

Cisco High-Speed WAN Interface Cards: Third-Generation Wireless WAN Cards for Cisco Integrated Services Routers

Product Overview

Q. What are the Cisco® Third-Generation (3G) Wireless WAN (WWAN) High-Speed WAN Interface Cards (HWICs)?

- A.** The Cisco 3G WWAN HWICs are the first enterprise-class 3G WWAN solution. Suitable for both backup and primary applications, these HWICs support the latest 3G standards (High-Speed Packet Access [HSPA] and EVDO Rev A) and are backward-compatible with Universal Mobile Telecommunications Service (UMTS), Enhanced Data Rates for Global Evolution (EDGE), General Packet Radio Service (GPRS), and EVDO Rev0/1xRTT. The Cisco 3G WWAN HWICs have two variants:
- Global System for Mobile Communications (GSM) and UMTS models are based on the Third-Generation Partnership Project (3GPP) and support HSPA (High-Speed Downlink Packet Access [HSDPA] and High-Speed Uplink Packet Access [HSUPA]), UMTS, EDGE, and GPRS.
 - Code Division Multiple Access (CDMA) models are based on 3G Partnership Project 2 (3GPP2) and support EVDO RevA/Rev0 and 1xRTT.

The Cisco 3G WWAN HWICs are tightly integrated with the services provided on the award-winning Cisco integrated services routers, which deliver secure data, voice, video, and mobility services. These HWICs are supported on the modular Cisco Integrated Services Routers—Cisco 1841 and 1861, Cisco 1900, Cisco 2800, Cisco 2900, Cisco 3800 and 3900 Series.

Q. What are the available models of the new Cisco 3G WWAN HWICs?

- A.** Table 1 lists the Cisco 3G WWAN HWICs supported on Cisco integrated services routers.

Table 1. Cisco 3G WWAN HWICs Supported on Cisco Integrated Services Routers

Part Number	Description
HWIC-3G-GSM	3G wireless WAN HWIC supporting GPRS, EDGE, UMTS, and HSDPA (global part number)
HWIC-3G-HSPA*	3G wireless WAN HWIC supporting GPRS, EDGE, UMTS, and HSPA (global part number)
HWIC-3G-CDMA-V	3G wireless WAN HWIC supporting 1xRTT and EVDO Rev A/Rel 0 (Verizon part number)
HWIC-3G-CDMA-S	3G wireless WAN HWIC supporting 1xRTT and EVDO Rev A/Rel 0 (Sprint part number)
HWIC-3G-CDMA-G	3G wireless WAN HWIC supporting 1xRTT and EVDO Rev A/Rel 0 (Generic part number)

Note: The HSPA HWIC (HWIC-3G-HSPA) is not supported on the AT&T network, but a separate product (HWIC-3G-HSPA-A) will be available at a later date for the AT&T network.

In addition to the Cisco 3G WWAN HWICs, Cisco provides a range of antenna solutions to accommodate a variety of installation environments. Table 2 lists the antenna options available.

Table 2. Antenna Options

Part Number	Description
3G-ANTM1919D	Multi-Band Swivel Mount Dipole Antenna, Faceplate Mount
3G-ANTM1916-CM	Multi-Band Omnidirectional Antenna, Ceiling Mount
3G-AE010-R	Single Unit Antenna Extension Base (10-ft (4.57) cable included)
3G-AE015-R	Single Unit Antenna Extension Base (15-ft (3.04m) cable included)
3G-ACC-OUT-LA	3G Outdoor Antenna Lightning Arrestor
3G-ANT-OUT-LP	Multi-Band Outdoor Low Profile Antenna with 15ft cable
3G-ANT-OUT-COMBO	Multi-Band Outdoor Omnidirectional Antenna Mast/Wall Mount plus 3G Outdoor Antenna Lightning Arrestor ("3G-ACC-OUT-LA")
3G-CAB-LMR240-25	25-ft(7.62 m) Low Loss LMR 240 Cable with TNC Connector
3G-CAB-LMR240-50	50-ft(15.24 m) Low Loss LMR 240 Cable with TNC Connector
3G-CAB-LMR240-75	75-ft(22.86 m) Low Loss LMR 240 Cable with TNC Connector
3G-CAB-ULL-50	50-ft (15.24 m) Ultra Low Loss LMR 400 Cable with TNC Connector
3G-CAB-ULL-20	20-ft (6.09 m) Ultra Low Loss LMR 400 Cable with TNC Connector

Q. Is the antenna included with the Cisco 3G WWAN HWICs, or do I need to place a separate order?

- A.** For all the Cisco 3G WWAN HWIC part numbers and spares, one multiband swivel mount dipole antenna (3G-ANTM1919D) is included with each 3G HWIC.

For the HSPA HWIC (HWIC-3G-HSPA), a 10-foot cable with antenna extension base (3G-AE010-R) and one multiband swivel mount dipole antenna (3G-ANTM1919D) will also be shipped.

Q. What wireless standards do the Cisco 3G WWAN HWICs support, and what are their relative performances?

- A.** The 3G WWAN HWICs support the following 3G and second-generation (2G) wireless technologies (Note that performance numbers listed are theoretical limits and may not be seen in production networks; contact your preferred wireless carrier for expected performance rates.):

- CDMA HWICs (HWIC-3G-CDMA-x):
 - CDMA 1xEV-DO Rev A1 (downlink up to 3.1 Mbps; uplink up to 1.8 Mbps)
 - CDMA 1xEV-DO Rel 0 (downlink up to 2.4 Mbps; uplink up to 153.6 kbps)
 - CDMA 1xRTT (downlink up to 153.6 kbps; uplink up to 153.6 kbps)
- GSM HWICs (HWIC-3G-GSM):
 - HSDPA: 850, 1900, and 2100 MHz (downlink up to 3.6 Mbps; uplink up to 384 kbps)
 - UMTS: 850, 1900, and 2100 MHz (downlink up to 2.0 Mbps; uplink up to 384 kbps)
 - EDGE: 850, 900, 1800, and 1900 MHz (downlink up to 236 kbps; uplink up to 124 kbps)
 - GPRS: 850, 900, 1800, and 1900 MHz (downlink up to 80 kbps; uplink up to 42 kbps)
- HSPA HWICs (HWIC-3G-HSPA)*:
 - HSPA: 850, 1900, and 2100 MHz (downlink up to 7.2 Mbps; uplink up to 5.0 Mbps)
 - UMTS: 850, 1900, and 2100 MHz (downlink up to 2.0 Mbps; uplink up to 384 kbps)
 - EDGE: 850, 900, 1800, and 1900 MHz (downlink up to 236 kbps; uplink up to 124 kbps)
 - GPRS: 850, 900, 1800, and 1900 MHz (downlink up to 80 kbps; uplink up to 42 kbps)

Note: The HSPA HWIC (HWIC-3G-HSPA) is not supported on the AT&T network, but a separate product (HWIC-3G-HSPA-A) will be available at a later date for the AT&T network.

Q. What Cisco IOS® Software release and feature set are required to support the Cisco 3G WWAN HWICs?

A. Modular Cisco 1841, 1861, 2800 and 3800 series Integrated Services Routers supported with the following Cisco IOS Releases in the Cisco IOS IP Base image or above

- HWIC-3G-HSPA supported with 12.4(24)T or later
- HWIC-3G-GSM supported with 12.4(15)T1 or later
- HWIC-3G-CDMA-S supported with 12.4(15)T1 or later
- HWIC-3G-CDMA-V supported with 12.4(15)T8 or later
- HWIC-3G-CDMA= (spare only) supported with 12.4(15)T1 or later

With Cisco IOS Release 15.0(1)M or later, All below 3G modules will be supported on Cisco 1900, 2900, and 3900 series Integrated Services Routers with the Cisco IOS IP Base license:

- HWIC-3G-HSPA
- HWIC-3G-GSM
- HWIC-3G-CDMA-S
- HWIC-3G-CDMA-V
- HWIC-3G-CDMA= (spare only)

Q. What is the difference between the HWICs with part numbers HWIC-3G-CDMA-S and HWIC-3G-CDMA-V?

A. Essentially, these part numbers are carrier-specific part numbers for Sprint (HWIC-3G-CDMA-S) and Verizon (HWIC-3G-CDMA-V). Their hardware is the same. The differences are in the following:

- Modem firmware
- Modem Preferred Roaming List (PRL)
- HWIC cookie, which controls over-the-air (OTA) provisioning and activation

The modem activation processes supported on these two carrier-specific HWICs are different. The Verizon HWIC (HWIC-3G-CDMA-V) supports automatic activation based on OTA service provisioning (OTASP), whereas the Sprint HWIC (HWIC-3G-CDMA-S) supports a manual modem activation process. For more information about the modem activation and provisioning process, visit http://www.cisco.com/en/US/products/ps6441/products_feature_guide09186a00807ec85b.html#wp1147979.

Q. For GSM carriers, are you planning to release separate part numbers for every operator?

A. No. A single GSM part number for each technology (HWIC-3G-GSM and HWIC-3G-HSPA*) supports all GSM carriers. Some carriers may require unique modem settings or modem firmware, but most of the carrier and account information resides in the subscriber identity module (SIM).

Note: The HSPA HWIC (HWIC-3G-HSPA) is not supported on the AT&T network, but a separate product (HWIC-3G-HSPA-A) will be available at a later date for the AT&T network.

Q. Can I use multiple Cisco 3G WWAN HWICs in a single router?

A. Yes, you can use multiple 3G WWAN HWICs in a single router for both backup and bandwidth aggregation. Please note that if all the 3G HWICs are on the same wireless carrier network, the combined throughput is not equal to the sum of their individual throughputs. To improve the total throughput, you should deploy the 3G HWICs on different carrier networks.

Q. I noticed that the CDMA version of the card has two antenna connectors and the GSM version has one antenna connector. Why?

A. On the CDMA version, the two antenna connectors provide diversity, allowing for stronger signal reception in areas where a signal might be poor or otherwise degraded. As a parallel example, most wireless LAN cards use diversity antennas to offer the PC client the strongest possible signal. Diversity also allows you to orient one antenna at one angle or direction and the other at another angle or direction to help improve signal reception.

Cisco testing did not show that diversity provided significant benefit for the GSM environment, so diversity is not supported on the GSM module.

Q. Are different firmware versions available for the Cisco 3G WWAN HWICs?

A. Yes. Different firmware versions may be introduced to address feature enhancements or carrier-specific functions. Current firmware versions and supported carriers are listed at

http://www.cisco.com/en/US/products/hw/routers/networking_solutions_products_generic_content0900aecd80601f7e.html.

Q. Is the firmware bundled with the Cisco IOS Software image?

A. The firmware comes preloaded with the Cisco 3G WWAN HWIC; it is not bundled with the Cisco IOS Software image. When a new firmware version is released, it is made available at

<http://tools.cisco.com/support/downloads/go/Redirect.x?mdfid=278875243>. To upgrade the firmware of your modem, download the correct firmware and copy it to the router flash memory. Then use the Cisco IOS Software command-line interface (CLI) to complete the upgrade process. Refer to the Cisco IOS Software feature guide for the firmware upgrade command, which is available at:

- For CDMA:

http://www.cisco.com/en/US/products/ps6441/products_feature_guide09186a00807ec85b.html#wp1161402

- For GSM:

http://www.cisco.com/en/US/products/ps6441/products_feature_guide09186a0080802d77.html#wp1202540

Q. Do the Cisco 3G GSM/HSPA HWICs ship preloaded with SIM cards?

A. No. You must obtain the SIM cards from a supported wireless carrier and you must be associated with an appropriate rate plan. A complete list of carriers is available at

http://www.cisco.com/en/US/products/hw/routers/networking_solutions_products_generic_content0900aecd80601f7e.html.

Q. Can I use the SIM card from my personal digital assistant (PDA) in the Cisco 3G WWAN HWIC?

A. No. Rate plans for PDAs and laptop computers typically do not cover multiple users and have data usage restrictions. We recommend that you purchase a data plan designed for wireless router or machine-to-machine applications.

Features and Applications

Q. What are the applications for the new Cisco 3G WWAN HWICs?

A. The Cisco 3G WWAN HWICs are suitable for both backup and primary WAN connectivity.

- **WAN backup:** Resilient WAN access is often a requirement for branch offices connecting to a corporate site or the Internet. Although DSL, Frame Relay, ISDN, and dialup are common choices for backup for primary WAN link failure, a nonterrestrial data path such as 3G WWAN provides enhanced WAN diversity. Cisco 3G WWAN HWICs combined with Cisco integrated services routers offer the capability to automatically initiate connection over the 3G WWAN when the primary WAN link is unavailable. In addition, you can use Cisco 3G WWAN HWICs to provide supplemental bandwidth when the primary WAN link is overused.

- **Primary connectivity:** For applications that have low data usage but high security requirements such as bank ATMs, gas station kiosks, and telemetry sites, the Cisco 3G WWAN HWIC offers a highly secure, simplified, and cost-effective WAN alternative to DSL or Frame Relay. In areas where terrestrial broadband services (cable, DSL, or T1) are not available or are expensive, 3G WWAN connectivity can be a viable alternative. For businesses requiring rapid setup or temporary connectivity, 3G WWAN offers the capability to activate a new site quickly and cost-effectively. Using the integrated services available on the Cisco integrated services routers, Cisco 3G WWAN HWICs can provide instant and mobile communications during disasters and service outages.

Q. How are the Cisco 3G WWAN HWICs integrated with Cisco IOS Software?

- A.** A new asynchronous serial interface, Interface Cellular, has been created in Cisco IOS Software to support the Cisco 3G WWAN HWICs. This interface is a dial-on-demand routing (DDR) interface, so a data call is initiated when there is traffic of interest to be routed over the 3G network. Refer to the configuration guide for more information about how to use the Cisco 3G WWAN HWICs.

Q. What management capabilities are available for the Cisco 3G WWAN HWICs?

- A.** You can configure and monitor these HWICs from the router CLI using Cisco IOS Software commands and the newly developed 3G cellular MIB that allow you to do the following and a lot more:
- Monitor and activate the 3G modem (only for HWIC-3G-CDMA-x)
 - Configure the data profile (only for HWIC-3G-GSM and HWIC-3G-HSPA)
 - Upgrade modem firmware
 - Select the network (only for HWIC-3G-GSM and HWIC-3G-HSPA)
 - Monitor the signal strength, available network and service, and data connection statistics

For remote management capabilities, Cisco 3G WWAN HWICs support the Simple Network Management Protocol (SNMP) 3G cellular and interface MIBs, allowing access to the standard interface counters. The interface MIB also provides traps for interface up and down events.

Cisco Cellular 3G WAN will be the first project to implement the Cisco 3G WAN MIB. The MIB implementation will support SNMP Group Encrypted Transport (read operation) for all MIB objects, and SNMP SET (write operation) for a subset of the objects.

Note: This MIB supports both CDMA and GSM sets of standards; you can use the standard MIB object defined in the MIB common table to distinguish between CDMA and GSM and implement the MIB for either CDMA or GSM accordingly.

Q. Can I use IP Security (IPSec) with the Cisco 3G WWAN HWICs?

- A.** Yes. All Cisco integrated services router security features are supported on the Cisco 3G WWAN HWIC interface. Cisco has tested IPSec in both site-to-site and Dynamic Multipoint VPN (DMVPN) and EzVPN configurations with these new HWICs.

Q. What factors affect throughput on the 3G WWAN?

- A.** Several factors can affect throughput and performance:
- **Congestion:** 3G WWAN data services use a shared wireless medium; therefore, the number of active users in a cell site affects throughput.
 - **Coverage:** The distance from the base transceiver station (BTS) or cell tower affects throughput. The further you are located from the cell tower, the lower the achievable throughput. A site survey is recommended as part of the installation process to help ensure adequate network coverage.
 - **Interference:** RF noise from nearby devices can inhibit performance.

Q. Are the Cisco 3G WWAN HWICs suitable for use as primary links?

A. The 3G wireless standards for data rate and latency performance have continuously improved. Today both EVDO and HSPA services offer fractional T1 data rates and latency below 100 milliseconds (ms). For sites and applications that have low and intermittent data usage (such as bank ATMs, kiosks, and gas stations), Cisco 3G WWAN HWICs may be suitable.

Q. Can I run voice-over-IP (VoIP) traffic over Cisco 3G WWAN HWICs?

A. VoIP is not a qualified configuration at this time.

Q. Is latency a problem with the Cisco 3G WWAN HWIC solution?

A. Latencies vary by technology. Depending on the service available in your area and the applications you are running over your link, latency may be a concern. The most advanced technologies support latencies of less than 100 ms.

Q. Do the Cisco 3G WWAN HWICs provide switched voice capability using the dual transfer mode (DTM)?

A. No. The Cisco 3G WWAN HWICs do not support DTM at this time.

Q. What is the Diag (diagnostics) port on the faceplate for?

A. The Diag port on the faceplate of the Cisco 3G WWAN HWIC allows users and network administrators to connect the Cisco 3G WWAN HWIC to industry-standard diagnostic and monitoring tools. These tools connect directly to the embedded 3G modem and provide detailed information about the air interface. The interface has been tested with the Qualcomm CDMA Air Interface Tester (CAIT), which characterizes performance by measuring real-time, mobile-based CDMA RF characteristics, as well as messaging and protocols. This tool displays statistics and diagnostic information that you can read and write to nonvolatile memory. A similar tool, the Spirent Universal Diagnostics Monitor (UDM), is also supported.

Q. Do Cisco 3G WWAN HWICs support HSUPA? If not, will they support HSUPA with a firmware upgrade?

A. No. Currently the Cisco 3G WWAN HWICs do not support HSUPA. HSUPA support would require new modem hardware and is planned for future releases.

3G WWAN Technology**Q. What is 3G? What are the 3G standards groups?**

A. Third generation (3G) is the term for the latest generation of mobile services, which provide advanced voice communications and high-speed data connectivity, including access to the Internet, mobile data applications, and multimedia content. The ITU, working with industry standards groups from around the world, has defined the technical requirements and standards as well as the spectrum for 3G systems under the International Mobile Telecommunications-2000 (IMT-2000) program. The ITU requires that IMT-2000 (3G) networks, among other capabilities, deliver improved system capacity and spectrum efficiency over 2G systems and that they support data services at minimum transmission rates of 144 kbps in mobile (outdoor) and 2 Mbps in fixed (indoor) environments.

Q. What is the difference between EVDO and HSPA(HSUPA/HSDPA)?

A. EVDO and HSPA(HSUPA/HSDPA) are parallel 3G data standards in the CDMA and GSM environments. EVDO evolved from the CDMA2000 standards, whereas HSPA evolved from the UMTS standard that was developed for the countries using GSM technology.

Q. In general, what is the level of adherence to the 3G Partnership Project 2 (3GPP2)? For example, do the Cisco 3G WWAN HWICs support EVDO Rev A quality of service (QoS)?

A. Adherence to the EIA/TIA and CDMA Development Group (CDG) standards depends on the carrier implementation and a combination of modem hardware and firmware and software. All Cisco 3G WWAN HWICs comply with the standards, but the specifics of carrier implementations vary by carrier.

Q. Do the Cisco 3G WWAN HWICs support Mobile IP or Simple IP only?

A. The CDMA 3G WWAN HWIC supports Mobile IP (MIP) on the modem. Depending on the configuration on the carrier network, it could be set to either MIP only or MIP preferred mode. In the MIP preferred mode, when MIP fails, the modem falls back to Simple IP. The GSM 3G WWAN does not have a Mobile IP stack, but the Mobile IP feature on the Cisco IOS Software could be used.

Q. How does the modem select the service to attach to? Does it switch to a better service when one is available?

A. The modem registers by default with the best available network. For example, if you have HSDPA coverage in your area, the modem is automatically attached to HSDPA service because it is the best available service. If you have only EDGE service, the modem continues to scan in the background for UMTS or HSDPA service. If the UMTS or HSDPA service becomes available, the modem automatically switches to that service.

Q. Is signal strength a concern? Can I use remote antennas?

A. Cellular frequency bands have very good building penetration characteristics, making them a good choice for WWAN connectivity. Ideally, the Cisco 3G WWAN HWIC should have signal strength of -85 dB for maximum throughput. The Cisco 3G WWAN HWICs operate in environments with lower signal strength, but this operation results in diminished throughput. The minimum throughput recommended for acceptable performance is -95 dB.

In cases where the signal strength needs to be improved, external antenna solutions are available. Refer to the Cisco 3G WWAN HWIC installation guide for more information about the antenna and cable accessories available with the Cisco 3G WWAN HWICs.

In very challenging environments where a remote antenna solution does not work, you can use RF signal booster solutions. A variety of solutions to solve indoor coverage challenges are on the market today. Contact your wireless service provider for more information about these solutions.

Service Plans and Carriers**Q. How can I get a service plan for the Cisco 3G Wireless WAN HWICs?**

A. You must obtain a service plan from a supported wireless carrier. For a complete list of supported wireless carriers, visit http://www.cisco.com/en/US/products/hw/routers/networking_solutions_products_generic_content0900aecd80601f7e.html.

For the GSM and HSPA HWICs (HWIC-3G-GSM and HWIC-3G-HSPA, respectively), the service plan information is included in the SIM card, which you must purchase from your local wireless carrier. In general, service plans should be metered plans. Several of the unlimited data plans are designed for laptop computers and PDAs and not for routers, for which you can have multiple data devices.

For the CDMA HWIC (HWIC-3G-CDMA), the carrier must activate the HWIC card. Typically activation involves providing account information as well as the electronic serial number of the modem.

Q. How are modems provisioned?

A. Modem provisioning involves two steps. The first step—the load of the firmware, PRL, and initial parameters—occurs in the manufacturing process. The second step occurs during the service activation procedure and may be OTA or manual. This second step may be performed by the service provider, value-added reseller (VAR), or distributor.

Q. How can I get my Cisco 3G WWAN HWICs activated?

A. The service activation procedure varies by wireless carrier. Activation can be performed through a phone call or by logging into a specific website so that the carrier can perform the activation. To activate a modem, typically you need to have a reseller agreement with the carrier. Following are the typical scenarios:

- **Managed services or wireless carrier:** If the modem was purchased through a wireless carrier or affiliate, the modem should be activated by the carrier or affiliate.
- **Reseller:** If your reseller has an agreement with a wireless carrier, the reseller may perform service activation. If the reseller does not have a relationship with a wireless carrier, the reseller may partner with a wireless agent to activate the modem.

Q. Is OTA provisioning supported, or is provisioning performed by a technician during installation over the connection to the console port?

- A.** OTA provisioning is supported; however, the OTA protocols of different wireless network operators vary.

Q. How can I tell if my preferred wireless carrier supports the Cisco 3G WWAN HWICs?

- A.** The list of supported carriers is available at

http://www.cisco.com/en/US/products/hw/routers/networking_solutions_products_generic_content0900aecd80601f7e.html.

Q. Where can I find configuration and installation guides for the Cisco 3G WWAN HWICs?

- A.** All configuration and installation guides are available at:

- CDMA: http://www.cisco.com/en/US/products/ps6441/products_feature_guide09186a00807ec85b.html
- GSM/HSPA: http://www.cisco.com/en/US/products/ps6441/products_feature_guide09186a0080802d77.html
- Installation guides:
http://www.cisco.com/en/US/products/hw/modules/ps2641/products_module_installation_guide_chapter09186a00807ecd4b.html#wp1060382



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