices, then check the LEDs. To verify router operation, refer to [Table 3-1](#).

For full LED description, see [Chapter 1, “LEDs”](#)

**Table 3-1** Verifying the Router Operation

Power and Link	LEDs to Check	Normal Patterns
PWR	Green steady On	Normal operation
	Green (blinking)	Boot up phase or in ROM Monitor mode
	Yellow	System shutdown due to under or over voltage conditions
GEO WAN	Steady On	Link is up
	Flashing	Transmitting and Receiving data
	Off	No network activity.
Ethernet LAN Switch Ports	Single LED per port	Off — No link
		Green Steady on — Link is up
		Green Blink — Transmitting and Receiving data
		Yellow — POE Fault, implies no link

**Table 3-1** Verifying the Router Operation (continued)

<b>Power and Link</b>	<b>LEDs to Check</b>	<b>Normal Patterns</b>
Sim cards	SIM0/SIM1	Off — No USIM Green — USIM installed and active
Cellular Modems	CELLULAR0/ CELLULAR1	Off — Module not powered on On — Module is powered on and connected but not transmitting or receiving Slow Blink — Module is powered on and searching for connection Fast Blink — Module is transmitting or receiving.



# CHAPTER 4

## Initial Configuration

---

This chapter provides instructions for initial configuration of the Cisco IR829 Integrated Services Routers (ISRs). To create the initial configuration, the setup command facility prompts you for basic information about your router and network.

This chapter contains the following sections:

- [Setup Command Facility, page 4-1](#)
- [Verifying the Initial Configuration, page 4-4](#)
- [Where To Go From Here, page 4-4](#)

## Setup Command Facility

The setup command facility guides you through the configuration process by prompting you for the specific information that is needed to configure your system. Use the setup command facility to configure a hostname for the router, to set passwords, and to configure an interface for communication with the management network.

To use the setup command facility, you must set up a console connection with the router and enter the privileged EXEC mode.

To configure the initial router settings by using the setup command facility, follow these steps:

---

**Step 1** Set up a console connection to your router, and enter privileged EXEC mode.

**Step 2** In privileged EXEC mode, at the prompt, enter **setup**.

```
yourname# setup
```

The following message is displayed:

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

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

You are now in the setup command facility.

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#). To proceed using the setup command facility, enter **yes**.

---

Would you like to enter the initial configuration dialog? **yes**

**Step 3** When the following messages appear, enter **yes** to enter basic management setup.

At any point you may enter a question mark '?' for help.  
Use ctrl-c to abort configuration dialog at any prompt.

Default settings are in square brackets '['].

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

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

**Step 4** Enter a hostname for the router (this example uses Router).

Configuring global parameters:  
Enter host name [Router]: **Router**

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

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

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

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

**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: **xxxxxxx**

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

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

A summary of the available interfaces is displayed. The following is an example summary and may not reflect your configuration:

Current interface summary

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

Interface	IP-Address	OK?	Method	Status	Protocol
GigabitEthernet0	20.1.0.165	YES	DHCP	up	up
GigabitEthernet1	unassigned	NO	unset	up	up

Async0	unassigned	YES	unset	up	down
Async1	unassigned	YES	unset	up	down
GigabitEthernet2	unassigned	NO	unset	up	up
Cellular0	unassigned	NO	unset	down	down
Cellular1	unassigned	NO	unset	down	down

**Step 9** Choose 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**

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

```
Configuring interface GigabitEthernet0:
  Configure IP on this interface? [yes]: yes

  Use the 100 Base-TX (RJ-45) connector? [yes]: yes
  Operate in full-duplex mode? [no]: yes
  Configure IP on this interface? [yes]: yes
    IP address for this interface: 172.1.2.3
    Subnet mask for this interface [255.255.0.0] : 255.255.0.0
    Class B network is 172.1.0.0, 26 subnet bits; mask is /16
```

The configuration is displayed:

The following configuration command script was created:

```
hostname Router
enable secret 5 $1$D5P6$PYx41/lQIASK.HcSbf05q1
enable password xxxxxx
line vty 0 4
password xxxxxx
snmp-server community public
!
no ip routing
!
interface GigabitEthernet0
no shutdown
speed 100
duplex auto
ip address 172.16.2.3 255.255.0.0
!
```

**Step 11** Respond to the following prompts. Enter **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.
Router>
```

**Step 12** Verify the initial configuration. See the [“Verifying the Initial Configuration”](#) section on page 4-4 for verification procedures.



After the initial configuration file is created, you can use the Cisco IOS CLI to perform additional configuration.

## Verifying the Initial Configuration

To verify that the new interfaces are operating correctly, perform the following tests:

- To verify that the interfaces and line protocol are in the correct state—up or down—enter the **show interfaces** command.
- To display a summary status of the interfaces configured for IP, enter the **show ip interface brief** command.
- To verify that you configured the correct hostname and password, enter the **show configuration** command.

After you complete and verify the initial configuration, you can configure your Cisco router for specific functions.

## Where To Go From Here

There are a wide variety of configuration options available on the Cisco IR829. The rest of this chapter will discuss different pieces of documentation to refer to, as well as point out the differences between this device and the rest of the 800 series routers.

## 800 Series Documentation

The home for all of the 800 series router documentation is here:

<http://www.cisco.com/c/en/us/support/routers/800-series-routers/tsd-products-support-series-home.html>

Most of the Cisco IR829 configuration tasks are available in the Cisco 800 Series Integrated Services Routers Software Configuration Guide:

<http://www.cisco.com/c/en/us/td/docs/routers/access/800/software/configuration/guide/SCG800Guide.htm>

Some common tasks between the Cisco 800 series and the Cisco IR829 are listed here:

Configuring Wireless Devices

[http://www.cisco.com/c/en/us/td/docs/routers/access/800/software/configuration/guide/SCG800Guide/SCG800\\_Guide\\_BookMap\\_chapter\\_01001.html](http://www.cisco.com/c/en/us/td/docs/routers/access/800/software/configuration/guide/SCG800Guide/SCG800_Guide_BookMap_chapter_01001.html)

Cisco 4G LTE Software Installation Guide

<http://www.cisco.com/c/en/us/td/docs/routers/access/interfaces/software/feature/guide/EHWIC-4G-LT-ESW.html>

# Cisco IR829 Differences

This section will discuss some of the ways that the Cisco IR829 differs from the rest of the 800 series.

## LEDs

The Cisco IR829 has LEDs that are discussed in previous chapters in this guide. There is also a command that will show you the status of the LEDs if you are not near the device. Use the `show platform led` command with options to view the different output.

```
IR800#show platform led

LED STATUS:
=====

GE PORTS :  GE0      GE1      GE2      GE3      GE4
LINK LED  :  GREEN    GREEN    GREEN    GREEN    OFF
=====
PoE LED   :  GREEN

Cellular PORTS: Cellular0
RSSI LED 1 : Green
RSSI LED 2 : Green
RSSI LED 3 : Off
GPS LED   : Slow Blinking
SIM0 LED  : Green
SIM1 LED  : Off
=====
VPN LED   : OFF

System LED: amber, blinking

IR800#show platform led summary
  Ports  LINK/ENABLE
-----+-----
GE0      GREEN
GE1      GREEN
GE2      GREEN
GE3      GREEN
GE4      OFF
-----+-----
PoE LED   : GREEN

          RSSI 1      RSSI 2      RSSI 3      GPS
-----+-----+-----+-----+-----
Ce0      Green      Green      Off      Slow Blink
-----+-----+-----+-----+-----

Cellular  SIM0      SIM1
-----+-----+-----
Ce0      Green      Off
-----+-----+-----
VPN LED   : OFF

System LED: amber, blinking
```



```
updating IOS image...
  Sending file modes: C0644 61505652 ir800-universalk9-mz.SSA.156-0.3.T

  IOS md5 verification passed!
Done!

IR800#
*Jun 25 18:51:16.975: %SYS-5-CONFIG_I: Configured from console by bundle install command
*Jun 25 18:51:16.975: %IR800_INSTALL-6-SUCCESS_BUNDLE_INSTALL: Successfully installed
bundle image.
```

**Step 3** Save the configuration and reload the router.

```
IR800#reload

Do you want to reload the internal AP ? [yes/no]: yes

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

[OK]
Proceed with reload? [confirm]press return

*Jun 25 19:03:13.685: %SYS-5-RELOAD: Reload requested by console. Reload Reason: Reload
Command.
```

**Step 4** Download the 4G firmware or AP image. Instructions for uploading firmware are located here:

<http://www.cisco.com/c/en/us/td/docs/routers/access/interfaces/software/feature/guide/EHWIC-4G-LT-ESW.html>

Search for “Upgrading the Modem Firmware”.

---





## CHAPTER 5

# Guest Operating System (Guest OS) Installation and Configuration

---

This chapter details Guest Operating System (Guest OS) installation for the Cisco IR829.

This chapter contains the following sections:

- [Guest Operating System Overview, page 5-1](#)
- [Prerequisites, page 5-2](#)
- [Guidelines and Limitations, page 5-2](#)
- [Installation and Upgrade, page 5-2](#)
- [Configuring Cisco IOS, page 5-3](#)
- [Configuring Guest OS, page 5-6](#)
- [Configuring NAT, page 5-8](#)
- [Troubleshooting, page 5-9](#)
- [Related Documentation, page 5-9](#)

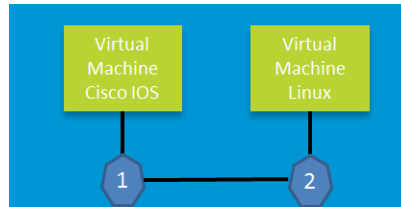
## Guest Operating System Overview

The IR829 supports a Hypervisor architecture to support multiple user-specified operating systems within independent Virtual Machines (VMs). Specific functions include Serial Relay and Network Address Translation (NAT).

Cisco IOS interacts closely with the platform and underlying Hypervisor. Cisco Guest OS allows you to run the Linux operating system (if within the memory, disk, and CPU budget) next to Cisco IOS on the Hypervisor. Cisco Guest OS does not require signing, allowing maximum deployment latitude; however you must ensure the integrity and proper behavior for any Guest OS that you install.

When you install the IR829 software bundle (image) on the router, the image automatically installs the supported Guest OS (Cisco IOS and Linux OS) instance(s). You can use the Linux Guest OS running on a VM on the IR829 to run utility applications.

The following example shows connectivity of Guest OS and Cisco IOS. A virtual interface (see [Configuring Guest OS Interface on Cisco IOS](#)) managed by Cisco IOS provides network connectivity to Guest OS. Cisco IOS forwards traffic from Guest OS through regular IP forwarding mechanisms.

**Figure 5-1** Connectivity Between Cisco IOS and Guest OS

In this example, number 1 is the interface being used on the router and number 2 is the interface on the Linux OS. For the Cisco IR829, 1 is Gigabit Ethernet 5 and 2 is Eth 0.

## Prerequisites

- Router must be running Cisco IOS.

## Guidelines and Limitations

- The bundled Guest OS is based on Linux kernel version 3.8.11.
- You must configure Cisco IOS to provide Guest OS Connectivity.

## Default Settings

The bundled Linux Guest OS:

- uses DHCP to acquire the IP address.
- does not have a default root password.

## Installation and Upgrade

By default, IR829s ship with a software bundle that includes the latest versions of all of the required images such as Cisco IOS, Guest OS, and Hypervisor.

Use the following procedure to upgrade your router to the latest software bundle. It can take several minutes for the router to upgrade and install all of the images (Hypervisor, Cisco IOS, and Guest OS).

### DETAILED STEPS

- 
- Step 1** Copy the bundle image to the IR829 IOS flash partition using scp or sftp.  
Example bundle name: **ir800-universalk9-bundle.SPA.<VERSION>**
- Step 2** Enter the following commands at the IR829 prompt:

Command	Purpose
<b>bundle install flash:</b> <i>&lt;bundle name&gt;.CG</i>	Installs the specified bundle.
<b>copy running config-config startup-config</b>	Saves the current running configuration.
<b>reload</b>	Reloads the router.

## Configuring Cisco IOS

This section describes how to configure the Cisco IOS VM to provide network connectivity to the Guest OS VM.

Guest OS connects to the network through a virtual Network Interface Card (VNIC) provided by the Hypervisor. Network attributes on the interface are statically configured or configured for DHCP to dynamically obtain IP addresses. Guest OS network connectivity is only through Cisco IOS, using the virtual network interface provided by the Hypervisor. Network attributes such as IP address, can be configured statically or dynamically, and are obtained from Cisco IOS using DHCP requests. The bundled Linux Guest OS is configured to use DHCP.

This section outlines the task to configure a Cisco IOS DHCP pool to provision the Linux Guest OS with an IP address, and an external Ethernet interface in Cisco IOS to allow the Guest OS network connectivity.

This section includes the following topics:

- [Configuring the IR829 Ethernet Interface, page 5-3](#)
- [Configuring Guest OS Interface on Cisco IOS, page 5-5](#)
- [Enabling Guest OS Console, page 5-6](#)

## Configuring the IR829 Ethernet Interface

You must enable one of the external Ethernet interfaces on the IR829 to provide network connectivity. For details on interface configuration refer to the Cisco 800 Series Integrated Services Routers Software Configuration Guide:

<http://www.cisco.com/c/en/us/td/docs/routers/access/800/software/configuration/guide/SCG800Guide.html>

## IPv6 Gigabit Ethernet

On Guest OS, IPv6 is enabled by default. The following example configuration uses IPv6 on Guest OS, where Guest OS is automatically assigned an IPv6 address by enabling prefix delegation on the Cisco IOS interface GigabitEthernet 5.

The following example configures G 0 for external connectivity:

```
interface GigabitEthernet 0
no switchport
  ipv6 address autoconfig default
  ipv6 enable
```



```

ipv6 dhcp client pd prefix-from-provider
end

```

The following example configures G5 to allow the Guest OS network connectivity:

```

interface GigabitEthernet 5
  duplex auto
  speed auto
  ipv6 address prefix-from-provider ::2:0:0:0:1/64
  ipv6 enable
end

```

## Enabling IPv4 Gigabit Ethernet

To enable an external Gigabit Ethernet IPv4 interface on the IR829 to provide network connectivity, enter the following commands:

Command	Purpose
<b>config terminal</b>	Enters global configuration mode.
<b>interface gig 0</b>	Configures an IPv4 address on Gigabit Ethernet interface 0, and enters interface configuration mode.
<b>ip address 9.1.1.5 255.255.255.0</b>	Sets the IP address and subnet mask for Gigabit Ethernet interface 0.
<b>no shutdown</b>	Enables the Gigabit Ethernet interface.

## Configuring DHCP Pool

To configure a local DHCP pool, enter the following commands, one per line:



### Note

The subnet used for the local DHCP pool must be reachable externally. If you cannot allocate the whole subnet to Guest OS, use a NAT-based configuration. See [Configuring NAT](#).

Command	Purpose
<b>config terminal</b>	Enters global configuration mode.
<b>ip dhcp pool gospool</b>	Names the local DHCP pool.
<b>network 9.1.2.0 255.255.255.0</b>	Sets the network address.
<b>default-router 9.1.2.1</b>	Sets the router address.
<b>domain-name utility.com</b>	Sets the subnet address.
<b>dns-server 9.1.1.1</b>	Sets the DNS server address.
<b>lease 5</b>	Sets the duration of the IP address lease to five days.

## Configuring Guest OS Interface on Cisco IOS

The Guest OS Ethernet port (eth0) connects to GigabitEthernet 5 on Cisco IOS. To configure the GigabitEthernet 5 interface with the default gateway address of the DHCP pool, enter the following commands:



**Note**

IPv6 must always be enabled on GigabitEthernet 5.

Command	Purpose
<b>interface GigabitEthernet 5</b>	Set the internal virtual interface that connects to the Linux Guest OS.
<b>ipv6 enable</b>	Enables IPv6.
<b>ipv6 address 2001:DB8:FFFF:0000:0000:0000:0001</b>	Sets the IPv6 address.
<b>ipv4 enable</b>	Enables IPv4.
<b>ipv4 address 9.1.2.1 255.255.255.0</b>	Sets the IPv4 address.
<b>no shutdown</b>	



**Note**

There exists a condition where the IR829 could display slow performance if the guest OS is consuming too many CPU resources.

By default, Guest OS gets 50% of one of the cores of the CPU. The following command allows you to change the percentage of CPU allocation to VDS out of 100. The rest will go to Guest OS. In the situation where you don't use the Guest OS, the CPU can be allocated 90% to VDS.

For Example:

```
IR800>en
IR800#conf t
Enter configuration commands, one per line. End with CNTL/Z.
IR800(config)#iox hypervisor ?
    sched-policy  percentage of CPU ticks to VDS

IR800(config)#iox hypervisor sched-policy ?
    10  VDS  10%  Guest OS 90%
    20  VDS  20%  Guest OS 80%
    30  VDS  30%  Guest OS 70%
    40  VDS  40%  Guest OS 60%
    50  VDS  50%  Guest OS 50%
    60  VDS  60%  Guest OS 40%
    70  VDS  70%  Guest OS 30%
    80  VDS  80%  Guest OS 20%
    90  VDS  90%  Guest OS 10%

IR800(config)#iox hypervisor sched-policy 90
```

## Enabling Guest OS Console

For heightened security, Guest OS console is disabled by default. To enable Guest OS console, enter the following commands:

Command	Purpose
<code>config terminal</code>	Enters global configuration mode.
<code>line 1/4</code>	Specifies line 1/4 for configuration and enters line configuration collection mode.
<code>transport input all</code>	Defines which protocols to use to connect to a specific line of the router.

## Configuring Guest OS

This section describes how to set the root password for Guest OS and enable SSH access. By default, SSH is disabled in Guest OS, this section describes the steps to reverse-Telnet into Guest OS, and enable SSH access.

### Starting Guest OS

By default, Guest OS starts after installation. To manually start the Guest OS, enter the following commands:

Command	Purpose
<code>show iox host list detail</code>	Displays OS: RUNNING if Guest OS is already running. If it is, go to <a href="#">Accessing Guest OS Console</a> .
<code>guest-os 1 start</code>	Starts Guest OS.

During start up, Guest OS sends a DHCP request and is assigned an IP address from the local DHCP pool. Guest OS is then configured with a hostname and sync time from IOS.



#### Note

It can take a few minutes for the Guest OS to start.

## Accessing Guest OS Console

The Guest OS console is accessible at port 2070 on any Cisco IOS interface. Use the following commands to access the Linux Guest OS console from Cisco IOS.



#### Note

You must first enable the Guest OS console as described in [Enabling Guest OS Console](#).

Command	Purpose
<b>telnet 9.1.2.1 2070</b>	Accesses the Guest OS console. This uses the IP address of the Gigabit Ethernet 5 port. The following is the example result:

**EXAMPLE**

```
Poky 9.0 (Yocto Project 1.4 Reference Distro) 1.4 qemu86 ttyS0
```

```
qemu86 login: root
root@qemu86:~#
```

## Setting the Root Password

Guest OS does not have a default root password. To set a root password, at the GOS prompt enter the following command.

**Note**

You must set a root password before turning on SSH access.

Command	Purpose
<b>[GOS] # passwd</b>	Runs the following UNIX password script. Enter your desired password at the prompt.

**EXAMPLE**

```
Changing password for user root.
New UNIX password:
Retype new UNIX password:
passwd: all authentication tokens updated successfully.
[GOS]#
```

An alternate method for changing the root password is shown in the following example:

```
IR800#iox host exec "resetpw cisco" IR800-GOS-1
Password reset successfully.
```

## Enabling Remote SSH Access

By default, SSH access is disabled to prevent unauthorized access to Guest OS. To enable SSH server on the guest OS:

- 
- Step 1** Launch the vi editor to edit the `sshd_config` file:
- ```
vi /etc/ssh/sshd_config
```
- Step 2** Set the **PermitRootLogin** and **PasswordAuthentication** parameters to **yes**.



**Note** Ensure that the **PermitEmptyPasswords** parameter is set to **no**.

```
PermitRootLogin yes
PasswordAuthentication yes
PermitEmptyPasswords no
```

**Step 3** Restart SSHD:

```
[GOS]# /etc/init.d/sshd stop
Stopping sshd: [ OK ]
[GOS]# /etc/init.d/sshd start
Starting sshd: [ OK ]
[GOS]#
```

**Step 4** From the IOS command line, enter the following:

```
IR800#iox host exec enablessh IR800-GOS-1
      ssh enabled successfully.
```

You now have remote SSH access to Guest OS.

## Configuring NAT

The following example configuration uses NAT for Guest OS network connectivity, where:

- 9.1.1.0 is the externally reachable subnet.
- 9.1.1.131 is the external IP address made available for Guest OS access.
- 192.168.1.0 is the private subnet created for Guest OS to Cisco IOS connectivity. This is not directly reachable outside the IR829.
- The IP address acquired by Guest OS through IOS local DHCP pool is 192.168.1.2. This address can be obtained using **show iox host list details** command from IOS.

```
ip dhcp pool gospool
  network 192.168.1.0 255.255.255.0
  default-router 192.168.1.1
  domain-name utility.com
  dns-server 9.1.1.1
  lease 5

interface gig 5
  ip nat inside
  ip address 192.168.1.1 255.255.255.0
  ipv6 enable
  no shutdown

interface gig 0
  ip nat outside
  ip address 9.1.1.5 255.255.255.0
  no shutdown

ip nat inside source static 192.168.1.2 9.1.1.131

! End of configuration

IR800#sh ip nat trans
```

```

Pro Inside global      Inside local          Outside local         Outside global
tcp 9.1.1.131:22       192.168.1.2:22       9.1.1.3:53649       9.1.1.3:53649
tcp 9.1.1.131:60100    192.168.1.2:60100    9.1.1.3:22          9.1.1.3:22
--- 9.1.1.131         192.168.1.2         ---                  ---

```

## Troubleshooting

To determine common causes of configuration failure, enter the following commands:

| Command                                                                                                                                                                                                                                                                                                                                                                                                                                         | Purpose                                                                                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| <b>ifconfig eth0</b>                                                                                                                                                                                                                                                                                                                                                                                                                            | Checks if Guest OS is assigned an IP address. The following is example output:         |
| <pre> eth0      Link encap:Ethernet  HWaddr 02:00:03:f1:cd:05           inet addr:9.1.2.2  Bcast:0.0.0.0  Mask:255.255.255.248           UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1           RX packets:2  errors:0  dropped:0  overruns:0  frame:0           TX packets:5  errors:0  dropped:0  overruns:0  carrier:0           collisions:0  txqueuelen:1000           RX bytes:684 (684.0 B)  TX bytes:894 (894.0 B)  [GOS]# </pre> |                                                                                        |
| <b>netstat -r</b>                                                                                                                                                                                                                                                                                                                                                                                                                               | Displays the Guest OS route table. The following is example output:                    |
| <pre> Kernel IP routing table Destination    Gateway      Genmask      Flags        MSS        Window     irtt        Iface default        9.1.2.1     0.0.0.0      UG           0          0          0           eth0 9.1.2.0        *           255.255.255.0  U           0          0          0           eth0  [GOS]# </pre>                                                                                                             |                                                                                        |
| <b>show ip arp</b>                                                                                                                                                                                                                                                                                                                                                                                                                              | Verifies that Cisco IOS learned Guest OS ARP mapping. The following is example output: |
| <pre> Protocol      Address      Age (min)    Hardware Addr    Type          Interface Internet      9.1.1.1     -            0022.bdef.c562   ARPA         GigabitEthernet0 Internet      9.1.2.1     -            0022.bdef.c569   ARPA         GigabitEthernet5 Internet      9.1.2.2     112         0022.bdef.c56d   ARPA         GigabitEthernet5  IR800# </pre>                                                                          |                                                                                        |

## Checking Connectivity

Use standard Linux tools (for example, ping and traceroute) to check Guest OS connectivity.

## Related Documentation

Find Cisco 1000 Series Connected Grid Routers product documentation at:

[www.cisco.com/go/cgr1000-docs](http://www.cisco.com/go/cgr1000-docs).

Find Connected Grid Modules for Cisco 1000 Series Connected Grid Routers documentation at:

[www.cisco.com/go/cg-modules](http://www.cisco.com/go/cg-modules)

For information on supporting systems referenced in this guide, see the following documentation on Cisco.com:

[Cisco ASR 1000 Series Aggregation Services Routers Configuration Guide](#)

[Cisco 3945 Series Integrated Services Router](#)

[Cisco 2000 Series Connected Grid Routers](#)

[Installation and Configuration Guide for Cisco Services Ready Engine Virtualization 1.1](#)

[Cisco IOS IP Application Services Command Reference](#)



# CHAPTER 6

## Technical Specifications

This appendix provides router, port, cabling specifications, and power adapters for the Cisco IR829 Integrated Services Router (ISRs).



### Note

For compliance and safety information, see the Regulatory Compliance and Safety Information Roadmap that was shipped with the router and [Regulatory Compliance and Safety Information for Cisco 800 Series and SOHO Series Routers](#).

## Router Specifications

[Table 6-1](#) lists the operational limits of the Cisco IR829. Operating the router outside of the limits specified is not supported.

**Table 6-1** Cisco IR829 Specifications

| Description                           | Design Specification                                                                                                    |
|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>Physical Characteristics</b>       |                                                                                                                         |
| Dimensions (H x W x D)                | (height x width x depth x) are 7.70 x 11 x 1.73 in. (19.6 x 27.9 x 4.39 cm).<br>5 lb (1.0 kg)                           |
| Weight                                |                                                                                                                         |
| Maximum Power Consumption             | 70 Watts with PoE                                                                                                       |
| <b>Environmental Operating Ranges</b> |                                                                                                                         |
| Operating Temperature and Altitude    | -40 to 140°F (-40 to 60°C). -500 to 5,000 feet. Derate max operating temperature 1.5°C per 1000 feet. 10,000 ft maximum |
| Humidity                              | 10% — 95% non-condensing                                                                                                |
| <b>Environmental Tests</b>            |                                                                                                                         |
| Ingress Protection Rating             | IP 40 per IEC 60529 for Vertical Falling Water, Pollution Degree 3                                                      |
| Humidity                              | Non-condensing Relative Humidity: 5% to 95%                                                                             |



Table 6-1 Cisco IR829 Specifications (continued)

| Description                              | Design Specification                                                                                                                                                                                                                                                                                                           |
|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Military Standard                        | MIL-STD-810G Method 514.6: Procedure 1 Category 4, Secured Cargo - Common<br>MIL-STD-810G Method 514.6: Procedure 1 Category 20, Ground Vehicles<br>MIL-STD-810G Method 516.6. Procedure 1, Functional Shock<br>MIL-STD-810G Method 516.6. Procedure 5, Crash Hazard<br>MIL-STD-810G Method 516.6. Procedure 6, Bench Handling |
| Vibration and Shock (Railway Vehicles)   | EN61373 Functional Random Vibe - Category 1, Class B<br>EN61373 Simulated Non-op Long-life Vibe - Category 1, Class B<br>EN61373 Non-op Shock, Class B                                                                                                                                                                         |
| Heavy-Duty Vehicle Applications          | SAE J1455 Operating Random Vibe, Cab Mounted Truck<br>SAE J1455 Operating Sinusoidal Vibe, Category 3<br>SAE J1455 Non-operating Sinusoidal Vibe, Category 3<br>SAE J1455 Handling Drop Test                                                                                                                                   |
| <b>Certifications</b>                    |                                                                                                                                                                                                                                                                                                                                |
| Standard Safety Certifications           | UL 60950-1, 2nd edition; CAN/CSA C22.2 No. 60950-1, 2nd edition, EN 60950-1, 2nd edition; CB to IEC 60950-1, 2nd edition with all group differences and national deviations                                                                                                                                                    |
| <b>Transportation/Storage Conditions</b> |                                                                                                                                                                                                                                                                                                                                |
| Temperature                              | -40 to 158°F (-40 to 85°C)                                                                                                                                                                                                                                                                                                     |
| Humidity                                 | 5–95%                                                                                                                                                                                                                                                                                                                          |
| Altitude                                 | 4570 m (15,000 ft)                                                                                                                                                                                                                                                                                                             |

# IMPORTANT! READ ALL THE SAFETY INFORMATION BEFORE INSTALLING THE HARDWARE

## Getting Started and Product Document of Compliance for the Cisco IR829 Integrated Services Router

- [Cisco Information](#), page 2
- [Introduction](#), page 2
- [Items Shipped with your Router](#), page 2
- [Equipment that you supply](#), page 2
- [Related Documentation](#), page 3
- [Installation Warning and Caution Statements](#), page 4
- [Grounding the Router](#), page 5
- [Connecting DC Power](#), page 6
- [Connecting to the Router Gateway Ports](#), page 8
- [Connecting to the USB Port](#), page 8
- [EMC Information](#), page 9



**Table 1** *Cisco Company Name and Address Details*

| <b>Company Name</b> | <b>Cisco Address</b>                                           |
|---------------------|----------------------------------------------------------------|
| Cisco Systems, Inc. | 170 West Tasman Drive, San Jose, CA 95134-1706, United States. |

## Introduction

The purpose of this document is to provide the installer the necessary information for installing the Cisco IR829 Integrated Services Router. The documentation is on-line, and subject to change. Make sure that you are downloading or viewing on-line the latest version before beginning an installation.

This document also contains Product Compliance and Safety information.

## Items Shipped with your Router

Unpack the box and verify that all items listed on the invoice were shipped with the Cisco IR829.

The following items are shipped with your router:

- This document Part Number 78-100611
- Power Cable components
- Grounding Lug
- Ethernet Cable Part Number 75-1501-01

## Equipment that you supply

- ESD-preventive cord and wrist strap.
- Wire-stripping tools for stripping 14- and 18-gauge wires
- Crimping tool
- Ratcheting torque screwdriver that exerts up to 15 in-lb (1.69 N-m) of pressure.

# Related Documentation

To access resources or to display the latest Cisco 800 Series Router documentation on-line, go to this URL: [www.cisco.com/go/800](http://www.cisco.com/go/800)

This portal has all of the information you need to get to know your router, install and configure it, as well as access software. Look at the right side of the page under **Support**. You will see the following categories as well as other important information:

- **All support information for Cisco 800 Series Routers:** Provides the most requested resources and a list of all of the models in the series.
- **Software Downloads, Release and General Information:** Links to the Software Download site, Compatibility Information, Licensing Information, and Product Release notes.
- **Install and Upgrade:** This is your starting point for Installing the Router. look under The Install and Upgrade Guide section for this model.
- **Configure:** These links provide configuration information. Look first under the Configuration Guide section for this model.

Other important and helpful links to Cisco information are here:

- Cisco.com: [www.cisco.com](http://www.cisco.com)
- Warranty Information: [www.cisco-warrantyfinder.com](http://www.cisco-warrantyfinder.com)
- Cisco Information Packet, consisting of Cisco Limited Warranty, Disclaimer of Warranty, End User License Agreement, and United States Federal Communications Commission Notice: [www.cisco.com/en/US/docs/general/warranty/English/SL3DEN\\_.html](http://www.cisco.com/en/US/docs/general/warranty/English/SL3DEN_.html)
- Cisco Marketplace: [www.cisco.com/cgi-bin/marketplace/welcome.pl](http://www.cisco.com/cgi-bin/marketplace/welcome.pl)
- Cisco Product Documentation: [www.cisco.com/go/techdocs](http://www.cisco.com/go/techdocs)
- Regulatory Compliance and Safety Information: <http://www.cisco.com/en/US/docs/routers/access/800/rcsi/800rcsi.html>
- Cisco Support: [www.cisco.com/cisco/web/support/index.html](http://www.cisco.com/cisco/web/support/index.html)

# Installation Warning and Caution Statements



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

---



Warning

---

In order to comply with FCC radio frequency (RF) exposure limits, antennas for this product should be located a minimum of 7.9 in. (20 cm) or more from the body of all persons. Statement 332

---



Warning

---

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

---



Warning

---

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

---



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

---



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

---

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

---



Warning

---

To prevent the system from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of:  
140°F (60°C) Statement 1047

---



Warning

---

Use twisted-pair supply wires suitable for 86°F (30°C) above surrounding ambient temperature outside the enclosure. Statement 1067

---



Warning

---

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

---

**Warning**

**Avoid using or servicing any equipment that has outdoor connections during an electrical storm. There may be a risk of electric shock from lightning.** Statement 1088

**Caution**

The equipment shall only be used in an area of not more than pollution degree 2, as defined in IEC 60664-1.  
The equipment shall be installed in a **certified ATEX** enclosure that provides a degree of protection not less than IP 54 in accordance with IEC 60079-15.

**Caution**

Airflow around the Router must be unrestricted. The dimensions (height x width x depth) are 7.70 x 11 x 1.73 in. (19.6 x 27.9 x 4.39 cm). To prevent the Router from overheating, there must be a minimum of 1.0 in. (25.4 mm) around all surfaces of the Router.

Contact your Cisco Technical Assistance Centre (TAC) if tighter spacings are required.

**Caution**

This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D, or only nonhazardous locations.

**Note**

This equipment is rated as follows:  
- DC Input Voltage: Maximum Operating Range: 9.6V to 32VDC; Nominal: 12/24 VDC

**Note**

This product is suitable for use in environmental air space in accordance with section 300.22.C of the National Electrical Code and sections 2-128, 12-010(3), and 12-100 of the Canadian Electrical Code, Part 1, C22.1. You should not install the power supply or power injector in air handling spaces.

**Note**

The maximum ambient operating temperature range is -40 to 140°F (-40 to 60°C).

## Grounding the Router

Make sure to follow any grounding requirements at your site.

**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 is intended to be grounded to comply with emission and immunity requirements. Ensure that the switch functional ground lug is connected to earth ground during normal use.** Statement 1064

**Caution**

To make sure that the equipment is reliably connected to earth ground, follow the grounding procedure instructions, and use 14-to-16 AWG wire.



**Caution**

Use at least a 4 mm<sup>2</sup> conductor to connect to the external grounding screw.

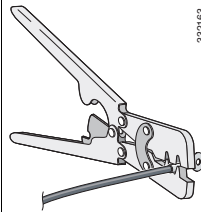
The ground lug is supplied with the device.

To ground the router to earth ground by using the ground screw, follow these steps:

**Step 1** Locate the ground lug in the packaging kit. Store the ground screw for later use.

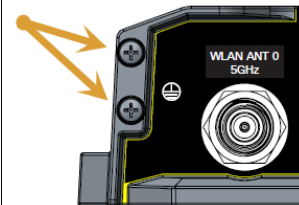
**Step 2** Use a wire stripping tool to strip the 14-16 AWG (2.08-1.31mm<sup>2</sup>) grounding wire to 0.22 in. (5.56 mm).

**Step 3** Insert the ground wire into the ring terminal lug, and using a crimping tool, crimp the terminal to the wire.



**Step 4** Slide the ground screw through the ground lug.

**Step 5** Insert the ground screw into one of the two screw positions shown in the graphic.



**Step 6** Use a ratcheting torque screwdriver to tighten the ground screw and ring terminal to the router side panel to 3.5 in-lb (0.4 N-m). The torque should not exceed 3.5 in-lb (0.4 N-m).

**Step 7** Attach the other end of the ground wire to a grounded bare metal surface, such as a ground bus, a grounded DIN rail, or a grounded bare rack.

## Connecting DC Power



**Warning**

**When you connect or disconnect the power and/or alarm connector with power applied, an electrical arc can occur. This could cause an explosion in hazardous area installations. Be sure that all power is removed from the switch and any other circuits. Be sure that power cannot be accidentally turned on or verify that the area is nonhazardous before proceeding.** Statement 1058



**Warning**

**Explosion Hazard—The area must be known to be nonhazardous before installing, servicing, or replacing the unit.** Statement 1082



**Explosion Hazard—Substitution of components may impair suitability for Class I, Division 2/Zone 2.**  
Statement 1083



**Connect the unit only to DC power source that complies with the safety extra-low voltage (SELV) requirements in IEC 60950 based safety standards.** Statement 1033

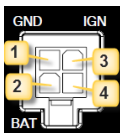
## Plugs and Pin-Outs

The following is a brief overview of connecting to DC power. Details can be found in the Cisco IR829 Integrated Services Router Hardware Installation Guide and should be understood before beginning. See [Related Documentation, page 3](#).

The IR829 ships with a DC power accessory kit that contains a 4-pin locking connector and pins to use for the power connections. Four contacts are supplied, but only three are used. One is a spare.

The power entry receptacle is on the IR829. The pin-outs are shown in [Figure 1](#). Descriptions are shown in [Figure 2](#).



**Figure 1** Power Connector Pin-outs



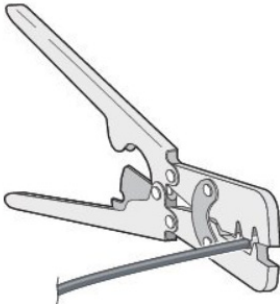
**Figure 2** Power connector Descriptions

| Pin Number | Name     | Description            | Color |
|------------|----------|------------------------|-------|
| 1          | DC In -  | DC Power Return (GND-) | Black |
| 2          | Ignition | Ignition Input (IGN)   | Blue  |
| 3          | DC In +  | DC Power In (BAT+)     | Red   |
| 4          | N/A      | N/A                    | N/A   |

To connect DC power:

|                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                        |                                                                                     |
|-----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <p><b>Step 1</b></p>  <p><b>Note</b></p> | <p>Identify the DC power source and measure 4 strands of copper wire 16 AWG (1.29mm) long enough to connect to the DC power source.</p> <p>The maximum length of the cable <b>before</b> twisting is 15 feet (4.6 meters).</p>                                                                                                                         |                                                                                     |
| <p><b>Step 2</b></p>                                                                                                        | <p>Using an 16-gauge wire-stripping tool, strip each of the wires coming from each DC-input power source to 0.25 inch (6.3 mm) ± 0.02 inch (0.5 mm). Do not strip more than 0.27 inch (6.8 mm) of insulation from the wire. Stripping more than the recommended amount of wire can leave exposed wire from the power connector after installation.</p> |  |



|               |                                                                                               |                                                                                  |
|---------------|-----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| <b>Step 3</b> | Using the pins included in the kit, crimp each pin onto a wire.                               |  |
| <b>Step 4</b> | Insert the pins into the power connector, referring to previous figures 1 and 2 for guidance. |                                                                                  |
| <b>Step 5</b> | Plug the connector into the power entry receptacle.                                           |                                                                                  |

## Connecting to the Router Gateway Ports

For hazardous location environments, follow these warnings when connecting to the destination ports (antenna, serial, Ethernet, and console ports).



### Warning

**If you connect or disconnect the console cable with power applied to the switch or any device on the network, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.**

Statement 1080



### Warning

**Do not connect or disconnect cables to the ports while power is applied to the switch or any device on the network because an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed from the switch and cannot be accidentally be turned on, or verify that the area is nonhazardous before proceeding.**

Statement 1070

## Connecting to the USB Port



### Note

If you are connecting to the USB port:

- a connection (to the USB port) can only be made in a non-hazardous environment
- the USB port cover must be reinstalled before the router can be deployed in a hazardous environment

# Hazardous Locations Standards and Marking Strings

---

The following standards were used for the hazardous locations approvals and certifications:

---

ANSI/ASA 12.12.01-2013

---

CAN/CSA C22.2 No. 60079-0-11 Ed. 2

---

CAN/CSA C22.2 No. 60079-15-12 Ed. 1

---

CSA C22.2 No. 213-M1987+A11:2013

---

EN 60079-0:2012

---

EN 60079-15:2010

---

IEC 60079-0 6th Edition

---

IEC 60079-15 4th Edition

---

UL 60079-0, 5th Ed, 2009-10-21

---

UL 60079-15, 3rd Ed, 2009-7-17

---

---

The following hazardous locations strings are provided on the router:

---

Class 1, Div 2, Groups A B C D

---

Class I, Zone 2, AEx nA IIC T4 Gc

---



II 3G, Ex nA IIC T4 Gc

---

DEMKO 15ATEX 1491X

---

Class 1, Zone 2, AEx nA IIC T4 Gc

---

## EMC Information

For EMC and safety information, see the Regulatory Compliance and Safety Information at this URL: [www.cisco.com/go/800](http://www.cisco.com/go/800)

## Class A Notice for FCC

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

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

This device operates in the : 5150-5250, 5250-5350, 5470-5725, and 5725-5850 MHz bands and may be operated indoor or outdoors per FCC guidance.

This equipment has been tested and found to comply with the limits of a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and radiates radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference. However, there is no guarantee that interference will not occur. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician.



**Caution**

---

The Part 15 radio device operates on a non-interference basis with other devices operating at this frequency when using the integrated antennas. Any changes or modification to the product not expressly approved by Cisco could void the user's authority to operate this device.

---



**Caution**

---

Within the 5.15 to 5.25 GHz and 5.47-5.725 GHz bands, this device is restricted to indoor operations to reduce any potential for harmful interference to co-channel Mobile Satellite System (MSS) operations.

---

## Industry Canada

### Canadian Compliance Statement

Cisco® 829 Industrial Integrated Services Router Model  
IR829GW-LTE

Cisco® 829 Industrial Integrated Services Router PIDS

- IR829GW-LTE-VZ-AK9
- IR829GW-LTE-NA-AK9
- IR829GW-LTE-ST-AK9

Industry Canada Certification Number

- 2461B-IR829GW-LTE

This Class A Digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulations.

This device complies with Class A Limits of Industry Canada. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

Cisco® 829 Industrial Integrated Services Routers are certified to the requirements of RSS-210. The use of this device in a system operating either partially or completely outdoors may require the user to obtain a license for the system according to the Canadian regulations. For further information, contact your local Industry Canada office.

This device has been designed to operate with antennas having a maximum gain of 6 dBi. Antennas having a gain greater than 6 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotopically radiated power (EIRP) is not more than that permitted for successful communication.

Operation in the band 5150-5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems.

Users are advised that high-power radars are allocated as primary users (i.e. priority users) of the bands 5250-5350 MHz and 5650-5850 MHz and that these radars could cause interference and/or damage to LE-LAN devices.

## European Community, Switzerland, Norway, Iceland, and Liechtenstein

Cisco® 829 Industrial Integrated Services Router PIDS

- IR829GW-LTE-VZ-AK9
- IR829GW-LTE-NA-AK9
- IR829GW-LTE-ST-AK9

### Declaration of Conformity with regard to the R&TTE Directive 1999/5/EC & Medical Directive 93/42/EEC

The following standards were applied:

- EMC-EN 301.489-1 v1.9.2; EN 301.489-17 v2.2.1
- Health & Safety-EN60950-1: 2005; EN 50385: 2002
- Radio-EN 300 328 v 1.9.1; EN 301.893 v 1.7.1, EN62311

The conformity assessment procedure referred to in Article 10.4 and Annex III of Directive 1999/5/EC has been followed.

This device also conforms to the EMC requirements of the Medical Devices Directive 93/42/EEC.



**Note**

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This equipment is intended to be used in all EU and EFTA countries. Outdoor use may be restricted to certain frequencies and/or may require a license for operation. For more details, contact Cisco Corporate Compliance.

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The product carries the CE Mark:



## Declaration of Conformity for RF Exposure

This section contains information on compliance with guidelines related to RF exposure.

### Generic Discussion on RF Exposure

The Cisco products are designed to comply with the following national and international standards on Human Exposure to Radio Frequencies:

- US 47 Code of Federal Regulations Part 2 Subpart J
- American National Standards Institute (ANSI) / Institute of Electrical and Electronic Engineers / IEEE C 95.1 (99)

- International Commission on Non Ionizing Radiation Protection (ICNIRP) 98
- Ministry of Health (Canada) Safety Code 6. Limits on Human Exposure to Radio Frequency Fields in the range from 3kHz to 300 GHz
- Australia Radiation Protection Standard

To ensure compliance with various national and international Electromagnetic Field (EMF) standards, the system should only be operated with Cisco approved antennas and accessories.

## This Device Meets International Guidelines for Exposure to Radio Waves

The IR829 series device includes a radio transmitter and receiver. It is designed not to exceed the limits for exposure to radio waves (radio frequency electromagnetic fields) recommended by international guidelines. The guidelines were developed by an independent scientific organization (ICNIRP) and include a substantial safety margin designed to ensure the safety of all persons, regardless of age and health.

As such the systems are designed to be operated as to avoid contact with the antennas by the end user. It is recommended to set the system in a location where the antennas can remain at least a minimum distance as specified from the user in accordance to the regulatory guidelines which are designed to reduce the overall exposure of the user or operator.

| Separation Distance     |                     |                         |
|-------------------------|---------------------|-------------------------|
| MPE                     | Distance            | Limit                   |
| 0.63 mW/cm <sup>2</sup> | 20 cm (7.87 inches) | 1.00 mW/cm <sup>2</sup> |

The World Health Organization has stated that present scientific information does not indicate the need for any special precautions for the use of wireless devices. They recommend that if you are interested in further reducing your exposure then you can easily do so by reorienting antennas away from the user or placing the antennas at a greater separation distance then recommended.

## This Device Meets FCC Guidelines for Exposure to Radio Waves

The IR829 series device includes a radio transmitter and receiver. It is designed not to exceed the limits for exposure to radio waves (radio frequency electromagnetic fields) as referenced in FCC Part 1.1310. The guidelines are based on IEEE ANSI C 95.1 (92) and include a substantial safety margin designed to ensure the safety of all persons, regardless of age and health.

As such the systems are designed to be operated as to avoid contact with the antennas by the end user. It is recommended to set the system in a location where the antennas can remain at least a minimum distance as specified from the user in accordance to the regulatory guidelines which are designed to reduce the overall exposure of the user or operator.

The device has been tested and found compliant with the applicable regulations as part of the radio certification process.

| Separation Distance     |                     |                         |
|-------------------------|---------------------|-------------------------|
| MPE                     | Distance            | Limit                   |
| 0.63 mW/cm <sup>2</sup> | 20 cm (7.87 inches) | 1.00 mW/cm <sup>2</sup> |

The US Food and Drug Administration has stated that present scientific information does not indicate the need for any special precautions for the use of wireless devices. The FCC recommends that if you are interested in further reducing your exposure then you can easily do so by reorienting antennas away from the user or placing the antennas at a greater separation distance then recommended or lowering the transmitter power output.

## This Device Meets the Industry Canada Guidelines for Exposure to Radio Waves

The IR829 series device includes a radio transmitter and receiver. It is designed not to exceed the limits for exposure to radio waves (radio frequency electromagnetic fields) as referenced in Health Canada Safety Code 6. The guidelines include a substantial safety margin designed into the limit to ensure the safety of all persons, regardless of age and health.

As such the systems are designed to be operated as to avoid contact with the antennas by the end user. It is recommended to set the system in a location where the antennas can remain at least a minimum distance as specified from the user in accordance to the regulatory guidelines which are designed to reduce the overall exposure of the user or operator.

| Separation Distance     |                     |                         |
|-------------------------|---------------------|-------------------------|
| MPE                     | Distance            | Limit                   |
| 0.63 mW/cm <sup>2</sup> | 20 cm (7.87 inches) | 1.00 mW/cm <sup>2</sup> |

Health Canada states that present scientific information does not indicate the need for any special precautions for the use of wireless devices. They recommend that if you are interested in further reducing your exposure you can easily do so by reorienting antennas away from the user, placing the antennas at a greater separation distance than recommended, or lowering the transmitter power output.

## Additional Information on RF Exposure

You can find additional information on the subject at the following links:

- Cisco Systems Spread Spectrum Radios and RF Safety white paper at this URL: [http://www.cisco.com/warp/public/cc/pd/witc/ao340ap/prodlit/rfhr\\_wi.htm](http://www.cisco.com/warp/public/cc/pd/witc/ao340ap/prodlit/rfhr_wi.htm)
- FCC Bulletin 56: Questions and Answers about Biological Effects and Potential Hazards of Radio Frequency Electromagnetic Fields
- FCC Bulletin 65: Evaluating Compliance with the FCC guidelines for Human Exposure to Radio Frequency Electromagnetic Fields
- FCC Bulletin 65C (01-01): Evaluating Compliance with the FCC guidelines for Human Exposure to Radio Frequency Electromagnetic Fields: Additional Information for Evaluating Compliance for Mobile and Portable Devices with FCC limits for Human Exposure to Radio Frequency Emission

You can obtain additional information from the following organizations:

- World Health Organization Internal Commission on Non-Ionizing Radiation Protection at this URL: [www.who.int/emf](http://www.who.int/emf)
- United Kingdom, National Radiological Protection Board at this URL: [www.nrpb.org.uk](http://www.nrpb.org.uk)
- Cellular Telecommunications Association at this URL: [www.wow-com.com](http://www.wow-com.com)
- The Mobile Manufacturers Forum at this URL: [www.mmfa.org](http://www.mmfa.org)

## EMC Class A Notices and Warnings

### Statement 340—Class A Warning for CISPR22

**Warnung** Dies ist ein Produkt der Klasse A. Bei der Verwendung dieses Produkts im Haus- oder Wohnungsbereich kann es zu Funkstörungen kommen. In diesem Fall muss der Benutzer u. U. angemessene Maßnahmen ergreifen.

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