



# Configuring 3G Wireless WAN on Modular and Fixed ISRs (HWIC-3G-GSM, HWIC-3G-HSPA, PCEX-3G-HSPA-x)

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The Cisco 880G series integrated services routers (Cisco ISRs) provide Internet, VPN, voice, data, and backup capability to corporate teleworkers, and remote and small offices of fewer than 20 users. These fixed routers are capable of bridging and multiprotocol routing between LAN and WAN ports, and provide advanced features such as antivirus protection.

The Third Generation (3G) Wireless High-Speed WAN Interface Card (HWIC) is a multiband, multiservice WAN card for use over WCDMA Radio Access Networks (RAN).

Both the fixed and the modular 3G routers can be used as the primary WAN connectivity and as a backup for critical applications, and can also be used as the primary WAN connection.

3G WAN is supported on the following modular Cisco ISRs:

- Cisco 1841
- Cisco 1861
- Cisco 2800 series
- Cisco 3800 series
- Cisco 1900
- Cisco 2900
- Cisco 3900
- Cisco 880

The HWIC-3G-GSM, HWIC-3G-HSPA, PCEX-3G-HSPA provide the following functionality:

- Broadband WAN connectivity using high-speed cellular data technology
- Support for the following technologies:
  - High Speed Packet Access (HSPA)



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- High-speed Downlink Packet Access (HSDPA)
- High-speed Uplink Packet Access (HSUPA)
- Universal Mobile Telecommunication System (UMTS)
- Enhanced Data-Rates for GSM Evolution (EDGE)
- General Packet Radio Service (GPRS)
- Automatic best-network selection
- Always-on capability
- Multiple antenna and cable options:
  - Diversity antenna
  - Indoor and outdoor external antennas
  - Radio Frequency Ultra-Low Loss (RF-ULL) cables (see [Table 7 on page 15](#) for details)
- IOS-based Mobile IP including network mobility (NEMO)
- Static and dynamic IP addressing
- Cellular interface based on the asynchronous interface in Cisco IOS software
- Network Address Translation (NAT) and Port Address Translation (PAT) support
- Security features such as firewall, intrusion-detection systems (IDS), and intrusion-prevention systems (IPS)
- Support for enhanced security features, such as GET VPN, EZ VPN, DMVPN, Multi-point GRE (mGRE), and IPsec VPN
- Auto-detecting optimized WAN switchover
- Support for Hot Standby Router Protocol (HSRP) and Virtual Router Redundancy Protocol (VRRP)
- Cellular WAN management information base (MIB)
- Diagnostic and monitoring (DM) capability
- Remote DM logging over IP
- Remote OMA-DM activation
- Mobile equipment subsidy unlocking (MEP)
- Multiple PDP support for HWIC-3G-HSPA-x SKUs.
- Voice-initiated data callback
- Cellular modem upgrade over wireless link
- SIM lock and unlock, security, verification upon activation, SIM PIN change
- Power Save mode capability
- Complete Cisco IOS feature capability
- Modem management—You can access modem software and hardware information, radio and network status, and data profile information by using Cisco IOS commands.
- Dial on Demand Routing (DDR)—This allows you to set up a data call when there is data traffic to be sent over the wireless network.
- Fallback connection (DDR backup)—3G WAN for fixed and modular routers allows you to configure the cellular modem to initiate a dialup connection when connection to a primary service is lost.

- Teardown after fallback (part of fallback DDR)—After a primary connection has failed and the cellular connection is in fallback mode, the 3G feature in fixed and modular routers tears down the fallback-mode connection when the primary connection is available.
- Automatic teardown—After a configurable timeout, the 3G WAN for fixed and modular routers automatically tears down a connection if there has been no activity.
- Autodetect—3G WAN for fixed and modular routers automatically detects and uses the best available service.
- Profile Configuration—You can configure upto 16 APN profiles.
- Firmware upgrade—You can upgrade the firmware on the modem by using Cisco IOS commands.
- 3G wireless WAN for fixed and modular routers support on Cisco Integrated Services Router (ISR) platforms, namely Cisco 1841, Cisco 1861, Cisco 2801, Cisco 2811, Cisco 2821, Cisco 2851, Cisco 3825, and Cisco 3845.
- Comprehensive Cisco IOS MIB support including Interface (IF) MIBs and Entity MIBs.
- 3G cellular MIB support.

Table 1 shows the SKU and the frequencies supported by the 3G HWICs.

**Table 1** *SKU Description and Supported Frequencies*

SKU Number	Description	Region	Frequency Bands
HWIC-3G-GSM	HSDPA/UMTS/EDGE/GPRS	Worldwide	800/850/1900/2100 MHz for WCDMA 850/900/1800/1900 for EDGE/GPRS
HWIC-3G-HSPA-G	HSPA (HSUPA/HSDPA) /UMTS/EDGE/GPRS	Worldwide	900/1900/2100 MHz for WCDMA 850/900/1800/1900 for EDGE/GPRS
HWIC-3G-HSPA-A	HSPA (HSUPA/HSDPA) /UMTS/EDGE/GPRS	Americas	800/850/1900/2100 MHz for WCDMA 850/900/1800/1900 for EDGE/GPRS
PCEX-3G-HSPA	HSPA/UMTS/EDGE/GRPRS	Worldwide	800/850/1900/2100 MHz for WCDMA 850/900/1800/1900 for EDGE/GPRS
PCEX-3G-HSPA-G	HSPA/UMTS/EDGE/GRPRS	Worldwide	800/850/900/1900/2100 MHz for WCDMA 850/900/1800/1900 for EDGE/GPRS
PCEX-3G-HSPA-US	HSPA/UMTS/EDGE/GRPRS	America	800/850/1900/2100 MHz for WCDMA 850/900/1800/1900 for EDGE/GPRS

## HWIC-3G-GSM

Figure 1 shows the front panel of the HWIC-3G-GSM HWIC.

**Figure 1**      *Front Panel of HWIC-3G-GSM*



<b>1</b>	Mounting Screws	<b>3</b>	Antenna Connector
<b>2</b>	Diagnostic Port	<b>4</b>	LEDs

## HWIC-3G-HSPA, HWIC-3G-HSPA-G, HWIC-3G-HSPA-A

Figure 2 shows the front panel of the HWIC-3G-HSPA.

**Figure 2**      *Front Panel of HWIC-3G-HSPA*



<b>1</b>	Mounting Screws	<b>4</b>	LEDs
<b>2</b>	Diagnostic Port	<b>5</b>	Diversity Antenna Connector
<b>3</b>	Main Antenna Connector		



**Note**

The diagnostic port is not required for normal activation or operation. Please see the [“Modem Troubleshooting Using the Diagnostic Port”](#) section on page 105 for details.

Table 2 lists the 3G HWIC LEDs and describes their functionality and different states. The LEDs provide a visual indication of your available services. Please see Chapter 13 in the *Cisco Interface Cards Hardware Installation Guide* for details on hardware installation.

**Table 2 3G HWIC LED Descriptions**

LED	Description
RSSI	Off: Low RSSI (under -100 dBm).
	Slow Green Blink: Low or medium RSSI (-99 to -90 dBm).
	Fast Green Blink: Medium RSSI (-89 to -70 dBm).
	Solid Green: Unknown service.
	Solid Yellow: No service.
WWAN	Off: HWIC in reset mode or not powered.
	Slow blink: Searching for service.
	Solid Green: Active service; no traffic detected.
	Fast Blink: Active service, and traffic detected proportional to blink rate.
UMTS	Solid Green: UMTS is the active service.
HSDPA	(HWIC-3G-GSM only) Solid Green: HSDPA is the active service.
HSPA	(HWIC-3G-HSPA only) Solid Green: HSPA is the active service.



**Note** Both HSPA/HSDPA and UMTS LEDs Off: Fallback (EGDE or GPRS) service is active.



**Note** Active service means the currently available service. Your 3G HWIC automatically selects the best available connection.

## PCEX-3G-HSPA-x

Figure 3 shows the front panel of the PCEX-3G-HSPA.

**Figure 3 Front Panel of PCEX-3G-HSPA**



<b>1</b>	LEDs	<b>3</b>	USB port
<b>2</b>	3G express card slot—Supports third-party <sup>1</sup> 3G card (Cisco 88xG models only)		

1. See the *Cisco 880 Series Integrated Services Routers* data sheet for supported vendors.

Table 3 lists the LEDs and describes their functionality and different states. The LEDs provide a visual indication of your available services. Please see the *Cisco 880 Series ISR Hardware Installation Guide* for details on hardware installation.

**Table 3 LED Description for PCEX-3G-HSPA-x**

LED	Color	Description	880 Series
3G <sup>1</sup> WWAN <sup>2</sup>	Green	On—Service is established. Slow Blinking—Searching for service. Fast Blinking—Data is either being received or being transmitted.	3G models
3G RSSI <sup>3</sup>	Green	Off—Low signal strength (lower than -100 dBm). On—High RSSI (-69 dBm or higher). Slow Blinking—Low or medium RSSI (-99 to -90 dBm). Fast Blinking—Medium RSSI (-89 to -70 dBm).	3G models
	Amber	On—No service.	3G models

LED	Color	Description	880 Series
3G GSM <sup>4</sup>	Green	On—Service is established. Off—No service.	3G models
3G CDMA <sup>5</sup>	Green	On—Service is established. Off—No service.	3G models

1. 3G = Third-Generation.
2. WWAN = wireless WAN.
3. RSSI = Received Signal Strength Indicator.
4. GSM = Global System for Mobile Communication.
5. CDMA = code division multiple access.

The PCEX-3G-HSPA supports the AC501 and the AC880E modem. [Table 4](#) shows the LED information for the LEDs located on the modem.

**Table 4 Modem LED Descriptions**

LED	Description
Power	Indicates one of the following states: <ul style="list-style-type: none"> <li>• The modem has detected or is connected to a 2G or 3G network.</li> <li>• The modem is not inserted in the PC.</li> <li>• The computer is off or in “suspend and resume mode”.</li> <li>• The modem has been turned off using Watcher (Tools &gt; Turn Radio Off) or another connection client.</li> </ul>
	Solid Blue: The power is on, the modem is working normally, and the firmware is not being updated.
	Blinking Blue: The firmware is being updated. Do not remove the modem from the PC.
	Blinking Amber: The modem is searching for service (initializing).
	Solid Amber: Error—either the modem is having a problem initializing (searching for service) or is offline because of a failure. Contact your service provider.
	2G
2G	Blinking Amber: The modem has detected a 2G network (EDGE, GPRS, GSM) and is ready to connect.
	Solid Amber: The modem is connected to a 2G network and is able to send and receive data.
	3G
3G	Blinking Blue: The modem has detected a 3G network (UMTS, HSDPA) and is ready to connect.
	Solid Blue: The modem is connected to a 3G network and can send and receive data.

**Feature History**

Release	Modification
12.4(11)XV	This feature was introduced for HWIC-3G-GSM. (This image is not supported any longer.)
12.4(15)T	This feature was integrated into Cisco IOS Release 12.4(15)T.
12.4(15)T1	This feature was updated.
15.0(1)M	The HSPA feature was introduced.
15.1(1)T	The PCEX feature was introduced and the HSPA feature was integrated into Cisco IOS Release 15.1(1)T.

**Finding Support Information for Platforms and Cisco IOS Software Images**

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at <http://www.cisco.com/go/fn>. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

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## Prerequisites for Configuring the 3G HWIC

The following are prerequisites to configuring the 3G HWICs:

- You must have service availability on the HWIC from a carrier, and you must have network coverage where your router will be physically placed. For a complete list of supported carriers, see the data sheet at the following URL: <http://www.cisco.com/go/3g>
- You must subscribe to a service plan with a wireless service provider and obtain a SIM card.
- You must install the SIM card before configuring the 3G HWIC. For instructions on how to install the SIM card, see *Connecting 3G Wireless High-Speed WAN Interface Cards to a Network* at the following URL:  
[http://www.cisco.com/en/US/docs/routers/access/interfaces/ic/hardware/installation/guide/cel\\_hwic.html](http://www.cisco.com/en/US/docs/routers/access/interfaces/ic/hardware/installation/guide/cel_hwic.html)



- You must install the required antennas before you configure the 3G HWIC. See the following URLs for instructions on how to install the antennas:
  - 3G-ANTM1919D—See the [Cisco Multiband Swivel Mount Dipole Antenna \(3G-ANTM1919D\)](#)
  - 3G-ANTM1916-CM—See the [Cisco Multiband Omnidirectional Ceiling Mount Antenna \(3G-ANTM1916-CM\)](#)
  - 3G-AE015-R (Antenna Extension)—See the [Cisco Single-Port Antenna Stand for Multiband TNC Male-Terminated Portable Antenna \(3G-AE015-R\)](#)
  - 3G-AE010-R (Antenna Extension)—See the [Cisco Single-Port Antenna Stand for Multiband TNC Male-Terminated Portable Antenna \(3G-AE010-R\)](#)
  - 3G-ANTM-OUT-OM—See the [Cisco 3G Omnidirectional Outdoor Antenna \(3G-ANTM-OUT-OM\)](#)
  - 3G-ANTM-OUT-LP—See the [Cisco 3G Low Profile Outdoor Antenna \(3G-ANTM-OUT-LP\)](#)
  - 3G-ACC-OUT-LA—See the [Cisco 3G Lightning Arrestor \(3G-ACC-OUT-LA\)](#)
- You must check your LEDs for signal reception as described in [Table 2](#).
- You should be familiar with the Cisco IOS software , beginning with Release 12.4(15)T or later for Cisco HWIC support. (See the Cisco IOS documentation.)
- To configure your 3G HWIC data profile, you will need the following information from your service provider:
  - Username (if required by your carrier)
  - Password (if required by your carrier)
  - Access Point Name (APN)

## Restrictions for Configuring 3G

The following restrictions apply to configuring the Cisco 3G HWICs:

- Data connection can be originated only by the 3G HWIC.
- Throughput—due to the shared nature of wireless communications, the experienced throughput varies depending on the number of active users or congestion in a given network.
- Cellular networks have higher latency compared to wired networks. Latency rates depend on the technology and carrier. Latency may be higher because of network congestion.
- Any restrictions that are a part of the terms of service from your carrier.
- Performance: Multiple PDP contexts are supported only in the HWIC-3G-HSPA-x SKUs that have the MC8790 modem. This requires an additional 2 Mb memory.

## Overview of UMTS/GSM Data Network

The Global System for Mobile Communications (GSM) is the most widely deployed cellular network in the world. It is based on the specification from European Telecommunications Standards Institute (ETSI). GSM was primarily designed for voice and was circuit switched but due to the popularity of cellular networks and the great demand for data services, GPRS was introduced as a packet switched data overlay over the GSM radio network. The radio and network resources of GPRS are accessed only when data actually needs to be transmitted between the GPRS mobile user and the GPRS network.

GPRS introduced several new network nodes into the GSM architecture for packet switching, they form the Mobile Packet Core. The Mobile Packet Core includes the Serving GPRS Support Node (SGSN) and the GPRS Gateway Support Node (GGSN). The SGSN is the node which in some ways carries out the same function as the Foreign Agent in Mobile IP. It tunnels IP packets towards the GGSN and detunnels packets back from the GGSN. It also carries out mobility managed and billing. The GGSN is the node which carries out the role in GPRS equivalent to the Home Agent in Mobile IP. The GGSN provides the connectivity to the IP network and the SGSN. It is responsible for IP address assignment and is the default router for the connected User Equipment (UE).

Figure 4 shows a GSM network and the network elements it contains.

**Figure 4** *GSM Network Overview*



The Base Transceiver Station (BTS) and Base Station Controller (BSC) are located at the Cell site and are the common nodes for both voice and data services. They provide the radio or the physical layer connectivity between the mobile user and the mobile network. As the BSC voice and data traffic get segregated, the voice traffic goes to the Mobile Switching Center (MSC), while the data traffic is sent to the GGSN. From the GGSN, the data packets either go directly to the internet or they can be backhauled to the customer data center for a VPN connection.

UMTS is a 3G wireless system that delivers high-bandwidth data and voice services to mobile users. UMTS evolved from GSM. UMTS has a new air interface based on Wideband Code Division Multiple Access (W-CDMA) and an IP core network based on general-packet radio service (GPRS). The nodes in a UMTS network are almost the same as in a GSM/GPRS network. BTS and BSC have been renamed to Node B and Radio Network Controller (RNC), respectively. UMTS addresses the growing demand of mobile and Internet applications for new capacity in the overcrowded mobile communications sky. The new network increases transmission speed to 2 Mbps per mobile user and establishes a global roaming standard.

High Speed Packet Access (HSPA) is a collection of two mobile protocols - High Speed Downlink Packet Access (HSDPA) and High Speed Uplink Packet Access (HSUPA), that extends and improves the performance of existing WCDMA/UMTS protocols. HSDPA and HSUPA provide increased performance by using improved modulation schemes and by refining the protocols by which 3G modem and base stations communicate. These improvements lead to a better utilization of the existing radio

bandwidth provided by WCDMA. HSPA improves the end-user experience by increasing peak data rates of up to 14 Mbit/s in the downlink and 5.76 Mbit/s in the uplink. It also reduces latency and provides up to five times more system capacity in the downlink and up to twice as much system capacity in the uplink, reducing the production cost per bit compared to original WCDMA protocols.

## Multiple PDP contexts

The multiple PDP contexts feature is supported on the HWIC-3G-HSPA SKU. The 8790 modem supports two primary PDP contexts.

Each PDP context is the separate data link over common 3G data connection. It has its own IP address and its own data and QoS profile. For each PDP context, the new IOS cellular interface is created once the HWIC is initialized in the system. In addition to that, each cellular interface has a corresponding TTY line. This is similar to HWICs with multiple ports.

The HWIC-3G-HSPA has Cellular 0/<hwic\_slot>/0, Cellular 0/<hwic\_slot>/1, Cellular 0/<hwic\_slot>/2 IOS interfaces. The last number in the triple numbering scheme is the port number.

The multiple cellular interfaces in 3G HWICs behave independently. Any of them can be used to establish data connection. However, only the first interface, e.g. Cellular 0/<hwic\_slot>/0 can be used to exercise the full set of modem AT commands using the Reverse Telnet feature.

The HSPA cellular modem allows you to configure up to 16 profiles. The QoS profile configured for an interface is selected by the `ATDT*98*#<profile_number>#` command in the chat script corresponding to a cellular interface. The basic data profile configuration is enhanced with the QoS profile configuration. You must use a different data/QoS profile for each cellular interface.



### Note

If both the primary interfaces are used, you must create two separate chat scripts in the router configuration.

## Overview of SNMP MIBs

Simple Management Network Protocol (SNMP) development and use is centered around the Management Information Base (MIB). An SNMP MIB is an abstract data base, i.e., a conceptual specification for information that a management application may read and modify in a certain form. This does not imply that the information is kept in the managed system in that same form. The SNMP agent translates between the internal data structures and formats of the managed system and the external data structures and formats defined for the MIB.

The SNMP MIB is conceptually a tree structure with conceptual tables. Cisco 3G MIB is discussed in more detail in the next section. Relative to this tree structure, the term MIB is used in two senses. In one sense it is actually a MIB branch, usually containing information for a single aspect of technology, such as a transmission medium or a routing protocol. A MIB used in this sense is more accurately called a MIB module, and is usually defined in a single document. In the other sense a MIB is a collection of such branches. Such a collection might comprise, for example, all the MIB modules implemented by a given agent, or the entire collection of MIB modules defined for SNMP.

A MIB is a tree where the leaves are individual items of data called objects. An object may be, for example, a counter or a protocol status. MIB objects are also sometimes called variables.

MIBs can be classified into three categories:

- IF MIBs—describes interface statistics

- Cisco-Entity-Vendortype-OID-MIB.my—ENTITY-MIBs are used to provide general hardware type for both the HWIC and the modem. CISCO-ENTITY-VENDORTYPE-OID-MIB assigns OIDs for Cisco components (including the HWICs & the modems). The OIDs are then used as the values of entPhysicalVendorType in the ENTITY-MIB.
- 3G/Wireless MIBs—cellular or wireless-specific MIBs

## 3G Cellular WAN MIB Architecture

This section describes the MIB definition and implementation support for Cisco's cellular 3G WAN products on the customer premises equipment (CPE) end.

The 3G Cellular WAN MIB supports both CDMA and GSM set of cellular standards and includes the following technologies:

- GSM—GPRS/EDGE/UMTS/HSPA
- CDMA—1xRTT/EVDO RevA/EVDO RevB

The 3G cellular MIB uses indexes from the cellular interface and from the modem. You can obtain the interface index using IF-MIBs and the modem index using the ENTITY MIBs.

The 3G MIB definition includes the following major sub-trees:

- Common objects
- CDMA objects
- GSM objects
- Traps or notifications

You can use MIB object c3gStandard defined in the c3gWanCommonTable to distinguish between CDMA or GSM and implementing MIB for CDMA or GSM.



### Note

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Cisco 3G MIB supports all SNMP versions including V1, V2, V2C and V3.

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At a high level architecture, the Cisco 3G WAN MIBs are divided into two groups and have the following structure:

1. ciscoWan3gMIBNotifs—this group defines all the trap events for Cisco 3G WAN MIBs
2. ciscoWan3gMIBObjects—this group defines all the MIB objects for Cisco 3G WAN MIBs

### ciscoWan3gMIBObjects

The ciscoWan3gMIBObjects group has three sub-groups:

- c3gWanCommonTable—defines the common MIB objects for both CDMA and GSM.
- c3gWanCdma—defines the MIB objects specific for CDMA set of standards (3GPP2).
- c3gWanGsm—defines the MIB objects specific for GSM set of standards (3GPP).

#### c3gWanCdma

Under c3gWanCdma, there are seven sub-groups:

- c3gCdmaSessionTable for CDMA session related objects.
- c3gCdmaConnectionTable for CDMA connection related objects.
- c3gCdmaIdentityTable for CDMA user identity related objects.

- c3gCdmaNetworkTable for CDMA network related objects.
- c3gCdmaProfile for CDMA user profile related objects.
- c3gCdmaRadio for CDMA radio related objects.
- c3gCdmaSecurityTable for CDMA security related objects.

### c3gWanGsm

Under c3gWanGsm, there are five sub-groups:

- c3gGsmIdentityTable for GSM user identity related objects.
- c3gGsmNetworkTable for GSM network related objects.
- c3gGsmPdpProfile for GSM PDP profile related objects.
- c3gGsmRadio for GSM radio related objects.
- c3gGsmSecurityTable for GSM security related objects.

### ciscoWan3gMIBNotifs

Cisco Cellular 3G WAN MIB implementation supports SNMP GET (read operation) for all MIB objects, and SNMP SET (write operation) for the following RW (read-write) objects and more:

- c3gRssiOnsetNotifThreshold
- c3gRssiAbateNotifThreshold
- c3gEcIoOnsetNotifThreshold
- c3gEcIoAbateNotifThreshold
- c3gModemTemperOnsetNotifThreshold
- c3gModemTemperAbateNotifThreshold
- c3gModemReset
- c3gModemUpNotifEnabled
- c3gModemDownNotifEnabled
- c3gServiceChangedNotifEnabled
- c3gNetworkChangedNotifEnabled
- c3gConnectionStatusChangedNotifFlag
- c3gRssiOnsetNotifFlag
- c3gRssiAbateNotifFlag
- c3gEcIoOnsetNotifFlag
- c3gEcIoAbateNotifFlag
- c3gModemTemperOnsetNotifEnabled
- c3gModemTemperAbateNotifEnabled



#### Note

By default, all notifications are disabled. To view notifications, you must enable these notifications.

**Note**

The IF MIBs also have notifications for the cellular interface objects that are used in conjunction with the notification type. When you get a notification, you must check the associated objects.

Table 5 shows various notifications and what they mean.

**Table 5**      **Notifications**

Notifications	Details
ModemUpNotification	Modem successfully recognized
ModemDown	Crash or power-cycle
Change Notification	Notifies about changes in service objects related to this notification—previous service type to current service type
ConnectionStatus	Shows the connection status. Service type is included in this notification.

## Restrictions

- For the router that runs the SNMP agent, you must configure appropriate access control (e.g. SNMP-server community) using the Cisco IOS CLI for the NMS and agent to work properly.
- It is strongly recommended that you configure SNMP V3 with authentication/privacy when implementing SNMP SET operation.

## Supported Cisco Antennas and Cables

Table 6 lists the Cisco antennas that are supported for use on the 3G HWIC.

**Table 6**      **Cisco Antennas Supported on Modular 3G ISRs**

Cisco Part Number	Antenna Type	Maximum Gain and Frequency Range	Description
3G-ANTM1919D	Dipole omnidirectional	0 dBi (806–960 MHz)  0 dBi (1710–2170 MHz)	This is the default antenna. Multiband ipole antenna. For more information, see the <a href="#">Cisco Multiband Swivel Mount Dipole Antenna (3G-ANTM1919D)</a> document.
3G-ANTM1916-CM	High-gain ceiling-mount omnidirectional	1.5 dBi (806–960 MHz)  2.5 dBi (1710–2170 MHz)	Multiband ceiling-mounted omnidirectional antenna. For more information, see the <a href="#">Cisco Multiband Omnidirectional Ceiling Mount Antenna (3G-ANTM1916-CM)</a> document.
3G-AE015-R (Antenna Extension)	Extension base	0.8–6.0 GHz	This antenna extension is a base with a 15-foot cable included for use with a dipole omnidirectional antenna. For more information, see the <a href="#">Cisco Single-Port Antenna Stand for Multiband TNC Male-Terminated Portable Antenna (3G-AE015-R)</a> document.

**Table 6** Cisco Antennas Supported on Modular 3G ISRs (continued)

Cisco Part Number	Antenna Type	Maximum Gain and Frequency Range	Description
3G-AE010-R (Antenna Extension)	Extension Base	N/A	This antenna extension is a base with a 10-foot cable included for use with dipole omnidirectional antennas. For more information, see the <a href="#">Cisco Single-Port Antenna Stand for Multiband TNC Male-Terminated Portable Antenna (3G-AE010-R)</a> document.
3G-ANTM-OUT-OM	Outdoor Omnidirectional	+2 dBi 800/900 MHz  +4 dBi 1800/1900/2100 MHz	This is an outdoor low profile omnidirectional mast antenna. For more information, see <a href="#">Cisco 3G Omnidirectional Outdoor Antenna (3G-ANTM-OUT-OM)</a>
3G-ANTM-OUT-LP	Low Profile Stick Antenna	- 1.5 dBi 850, 900 MHz  - 2.5 dBi 1800, 1900, 2100 MHz	This is an omnidirectional stick antenna. For more information, see <a href="#">Cisco 3G Low Profile Outdoor Antenna (3G-ANTM-OUT-LP)</a>
3G-ACC-OUT-LA (Lightning Arrestor)	Lightning Arrestor	800 MHz to 2200 MHz	This is a quarter-wave lightning protector with integrated high-pass filter. For more information, see <a href="#">Cisco 3G Lightning Arrestor (3G-ACC-OUT-LA)</a>
3G-ACC-OUT-COMBO	Lightning Arrestor and antenna	N/A	Multi-Band Outdoor Omnidirectional Antenna Mast/Wall Mount (3G-ACC-OUT-OM) and 3G Outdoor Antenna Lightning Arrestor (3G-ACC-OUT-LA)

[Table 7](#) lists insertion loss information for the ultra-low-loss (ULL) LMR 400 extension cables available from Cisco for use with 3G HWIC antennas.

**Table 7** Cisco Extension Cables for Use with Antennas

Cisco Product Number	Cable Length	Insertion Loss	Frequency (MHz)
3G-CAB-ULL-20	20 ft (6 m)	1.50 dB max.	2100
3G-CAB-ULL-50	50 ft (15 m)	3.50 dB max.	2100
3G-CAB-LMR240-25	25 ft (7.5 m)	3.50 dB max.	2200
3G-CAB-LMR240-50	50 ft (15 m)	6.90 dB max.	2200
3G-CAB-LMR240-75	75 ft (23 m)	10.5 dB max.	2200

[Table 8](#) lists loss information for the ultra-low-loss (ULL) LMR 400 cables available from Cisco for use with 3G fixed platforms.

**Table 8** Cisco Adapter Cables for Use with 3G Fixed Routers

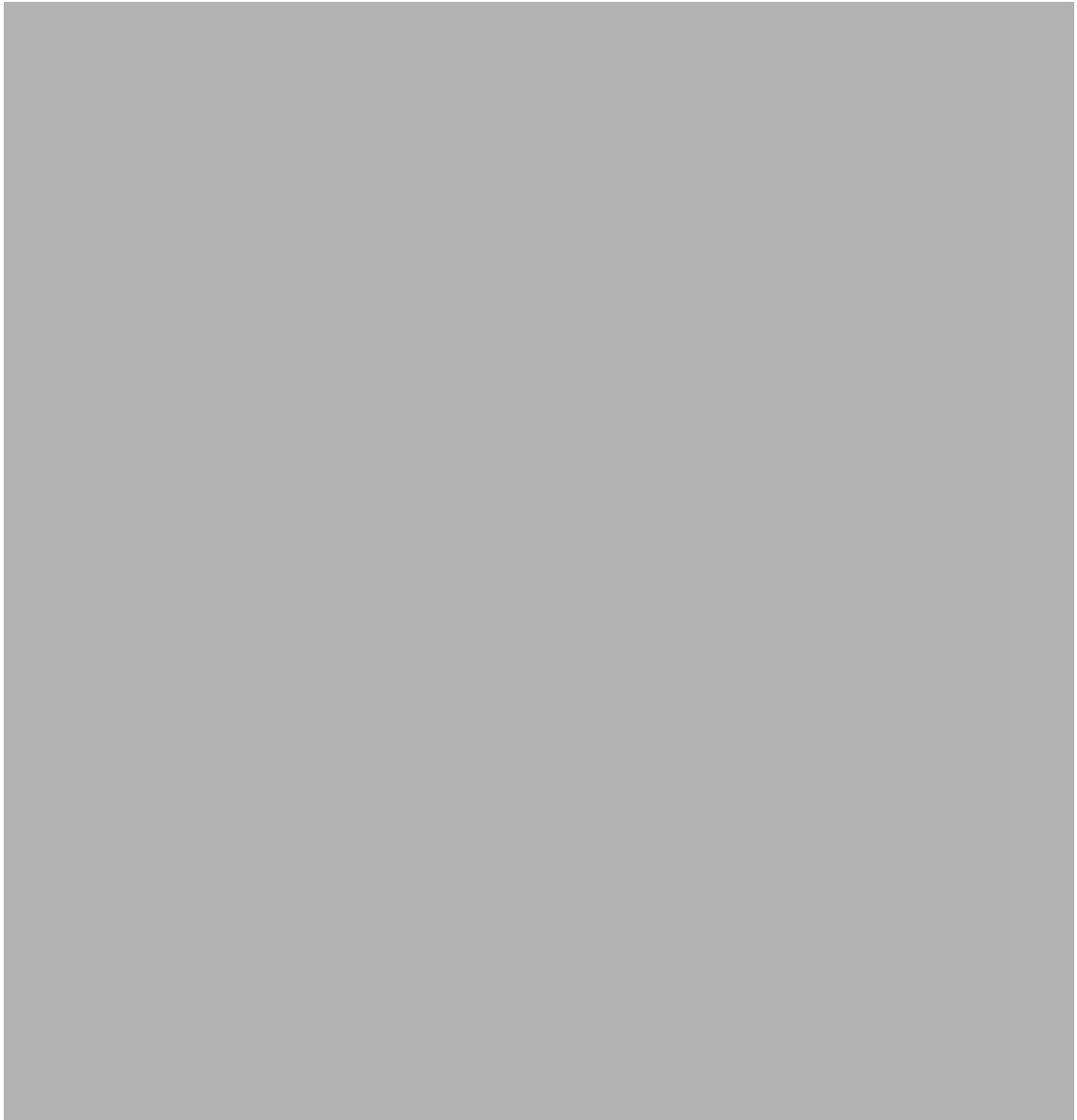
Cisco Product Number	Antenna Adapter Length	Insertion Loss	Frequency (MHz)
3G-ACC-SSMB-TNC	14.5 inches	0.66 dB	2100
3G-ACC-TS9-TNC	13.5 inches	0.62 dB	2100

**Note**

You can use the RG-174/U type cables to adapt the modem external antenna connection to any of the HWIC cables and antennas.

[Figure 5](#) and [Figure 6](#) show some antenna options for the 3G HWIC.

**Figure 5**      **Antenna Options**





**Figure 6**      *Antenna Options*



# How to Configure 3G for Modular and Fixed Cisco ISRs

**Note**

The procedure to configure 3G on both modular and fixed Cisco ISRs is the same except for slot numbering. For example, for 3G HWICs, the numbering for slot 0, wic 0 and port 0 would be 0/0/0 for all commands. For a fixed Cisco ISR, it would be only 0. Please refer to platform-specific documentation for details on slot numbering.

To configure the 3G features, follow these procedures:

- [Data Account Provisioning](#)
- [Data Call Setup](#)
- [Voice Initiated Data Callback or Remote Dial-in \(Optional\)](#)

## Data Account Provisioning

**Note**

To provision your modem, you must have an active wireless account with a service provider and a SIM card installed in your 3G HWIC.

To provision your data account, follow these procedures:

- [Verifying Signal Strength and Service Availability, page 18](#)
- [Configuring a Modem Data Profile, page 19](#)

## Verifying Signal Strength and Service Availability

To verify the signal strength and service availability on your modem, use the following commands in privileged EXEC mode.

### SUMMARY STEPS

1. **show cellular network**
2. **show cellular radio**
3. **show cellular profile**
4. **show cellular security**
5. **show cellular all**

## DETAILED STEPS

	Command or Action	Purpose
<b>Step 1</b>	Router# <b>show cellular</b> <slot/wic/port> <b>network</b>  <b>Example:</b> Router# show cellular 0/0/0 network	Displays information about the carrier network, cell site, and available service.
<b>Step 2</b>	Router# <b>show cellular</b> <slot/wic/port> <b>radio</b>  <b>Example:</b> Router# show cellular 0/0/0 radio	Shows the radio signal strength.  <b>Note</b> The RSSI should be better than -90 dBm for steady and reliable connection.
<b>Step 3</b>	Router# <b>show cellular</b> <slot/wic/port> <b>profile</b>  <b>Example:</b> Router# show cellular 0/0/0 profile	Shows information about the modem data profiles created.
<b>Step 4</b>	Router# <b>show cellular</b> <slot/wic/port> <b>security</b>  <b>Example:</b> Router# show cellular 0/0/0 security	Shows the security information for the modem, such as SIM and modem lock status.
<b>Step 5</b>	Router# <b>show cellular</b> <slot/wic/port> <b>all</b>  <b>Example:</b> Router# show cellular 0/0/0 all	Shows consolidated information about the modem, profiles created, radio signal strength, network security, and so on.

## Configuring a Modem Data Profile

To configure or create a new modem data profile, enter the following command in privileged EXEC mode.

## SUMMARY STEPS

1. **cellular gsm profile create** <profile number> <apn> <authentication> <username> <password>

## DETAILED STEPS

Command or Action	Purpose
Router# <b>cellular</b> <slot/wic/port> <b>gsm profile create</b> <profile number> <apn> <authentication> <username> <password>  <b>Example:</b> Router# cellular 0/0/0 gsm profile create 3 apn.com chap GSM GSMPassword	Creates a new modem data profile. Refer to <a href="#">Table 9</a> for details on the command parameters.

**Table 9 Modem Data Profile Parameters**

<i>profile number</i>	Number for the profile you are creating. You can create upto 16 profiles.
<i>apn</i>	Access Point Name. You must get this information from the service provider.
<i>authentication</i>	The type of authentication. For example, CHAP, PAP.
<i>Username</i>	The username provided by your service provider.
<i>Password</i>	The password provided by your service provider.

## Data Call Setup

To set up a data call, use the following procedures:

- [Configuring the Cellular Interface, page 20](#)
- [Configuring DDR, page 22](#)
- [Configuring DDR Backup, page 24](#)

Figure 7 shows a typical data call setup with the 3G HWIC.

**Figure 7 Data Call Setup with HWIC-3G-GSM**

## Configuring the Cellular Interface

To configure the cellular interface, enter the following commands in the cellular interface mode.

### SUMMARY STEPS

1. **configure terminal**
2. **interface cellular** <slot/wic/port>
3. **encapsulation ppp**
4. **ppp chap hostname** <host>
5. **ppp chap password 0** <password>
6. **asynchronous mode interactive**

## 7. ip address negotiated



### Note

The PPP CHAP authentication parameters that you use in this procedure must be the same as the username and password provided by your carrier and configured under the GSM profile.

### DETAILED STEPS

	Command or Action	Purpose
Step 1	Router# <b>configure terminal</b>  <b>Example:</b> Router# configure terminal	Enters global configuration mode from the terminal.
Step 2	Router(config)# <b>interface cellular</b> <slot/wic/port>  <b>Example:</b> Router (config)# interface cellular 0/0/0	Specifies the cellular interface.  <b>Note</b> Interface cellular 0/0/0 is for PDP 1 Interface cellular 0/0/1 is for PDP 2 Multiple PDP contexts are applicable only to HSPA HWICs.
Step 3	Router(config-if)# <b>encapsulation ppp</b>  <b>Example:</b> Router (config-if)# encapsulation ppp	Specifies PPP encapsulation for an interface configured for dedicated asynchronous mode or dial-on-demand routing (DDR).
Step 4	Router(config-if)# <b>ppp chap hostname</b> <hostname>  <b>Example:</b> Router (config-if)# ppp chap hostname cisco@wwan.ccs	Defines an interface-specific CHAP hostname. This must match the username given by the carrier.
Step 5	Router(config-if)# <b>ppp chap password</b> <password>  <b>Example:</b> Router (config-if)# ppp chap password 0 cisco	Defines an interface-specific CHAP password. This must match the password given by the carrier.
Step 6	Router(config-if)# <b>async mode interactive</b>  <b>Example:</b> Router (config-if)# async mode interactive	Returns a line that has been placed into dedicated asynchronous network mode to interactive mode, thereby enabling the <b>SLIP</b> and <b>PPP</b> commands in privileged EXEC mode.
Step 7	Router(config-if)# <b>ip address negotiated</b>  <b>Example:</b> Router (config-if)# ip address negotiated	Specifies that the IP address for a particular interface is obtained via PPP/IPCP address negotiation.



### Note

When a static IP address is required for the cellular interface, the address may be configured as **ip address negotiated**. During IPCP, the network ensures that the correct static IP address is allocated to the device. If a tunnel interface is configured with **ip address unnumbered** <cellular interface>, it is

necessary to configure the actual static IP address under the cellular interface, in place of **ip address negotiated**. For a sample cellular interface configuration, see the “[Basic Cellular Interface Configuration](#)” section on page 28.

## Configuring DDR

To configure DDR for the cellular interface, follow these steps.

### SUMMARY STEPS

1. **configure terminal**
2. **interface cellular** *<slot/wic/port>*
3. **dialer in-band**
4. **dialer idle-timeout** *<seconds>*
5. **dialer string** *<string>*
6. **dialer group** *<number>*
7. **exit**
8. **dialer-list** *<dialer-group>* **protocol** *<protocol-name>* {**permit** | **deny** | **list** *<access-list-number>* | **access-group** }>
9. **ip access-list***<access list number>***permit** *<ip source address>*
10. **line** *<slot/wic/port>*
11. **script dialer** *<regexp>*
12. **exit**
13. **chat-script** *<script name>* **””** **”ATDT\*98\**<profile number>*#”** **TIMEOUT** *<timeout value>*  
**CONNECT**
14. **interface cellular** *<slot/wic/port>*

### DETAILED STEPS

	Command or Action	Purpose
<b>Step 1</b>	Router# <b>configure terminal</b>  <b>Example:</b> Router# configure terminal	Enters global configuration mode from the terminal.
<b>Step 2</b>	Router(config)# <b>interface cellular</b> <i>&lt;slot/wic/port&gt;</i>  <b>Example:</b> Router (config)# interface cellular 0/0/0	Specifies the cellular interface.
<b>Step 3</b>	Router(config-if)# <b>dialer in-band</b>  <b>Example:</b> Router (config-if)# dialer in-band	Enables DDR and configures the specified serial interface to use in-band dialing.

	Command or Action	Purpose
<b>Step 4</b>	Router(config-if)# <b>dialer idle-timeout</b> <seconds>  <b>Example:</b> Router (config-if)# dialer idle-timeout 30	Specifies the duration of idle time, in seconds, after which a line will be disconnected.
<b>Step 5</b>	Router(config-if)# <b>dialer string</b> <string>  <b>Example:</b> Router (config-if)# dialer string gsm	Specifies the number or string to dial. Use the name of the CHAT script here.  <b>Note</b> You can define multiple dialer strings, one for each PDP context.
<b>Step 6</b>	Router(config-if)# <b>dialer-group</b> <number>  <b>Example:</b> Router (config-if)# dialer-group 1	Specifies the number of the dialer access group to which the specific interface belongs.
<b>Step 7</b>	Router(config-if)# <b>exit</b>  <b>Example:</b> Router (config-if)# exit	Enters the global configuration mode.
<b>Step 8</b>	Router(config)# <b>dialer-list</b> <dialer-group> <b>protocol</b> <protocol-name> { <b>permit</b>   <b>deny</b>   <b>list</b> <access-list-number>   <b>access-group</b> }>  <b>Example:</b> Router (config)# dialer-list 1 protocol ip list 1	Creates a dialer list for traffic of interest and permits access to an entire protocol.
<b>Step 9</b>	Router(config)# <b>ip access-list</b> <access list number> <b>permit</b> <ip source address>  <b>Example:</b> Router (config)# ip access list 1 permit any	Defines traffic of interest.
<b>Step 10</b>	Router(config)# <b>line</b> <slot/wic/port>  <b>Example:</b> Router (config-line)# line 0/0/0	Specifies the line configuration mode.
<b>Step 11</b>	Router(config-line) <b>script dialer</b> <regex>  <b>Example:</b> Router (config-line)# script-dialer gsm	Specifies a default modem chat script.
<b>Step 12</b>	Router(config-line) <b>exit</b>  <b>Example:</b> Router (config-line)# exit	Exits line configuration mode.

	Command or Action	Purpose
<b>Step 13</b>	<pre>Router(config)# chat-script &lt;script name&gt; "" ^ATDT*98*&lt;profile number&gt;#" TIMEOUT &lt;timeout value&gt; CONNECT</pre> <p><b>Example:</b></p> <pre>Router (config)# chat-script gsm "" "ATDT*98*2#" TIMEOUT 60 "CONNECT"</pre>	<p>Defines the ATDT commands when the dialer is initiated.</p> <p><b>Note</b> You can define multiple chat scripts here (as in Step 5), one for each PDP context.</p>
<b>Step 14</b>	<pre>Router(config)# interface cellular &lt;slot/wic/port&gt;</pre> <p><b>Example:</b></p> <pre>Router (config)# interface cellular 0/1/0</pre>	Specifies the cellular interface.

## Configuring DDR Backup

To monitor the primary connection and initiate the backup connection when needed, the router can use one of the following methods:

- Backup Interface—The backup interface that stays in standby mode until the primary interface line protocol is detected as down and then is brought up.
- Floating Static Route—The route through the backup interface has an administrative distance that is greater than the administrative distance of the primary connection route and therefore would not be in the routing table until the primary interface goes down.
- Dialer Watch—Dialer watch is a backup feature that integrates dial backup with routing capabilities.

### Configuring Interfaces to Use a Backup Interface

To configure one or more interfaces to use a backup interface, use the following commands, beginning in global configuration mode.

#### SUMMARY STEPS

1. **interface** *type number*
2. **backup interface cellular** *number*
3. **backup delay** *enable-delay disable-delay*



## DETAILED STEPS

	Command or Action	Purpose
<b>Step 1</b>	Router(config)# <b>interface</b> type number  <b>Example:</b> Router(config)# interface ATM0/0/0	Specifies the interface to be backed up and begins interface configuration mode.
<b>Step 2</b>	Router(config-if)# <b>backup interface cellular</b> <number>  <b>Example:</b> Router(config-if)# backup interface cellular0/3/0	Specifies the cellular interface as backup.
<b>Step 3</b>	Router(config-if)# <b>backup delay</b> enable-delay disable-delay  <b>Example:</b> Router(config-if)# backup delay enable delay	Specifies delay between the physical interface going down and the backup interface being enabled, and between the physical interface coming back up and the backup being disabled.

**Note**

You cannot configure a backup interface for the cellular interface and any other asynchronous serial interface.

## Configuring DDR Backup Using Dialer Watch

To initiate dialer watch, you must configure the interface to perform DDR and backup. Use traditional DDR configuration commands, such as dialer maps, for DDR capabilities. To enable dialer watch on the backup interface and create a dialer list, use the following commands in interface configuration mode.

## SUMMARY STEPS

1. **configure terminal**
2. **interface** type number
3. **dialer watch group** group-number
4. **dialer watch-list** group-number **ip** ip-address address-mask
5. **dialer-list** <dialer-group> **protocol** <protocol name> { **permit** | **deny** | **list** <access list number> | **access-group** }
6. **ip access-list** <access list number> **permit** <ip source address>
7. **interface cellular** <slot/wic/port>
8. **dialer string** <string>

## DETAILED STEPS

	Command or Action	Purpose
Step 1	Router# <b>configure terminal</b>  <b>Example:</b> Router# configure terminal	Enters global configuration mode from the terminal.
Step 2	Router(config)# <b>interface</b> type number  <b>Example:</b> Router (config)# interface ATM0/0/0	Specifies the interface.
Step 3	Router(config-if)# <b>dialer watch-group</b> group-number  <b>Example:</b> Router(config-if)# dialer watch-group 2	Enables dialer watch on the backup interface.
Step 4	Router(config)# <b>dialer watch-list</b> group-number <b>ip</b> ip-address address-mask  <b>Example:</b> Router(config-if)# dialer watch-list 2 ip 10.4.0.254 255.255.0.0	Defines a list of all IP addresses to be watched.
Step 5	Router(config)# <b>dialer-list</b> <dialer-group> <b>protocol</b> <protocol-name> { <b>permit</b>   <b>deny</b>   <b>list</b> <access-list-number>   <b>access-group</b> >  <b>Example:</b> Router(config)# dialer-list 2 protocol ip permit	Creates dialer list for traffic of interest and permits access to an entire protocol.
Step 6	Router(config)# <b>ip access-list</b> <access list number> <b>permit</b> <ip source address>  <b>Example:</b> Router(config)# access list 2 permit 10.4.0.0	Defines traffic of interest.  <b>Note</b> Do not use the <b>access list permit all</b> command to avoid sending traffic to the IP network. This may result in call termination.
Step 7	Router(config)# <b>interface cellular</b> <slot/wic/port>  <b>Example:</b> Router (config)# interface cellular 0/1/0	Specifies the cellular interface.
Step 8	Router(config-if)# <b>dialer string</b> <string>  <b>Example:</b> Router (config)# dialer string cdma	Specifies the dialer script (defined using the <b>chat script</b> command).

## Configuring DDR Backup Using Floating Static Route

To configure a floating static default route on the secondary interface beginning in the global configuration mode, perform the following tasks.

**Note**

Make sure you have ip classless enabled on your router.

**SUMMARY STEPS**

1. **configure terminal**
2. **ip route** *network-number network-mask* {ip address | interface} [administrative distance] [**name** *name*]

**DETAILED STEPS**

	Command or Action	Purpose
<b>Step 1</b>	Router# <b>configure terminal</b>  <b>Example:</b> Router# configure terminal	Enters global configuration mode from the terminal.
<b>Step 2</b>	Router(config)# <b>ip route</b> network-number network-mask {ip-address   interface} [administrative distance] [ <b>name</b> name]  <b>Example:</b> Router (config)# ip route 0.0.0.0 Dialer 2 track 234	Establishes a floating static route with the configured administrative distance through the specified interface.  <b>Note</b> A higher administrative distance should be configured for the route through the backup interface, so that it is used only when the primary interface is down.

**Voice Initiated Data Callback or Remote Dial-in (Optional)**

The dial-in feature uses the cellular voice connection request to initiate data call back from an HWIC.

**Note**

For HWICs which support multiple PDP contexts, callback will be initiated only for the first PDP context, for example, for the interface Cellular 0/x/0.

To configure voice-initiated data callback or remote dial-in on your modem, use the following commands in privileged EXEC mode.

**SUMMARY STEPS**

1. **dialer caller callback**
2. **show caller**
3. **debug cellular messages callback**

## DETAILED STEPS

	Command or Action	Purpose
Step 1	Router# <b>dialer caller</b> <number> <b>callback</b>  <b>Example:</b> Router# <b>dialer caller</b> 23456789 <b>callback</b>	Configures caller ID screening for a dialer rotary group interface or to bind an incoming call to a particular dialer profile.  Use the <b>no dialer caller callback</b> command to disable callback.  <b>Note</b> In general, the use of this command performs call screening in non-exact mode. It means that the leading numbers comparison is ignored when one of the configured caller ID or incoming call caller ID number is shorter. The comparison is done only for digits of the shorter number. When you configure the <b>dialer caller callback</b> command on the cellular interface, the exact mode is enforced if no wildcard characters, like <i>x</i> are specified in the dialer string. In the exact mode, if the numbers do not match in length or in digits, the callback will fail.
Step 2	Router# <b>show caller</b>	Shows caller ID screening.
Step 3	Router# <b>debug cellular</b> <unit> <b>messages callback</b>  <b>Example:</b> Router# <b>debug cellular</b> 0 <b>messages callback</b>	Enables the driver level debug for callback screening.

**Note**

You can use the **dialer caller callback** command multiple times to configure multiple call back numbers.

## Configuration Examples for the 3G HWIC

This section provides the following configuration examples:

- [Basic Cellular Interface Configuration, page 28](#)
- [Multiple PDP Contexts Configuration, page 29](#)
- [Tunnel over Cellular Interface Configuration, page 30](#)
- [3G Wireless Modem as Backup with NAT and IPSec, page 32](#)
- [Voice-Initiated Data Callback, page 35](#)

### Basic Cellular Interface Configuration

The following example shows how to configure the cellular interface to be used as a primary and is configured as the default route:

```

chat-script gsm "" "ATDT*98*2#" TIMEOUT 60 "CONNECT"

!
interface Cellular0/0/0
 ip address negotiated
 encapsulation ppp
 dialer in-band
 dialer string gsm
 dialer-group 1
 async mode interactive
 ppp chap hostname cisco@wwan.ccs
 ppp chap password 0 cisco
 ppp ipcp dns request
!

!
!
access-list 1 permit any
dialer-list 1 protocol ip list 1
!
line 0/0/0
 exec-timeout 0 0
 script dialer gsm
 login
 modem InOut

```

## Multiple PDP Contexts Configuration

```

chat-script pdp1 "" "atdt*98*1#" TIMEOUT 180 "CONNECT"
chat-script pdp2 "" "atdt*98*2#" TIMEOUT 180 "CONNECT"

interface Cellular0/1/0
 bandwidth 237
 ip address negotiated
 encapsulation ppp
 no sh
 load-interval 30
 dialer in-band
 dialer idle-timeout 0
 dialer string pdp1
 dialer-group 1
 no peer default ip address
 async mode interactive
 no ppp lcp fast-start
 ppp chap hostname ccspbsc064.acfes.org
 ppp chap password 0 nopassword
 ppp ipcp dns request
 routing dynamic
!
interface Cellular0/1/1
 ip address negotiated
 encapsulation ppp
 no sh
 load-interval 30
 dialer in-band
 dialer idle-timeout 100000
 dialer string pdp2
 dialer-group 1
 no peer default ip address
 async mode interactive
 no ppp lcp fast-start

```

```

ppp chap hostname isp.cingular
ppp chap password 0 cingular1
ppp ipcp dns request
routing dynamic
!
ip route 0.0.0.0 0.0.0.0 Cellular0/1/0
ip route 60.60.60.60 255.255.255.255 Cellular0/1/1
dialer-list 1 protocol ip permit

line 0/1/0
exec-timeout 0 0
script dialer pdp1
login
modem InOut
no exec
transport input all
transport output all
autoselect during-login
autoselect ppp
speed 237000

line 0/1/1
exec-timeout 0 0
script dialer pdp2
login
modem InOut
no exec
transport input all
transport output all
autoselect during-login
autoselect ppp
speed 237000

```

## Tunnel over Cellular Interface Configuration

The following example shows how to configure the static IP address when a tunnel interface is configured with **ip address unnumbered** <cellular interface>:

```

interface Tunnel2
ip unnumbered Cellular0/3/0
tunnel source Cellular0/3/0
tunnel destination 128.107.248.254

interface Cellular0/3/0
bandwidth receive 1400000
ip address 23.23.0.1 255.255.0.0
ip nat outside
ip virtual-reassembly
encapsulation ppp
no ip mroute-cache
dialer in-band
dialer idle-timeout 0
dialer string dial<carrier>
dialer-group 1
async mode interactive
no ppp lcp fast-start
ppp chap hostname <hostname>

```

```
ppp chap password 0 <password>
ppp ipcp dns request

! traffic of interest through the tunnel/cellular interface
ip route 10.10.0.0 255.255.0.0 Tunnel2
```

## 3G Wireless Modem as Backup with NAT and IPsec

The following example shows how to configure the 3G wireless modem on the router as backup with NAT and IPsec:


**Note**

The receive and transmit speeds cannot be configured. The actual throughput depends on the cellular network service.

```

ip dhcp excluded-address 10.4.0.254
!
ip dhcp pool gsm pool
  network 10.4.0.0 255.255.0.0
  dns-server 66.209.10.201 66.102.163.231
  default-router 10.4.0.254
!
!
chat-script gsm "" "atdt*98*1#" TIMEOUT 30 "CONNECT"

crypto isakmp policy 1
  encr 3des
  authentication pre-share
crypto isakmp key gsm address 128.107.241.234
!
!
crypto ipsec transform-set gsm ah-sha-hmac esp-3des
!
crypto map gsm1 10 ipsec-isakmp
  set peer 128.107.241.234
  set transform-set gsm
  match address 103
!
!
interface ATM0/0/0
  no ip address
  ip virtual-reassembly
  load-interval 30
  no atm ilmi-keepalive
  dsl operating-mode auto
!
interface ATM0/0/0.1 point-to-point
  backup interface Cellular0/3/0
  ip nat outside
  ip virtual-reassembly
  no snmp trap link-status
  pvc 0/35
  pppoe-client dial-pool-number 2
!
!
interface Cellular0/3/0
  bandwidth receive 1400000
  ip address negotiated
  ip nat outside
  ip virtual-reassembly
  encapsulation ppp
  no ip mroute-cache
  dialer in-band
  dialer idle-timeout 0
  dialer string gsm
  dialer-group 1
  async mode interactive

```



```

no ppp lcp fast-start
ppp chap hostname cisco@wwan.ccs
ppp chap password 0 cisco
ppp ipcp dns request
crypto map gsm1
!

interface Vlan104
description used as default gateway address for DHCP clients
ip address 10.4.0.254 255.255.0.0
ip nat inside
ip virtual-reassembly
!
interface Dialer2
ip address negotiated
ip mtu 1492
ip nat outside
ip virtual-reassembly
encapsulation ppp
load-interval 30
dialer pool 2
dialer-group 2
ppp authentication chap callin
ppp chap hostname cisco@dsl.com
ppp chap password 0 cisco
ppp ipcp dns request
crypto map gsm1
!
ip local policy route-map track-primary-if
ip route 0.0.0.0 0.0.0.0 Dialer2 track 234
ip route 0.0.0.0 0.0.0.0 Cellular0/3/0 254
!
!
ip nat inside source route-map nat2cell interface Cellular0/3/0 overload
ip nat inside source route-map nat2dsl interface Dialer2 overload
!
ip sla 1
icmp-echo 209.131.36.158 source-interface Dialer2
timeout 1000
frequency 2
ip sla schedule 1 life forever start-time now
access-list 1 permit any
access-list 2 permit 10.4.0.0 0.0.255.255
access-list 3 permit any
access-list 101 permit ip 10.4.0.0 0.0.255.255 any
access-list 102 permit icmp any host 209.131.36.158
access-list 103 permit ip host 166.138.186.119 128.107.0.0 0.0.255.255
access-list 103 permit ip host 75.40.113.246 128.107.0.0 0.0.255.255
dialer-list 1 protocol ip list 1
dialer-list 2 protocol ip permit
!
!
route-map track-primary-if permit 10
match ip address 102
set interface Dialer2
!
route-map nat2dsl permit 10
match ip address 101
match interface Dialer2
!
route-map nat2cell permit 10
match ip address 101
match interface Cellular0/3/0
!

```

## ■ Configuration Examples for the 3G HWIC

```
line 0/3/0
  exec-timeout 0 0
  script dialer dial gsm
  login
  modem InOut
```

## Voice-Initiated Data Callback

The following example shows how to configure voice-initiated data callback on the router:

```

hostname 1900
!
boot-start-marker
boot-end-marker
!
security passwords min-length 1
enable password lab
!
no aaa new-model
service-module wlan-ap 0 bootimage autonomous
!
no ipv6 cef
ip source-route
ip cef

!
!
multilink bundle-name authenticated
!
chat-script cdma "" "atdt#777" TIMEOUT 60 "CONNECT"
chat-script gsm "" "atdt*98*2#" TIMEOUT 180 "CONNECT"
!
!
license udi pid CISCO1941-W sn FHH1249P021
!
!
archive
  log config
  hidekeys
!
!
controller Cellular 0/0
!
!
!
interface Loopback1
  ip address 1.1.1.1 255.255.255.255
!
interface Wlan-GigabitEthernet0/0
  description Internal switch interface connecting to the embedded AP
!
interface GigabitEthernet0/0
  no ip address
  shutdown
  duplex auto
  speed auto
!
interface wlan-ap0
  description Service module interface to manage the embedded AP
  no ip address
  shutdown
  arp timeout 0
  no mop enabled
  no mop sysid
!
interface GigabitEthernet0/1
  no ip address
  shutdown

```

```

duplex auto
speed auto
!
interface Cellular0/0/0
 ip address negotiated
 encapsulation ppp
 no ip mroute-cache
 load-interval 30
 dialer in-band
 dialer pool-member 1
 dialer-group 1
 no peer default ip address
 fair-queue 64 16 0
 no ppp lcp fast-start
 routing dynamic
!
interface Vlan1
 no ip address
!
interface Dialer1
 ip address negotiated
 encapsulation ppp
 dialer pool 1
 dialer idle-timeout 0
 dialer string cdma
 dialer caller 9994082188382 callback
 dialer-group 1
!
ip forward-protocol nd
ip route 0.0.0.0 0.0.0.0 Dialer1
!
no ip http server
no ip http secure-server
!
!
dialer-list 1 protocol ip permit
!
!
snmp-server group steeler3g v3 auth match exact notify 3gView
snmp-server community public RW
snmp-server community steeler3g-test RW
snmp-server enable traps c3g
snmp-server host 172.27.168.158 public c3g
snmp-server host 172.27.168.158 public udp-port 6059
!
control-plane
!
!
line con 0
 exec-timeout 0 0
line aux 0
line 0/0/0
 script dialer cdma
 login
 modem InOut
 no exec
 transport input all
 transport output all
 rxspeed 3100000
 txspeed 1800000
line 67
 no activation-character
 no exec
 transport preferred none

```

```
transport input all
transport output pad telnet rlogin lapb-ta mop udptn v120 ssh
line vty 0 3
password lab
login
!
exception data-corruption buffer truncate
scheduler allocate 20000 1000
end

1900#
```

# Modem Firmware Upgrade

The fixed and modular ISRs have a 3G modem from Sierra Wireless. The firmware for the modem is upgradable using Cisco IOS commands. The firmware is packaged in a tar distribution file and can be downloaded from the wireless software download page on Cisco.com. Use the following procedure to upgrade the modem firmware:



## Caution

Before upgrading the modem to a new firmware version, please check if the new firmware version has been certified by your wireless service provider. Using an uncertified firmware version on the modem may impact the wireless service provider network adversely.



## Note

You can also remotely download firmware over the air by following the same steps listed below.

Refer to the following website for the latest certified firmware version for your carrier and IOS compatibility:

[http://www.cisco.com/en/US/products/hw/routers/networking\\_solutions\\_products\\_generic\\_content0900aecd80601f7e.html](http://www.cisco.com/en/US/products/hw/routers/networking_solutions_products_generic_content0900aecd80601f7e.html)

## SUMMARY STEPS

**Step 1** Go to the Cisco Wireless WAN software download website at:

<http://software.cisco.com/download/type.html?mdfid=281295483&flowid=7001>

and select GSM Modem Firmware.



## Note

For remote download, you can transfer this using the 3G wireless link from Cisco.com onto flash. You must configure external dialer and dialer persistent in order to bring the interface and the dialer up again.

**Step 2** Download the appropriate GSM firmware release under Wireless Integrated Switches and Routers.

**Step 3** Use the archive command to untar the firmware distribution into router flash:

```
archive tar /xtract source-url destination-url
```

**Step 4** Use the following command to initiate the firmware upgrade process:


```
microcode reload cellular pa-bay slot gsm modem-provision
```



## Note

For remote downloads, if 3G is your only link, you will lose connectivity. Connectivity is restored after the download. If you have opted for logging in step 4, the firmware log file would be available on flash with the download status.

## DETAILED STEPS

	Command or Action	Purpose
<b>Step 1</b>	Go to the Download Software website at: <a href="http://software.cisco.com/download/navigator.html">http://software.cisco.com/download/navigator.html</a> and select Wireless > Wireless Integrated Switches and Routers > Cisco 3G Wireless WAN (GPRS/EDGE/UMTS/HSDPA) High-Speed Wan Interface Card > GSM Modem Firmware.	Gives you access to Cisco Wireless WAN software downloads. Select the firmware for Cisco 3G.  <b>Note</b> This website is only available to registered Cisco.com users.
<b>Step 2</b>	Download the appropriate GSM firmware release under Wireless Integrated Switches and Routers.	Downloads the modem firmware package to a TFTP/FTP server that is accessible from the router with 3G.
<b>Step 3</b>	router# <code>archive tar /xtract source-url destination-url</code>  <b>Example:</b> Router# <code>archive tar /xtract tftp://192.168.1.1/MC8775_1_0_0_7_package.tar flash:</code>	Uncompresses the files of the modem firmware package and copies them to a location that is accessible by the router with 3G.  <i>source-url</i> —URL of the source location with the firmware TAR filename. Valid URLs can refer to TFTP or HTTP servers or to router flash memory.  <i>destination-url</i> —URL of the destination where the tar file would be extracted. Use router flash.
<b>Step 4</b>	router# <code>microcode reload cellular pa-bay slot gsm modem-provision</code>	Initiates the firmware upgrade process.  <i>pa-bay</i> —Use 0 for HWIC.  <i>slot</i> —slot number where the HWIC is plugged in.   <b>Note</b> For remote download, you can transfer this using the 3G wireless link from Cisco.com onto flash. You must configure external dialer and dialer persistent in order to bring the interface and the dialer up again.

**Caution**

Do not disconnect power or switch the router off during the firmware upgrade process. This may result in permanent modem failure.

## Additional References

The following sections provide references related to configuring 3G on modular and fixed Cisco ISRs.

## Related Documents

Related Topic	Document Title
Supported Cisco Antennas	<ul style="list-style-type: none"> <li>• <a href="#">Cisco Multiband Swivel Mount Dipole Antenna (3G-ANTM1919D)</a></li> <li>• <a href="#">Cisco Multiband Omnidirectional Ceiling Mount Antenna (3G-ANTM1916-CM)</a></li> <li>• <a href="#">Cisco Single-Port Antenna Stand for Multiband TNC Male-Terminated Portable Antenna (3G-AE015-R)</a></li> <li>• <a href="#">Cisco 3G Omnidirectional Outdoor Antenna (3G-ANTM-OUT-OM)</a></li> <li>• <a href="#">Cisco 3G Low Profile Outdoor Antenna (3G-ANTM-OUT-LP)</a></li> <li>• <a href="#">Cisco 3G Lightning Arrestor (3G-ACC-OUT-LA)</a></li> <li>• <a href="#">Cisco Single-Port Antenna Stand for Multiband TNC Male-Terminated Portable Antenna (3G-AE010-R)</a></li> </ul>
Hardware Installation	<p>Chapter 13 in the <a href="#">Cisco Interface Cards Hardware Installation Guide</a>, “Connecting 3G Wireless High-Speed WAN Interface Cards to a Network.”</p> <p>For installation information on the Cisco 880 Series ISRs, see the <a href="#">Cisco 860 Series</a>, <a href="#">Cisco 880 Series</a>, and <a href="#">Cisco 890 Series Integrated Services Routers Hardware Installation Guide</a>.</p>

## Technical Assistance

Description	Link
The Cisco Technical Support & Documentation website contains thousands of pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	<a href="http://www.cisco.com/techsupport">http://www.cisco.com/techsupport</a>



# Command Reference

This section documents new and modified commands.

- [cellular gsm band](#)
- [cellular gsm mep unlock](#)
- [cellular gsm plmn search](#)
- [cellular gsm plmn select](#)
- [cellular gsm profile create](#)
- [cellular gsm sim change-pin](#)
- [cellular gsm sim lock](#)
- [cellular gsm sim unblock](#)
- [cellular gsm sim unlock](#)
- [debug cell-hwic driver](#)
- [debug cell-hwic firmware](#)
- [debug cell-hwic virt-con](#)
- [debug cellular messages all](#)
- [debug cellular messages async](#)
- [debug cellular messages data](#)
- [debug cellular messages management](#)
- [gsm radio off](#)
- [gsm sim authenticate](#)
- [show cellular all](#)
- [show cellular connection](#)
- [show cellular hardware](#)
- [show cellular network](#)
- [show cellular profile](#)
- [show cellular radio](#)
- [show cellular security](#)
- [show controllers cellular](#)
- [show interfaces cellular](#)
- [show run interface cellular](#)

## Electronic Serial Number (ESN)

The ESN number is located directly on the modem label in hexadecimal notation. It can also be retrieved using the Cisco IOS CLI using the **show cellular all** command.

The sample output below shows the ESN number:

```
Profile Information
=====
Electronic Serial Number (ESN) = 0x603C9854
```

### Converting Hexadecimal ESN to Decimal Notation

To convert the ESN number from hexadecimal notation to decimal notation, follow this procedure:

- 
- Step 1** Start with the 8-digit HEX ESN # obtained from the label or using CLI, for example 0x603C9854. This number consists of two parts:
- 0x60—Serial number
  - 3C9854—Manufacturer's code
- Step 2** Convert manufacturer's code to decimal as shown:  
Hexadecimal 0x60 equals decimal 96.  
If decimal value is two digits only, prepend it with a zero to expand it to three digits.  
Manufacturer's code is thus 096
- Step 3** Convert the serial number to decimal, as shown in the example below:  
Hexadecimal 0x3C9854 equals decimal 3971156  
If decimal value is less than 8 digits, add enough zeros to make it into an 8 digit number.  
Serial number is thus 03971156
- Step 4** To obtain complete 11-digit decimal ESN notation, combine manufacturer code and serial number:  
Manufacturer code: 096  
Serial #: 03971156  
Decimal ESN: 09603971156
-

# cellular gsm band

To select a particular band manually, use the **cellular gsm band** command in privileged EXEC mode.

```
cellular slot/wic_slot/port gsm band <band>
```



## Note

Only the bands that can be selected by the modem are listed.

## Syntax Description

<i>slot/wic_slot/port</i>	Numeric values that indicate the router slot, WAN interface card (WIC) slot, and port.
<i>band</i>	Number for the profile you are creating. You can create up to 16 profiles.

## Command Default

None

## Command Modes

Privileged EXEC

## Command History

Release	Modification
12.4(15)T1	This command was introduced.
15.1(1)T	This command was integrated into Cisco IOS Release 15.1(1)T.

## Examples

The following example shows output for this command:

## Related Commands

Command	Description
<a href="#">cellular gsm profile delete</a>	Deletes an existing GSM profile.
<a href="#">show cellular profile</a>	Displays the modem data profiles created.

# cellular gsm mep unlock

If your modem is locked by Mobile Equipment Personalization (MEP), in order to submit the unlocking code to your service provider, use the **cellular gsm mep unlock** command in privileged EXEC mode.

```
cellular <unit> gsm mep unlock <puk><new pin>]
```

## Syntax Description

<i>unit</i>	Cellular modem.
<i>puk</i>	Unlocking CHV1 code to be obtained from the carrier.
<i>pin</i>	A 4 to 8 character code provided by your carrier to lock or unlock the SIM card.

## Command Default

None

## Command Modes

Privileged EXEC

## Command History

Release	Modification
15.1(1)T	This command was introduced.

## Usage Guidelines

- Check the modem status by using the **show cellular security** command.
- Entering the command will result in modem reset automatically if you have entered the correct MEP code. If the code is incorrect, the modem pauses and resends notification to enter MEP code.



### Note

For modular routers, you must enter the slot/subslot/port numbers for the command. For fixed routers, you must enter slot/port numbers.

## Examples

To verify if the modem MEP is locked, use the **show cellular security** command. The following output is an example when the modem MEP is locked:

```
Router#sh cellular 0 security
Card Holder Verification (CHV1) = Disabled
SIM Status = MEP locked
SIM User Operation Required = Enter MEP code
Number of Retries remaining = 255
Router#
```

The following example shows output for this command when you enter a correct MEP PIN:

```
Router#cellular 0 gsm mep unlock 12348765
!!!WARNING: Modem will be MEP unlocked with PIN:12348765(8).
Interface will be shutdown for MEP unlock.
This will terminate any active data connection.Are you sure you want to proceed?[confirm]
```

```
MEP unlock code has been sent to modem for verification
Resetting modem, please wait...
```

```
*Sep 26 01:36:04.103: %CISCO800-2-MODEM_REMOVAL_DETECTED: Cellular0 modem is now REMOVED
*Sep 26 01:36:04.103: %CISCO800-2-MODEM_DOWN: Cellular0 modem is now DOWN.
*Sep 26 01:36:05.391: %LINK-5-CHANGED: Interface Cellular0, changed state to
administratively down
*Sep 26 01:36:10.443: Sierra Wireless 501modem is detected
*Sep 26 01:36:10.443: %CISCO800-2-MODEM_INSERTED_DETECTED: Cellular0 modem is now INSERTED
*Sep 26 01:36:17.551: %LINK-3-UPDOWN: Interface Cellular0, changed state to down
*Sep 26 01:36:45.867: %CISCO800-2-MODEM_UP: Cellular0 modem is now UP.
Router#
Router#
Router#sh cellular 0 security
Card Holder Verification (CHV1) = Disabled
SIM Status = OK
SIM User Operation Required = None
Number of Retries remaining = 3
Router#
```

### Related Commands

Command	Description
<a href="#">show cellular security</a>	Displays the SIM status and the modem lock state.

# cellular gsm plmn search

To search for the available public land mobile networks (PLMNs), use the **cellular gsm plmn search** command in privileged EXEC mode.

**cellular slot/wic\_slot/port gsm plmn search**

<b>Syntax Description</b>	<i>slot/wic_slot/port</i>	Numeric values that indicate the router slot, WAN interface card (WIC) slot, and port.
---------------------------	---------------------------	--

**Command Default** None

**Command Modes** Privileged EXEC

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.4(11)XV	This command was introduced.
	12.4(15)T	This command was integrated into Cisco IOS Release 12.4(15)T.
	15.1(1)T	This command was integrated into Cisco IOS Release 15.1(1)T.

## Usage Guidelines

This command searches for the available PLMNs or carrier networks at your location. After you issue this command, you must wait for the search completion message and then use the **show cellular network** command to view the list of the PLMNs available. It may take up to 5 minutes for the search to be completed.

## Examples

The following example shows output for this command:

```
router# cellular 0/1/0 gsm plmn search
router#
Dec 12 07:37:15.147: Searching for available PLMNS...Please wait...
Dec 12 07:37:45.095: PLMN search done. Please use "show cellular
x/x/x network" to see available PLMNS
c2800#sh cellular 0/1/0 network
<...deleted...>
Available PLMN's:
PLMN Name = <carrier name>
      MCC = 310, MNC = 380
      Status = Registered,, Network = Unknown
PLMN Name = <carrier name>
      MCC = 310, MNC = 380
      Status = Registered,Supports GPRS, Network = GSM
PLMN Name = <carrier name>
      MCC = 310, MNC = 17
      Status = Supports GPRS, Network = GSM
```

---

**Related Commands**

<b>Command</b>	<b>Description</b>
<a href="#">cellular gsm plmn select</a>	Allows manual or automatic selection of an available PLMN.

## cellular gsm plmn select

To manually or automatically select from the available public land mobile network (PLMN) in an area to attach the modem to, use the **cellular gsm plmn select** command in privileged EXEC mode.

```
cellular slot/wic_slot/port gsm plmn select { manual<mcc> <mnc>| auto }
```

Syntax Description		
	<i>slot/wic_slot/port</i>	Numeric values that indicate the router slot, WAN interface card (WIC) slot, and port.
	<b>manual</b>	Allows manual selection of the PLMN for the modem.
	<i>mcc</i>	Mobile country code—a number between 0 and 65535.
	<i>mnc</i>	Mobile network code—a number between 0 and 65535.
	<b>auto</b>	Automatically selects the PLMN available in the area.

**Command Default** By default, PLMN is set to automatic.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.4(11)XV	This command was introduced.
	12.4(15)T	This command was integrated into Cisco IOS Release 12.4(15)T.
	15.1(1)T	This command was integrated into Cisco IOS Release 15.1(1)T.

**Examples** The following example shows output for the **cellular gsm plmn select manual** command. In this example, the user selects PLMN with MCC=310, MNC=17. The **show cellular x/x/x network**, shows the modem attached to the EDGE network.

```
Dec 12 07:38:43.799: Selecting PLMN mode to Manual...Please wait...
Dec 12 07:38:43.811: PLMN Selection Successful
```

```
router# show cellular 0/1/0 network
Current Service Status = Normal, Service Error = None
Current Service = Combined
Packet Service = EDGE (Attached)
Packet Session Status = Inactive
Current Roaming Status = Roaming
Network Selection Mode = Manual
Country = USA, Network = Cinglr
Mobile Country Code (MCC) = 310
Mobile Network Code (MNC) = 17
Location Area Code (LAC) = 230
Routing Area Code (RAC) = 1
Cell ID = 25573
Primary Scrambling Code = 0
PLMN Selection = Manual
Registered PLMN = Cingular , Abbreviated = Cinglr
Service Provider = ROGERS
```



The following example shows output for the **cellular gsm plmn select auto** command.

```
router# cellular 0/1/0 gsm plmn select auto
router#
Dec 12 07:46:42.751: Selecting PLMN mode to Auto...Please wait...
Dec 12 07:46:42.763: PLMN Selection Successful
router#
router#sh cellular 0/1/0 network
Current Service Status = Normal, Service Error = None
Current Service = Combined
Packet Service = UMTS/WCDMA (Attached)
Packet Session Status = Inactive
Current Roaming Status = Roaming
Network Selection Mode = Automatic
Country = USA, Network = CINGULAR
Mobile Country Code (MCC) = 310
Mobile Network Code (MNC) = 380
Location Area Code (LAC) = 56997
Routing Area Code (RAC) = 253
Cell ID = 4503
Primary Scrambling Code = 169
PLMN Selection = Automatic
Registered PLMN = CINGULAR , Abbreviated = CINGULAR
Service Provider = ROGERS
```

#### Related Commands

Command	Description
<a href="#">cellular gsm plmn search</a>	Searches for and selects an available public land mobile network (PLMN).
<a href="#">cellular gsm profile create</a>	Creates a new GSM profile.
<a href="#">cellular gsm profile delete</a>	Deletes an existing GSM profile.

# cellular gsm profile create

To create a new modem data profile, use the **cellular gsm profile create** command in privileged EXEC mode.

```
cellular slot/wic_slot/port gsm profile create <profile number><apn><pdp
type><authentication><username><password>
```

## Syntax Description

<i>slot/wic_slot/port</i>	Numeric values that indicate the router slot, WAN interface card (WIC) slot, and port.
<i>profile number</i>	Number for the profile you are creating. You can create up to 16 profiles.
<i>apn</i>	Access point name. You must get this information from the service provider.
<i>pdp type</i>	PDP type. Can be set to IPv4 or ppp. Default is IPv4.
<i>authentication</i>	The type of authentication. For example, CHAP or PAP.
<i>username</i>	The username provided by your service provider.
<i>password</i>	The password provided by your service provider.

## Command Default

None

## Command Modes

Privileged EXEC

## Command History

Release	Modification
12.4(11)XV	This command was introduced.
12.4(15)T	This command was integrated into Cisco IOS Release 12.4(15)T.
15.1(1)T	This command was integrated into Cisco IOS Release 15.1(1)T.
15.1(4)M4	This command was modified to increase the lengths of the username and password from 32 to 128 B.

## Usage Guidelines

Some of the command parameters, such as username, password, and authentication, are optional, and do not need specification. When multiple profiles are created, you can select the profile used to set up the data call by including the profile number in the **ATDT** command (**ATDT\*99\*<profile number>#**). If you do not include a profile number in the **ATDT** command (**ATDT\*99#**), profile 1 is used.

## Examples

The following example shows output for this command:

```
router# cellular 0/0/0 gsm profile create 3 apn.com ipv4 chap GSM GSMPassword

Profile 3 will be created with the following values:
PDP type = IPv4
APN = apn.com
Authenticaton = CHAP
Username = GSM
```

```
Password = GSMPassword  
Are you sure? [confirm]y  
Profile 3 written to modem
```

**Related Commands**

<b>Command</b>	<b>Description</b>
<a href="#">cellular gsm profile delete</a>	Deletes an existing GSM profile.
<a href="#">show cellular profile</a>	Displays the modem data profiles created.

# cellular gsm sim change-pin

To change CHV1 pin for the SIM, use the **cellular gsm sim change-pin** command in privileged EXEC mode.

```
cellular <unit> gsm sim change-pin <old pin><new pin>]
```

Syntax Description	
<i>unit</i>	Cellular modem.
<i>pin</i>	A 4 to 8 digit numeric code provided by your carrier to lock or unlock the SIM card.

**Command Default** None

**Command Modes** Privileged EXEC

Command History	Release	Modification
	15.0(1)XA	This command was introduced.
	15.1(1)T	This command was integrated into Cisco IOS Release 15.1(1)T.

## Usage Guidelines

Typically, you can attempt to change pin only 3 times consecutively after which the SIM will get blocked, but the number of attempts will vary depending on your carrier. Using this command resets the modem.

If the old PIN is entered incorrectly, your PIN will not be changed.

You can verify the SIM status using the **show cellular security** command.

## Examples

The following example shows output for this command:

```
change SIM's PIN with SIM is not locked:
-----
#sh cellular 0 security
Card Holder Verification (CHV1) = Disabled
SIM Status = OK
SIM User Operation Required = None
Number of Retries remaining = 3
#
#
#cellular 0 gsm sim change-pin ?
WORD Old PIN (Length 4 to 8 digits)

#cellular 0 gsm sim change-pin 1234 5678 ?
<cr>

#cellular 0 gsm sim change-pin 1234 5678
!!!WARNING: SIM PIN will be changed from:1234(4) to:5678(4)
Call will be disconnected. If old PIN is entered incorrectly in 3 attempt(s), SIM will be
blocked!!!
```

```
Are you sure you want to proceed?[confirm]
Change CHV1 failed: CHV1 verification not enabled <<<=== SIM needs to be locked first
#
```

### Change SIM PIN with authentication in IOS:

```
-----
Card Holder Verification (CHV1) = Enabled
SIM Status = OK
SIM User Operation Required = None
Number of Retries remaining = 3
#
#cellular 0 gsm sim change-pin 1234 5678
!!!WARNING: SIM PIN will be changed from:1234(4) to:5678(4)
Call will be disconnected. If old PIN is entered incorrectly in 3 attempt(s), SIM will be
blocked!!!
Are you sure you want to proceed?[confirm]
Change CHV1 failed: Please remove 'gsm sim authenticate' from controller configuration and
then retry this command
#

* User needs to remove Auth from IOS first before can change PIN

(config)#controller cellular 0
(config-controller)#no gsm sim authenticate 0 1234 <<<=== this needs to be done first
before can change PIN
WARNING!!!This command will not unlock SIM. Please execute 'cellular <unit> gsm sim unlock
<pin>' to unlock SIM.
Resetting modem. Call will be disconnected.
(config-controller)#
*Sep 28 18:00:44.999: %CISCO800-2-MODEM_REMOVAL_DETECTED: Cellular0 modem is now REMOVED
*Sep 28 18:00:44.999: %CISCO800-2-CELLULAR_INTERFACE_NOT_SHUTDOWN: WARNING: Cellular0
interface should be shutdown before removing modem. Reload Required to reset interface
*Sep 28 18:00:44.999: %CISCO800-2-MODEM_DOWN: Cellular0 modem is now DOWN.
(config-controller)#end
#
*Sep 28 18:00:48.167: %SYS-5-CONFIG_I: Configured from console by console
*Sep 28 18:00:51.191: Sierra Wireless 501modem is detected
*Sep 28 18:00:51.191: %CISCO800-2-MODEM_INSERTED_DETECTED: Cellular0 modem is now INSERTED
#
#
*Sep 28 18:01:26.535: %CELLWAN-2-SIM_LOCKED: [Cellular0]: SIM is locked
*Sep 28 18:01:26.655: %CISCO800-2-MODEM_UP: Cellular0 modem is now UP.
#

#cellular 0 gsm sim change-pin 1234 5678
!!!WARNING: SIM PIN will be changed from:1234(4) to:5678(4)
Call will be disconnected. If old PIN is entered incorrectly in 3 attempt(s), SIM will be
blocked!!!
Are you sure you want to proceed?[confirm]
Resetting modem, please wait...

CHV1 code change has been completed. Please enter the new PIN in controller configuration
for verification
#
#
*Sep 28 18:02:32.051: %CISCO800-2-MODEM_REMOVAL_DETECTED: Cellular0 modem is now REMOVED
*Sep 28 18:02:32.051: %CISCO800-2-CELLULAR_INTERFACE_NOT_SHUTDOWN: WARNING: Cellular0
interface should be shutdown before removing modem. Reload Required to reset interface
*Sep 28 18:02:38.159: Sierra Wireless 501modem is detected
*Sep 28 18:02:38.159: %CISCO800-2-MODEM_INSERTED_DETECTED: Cellular0 modem is now INSERTED
*Sep 28 18:02:51.655: %CISCO800-2-MODEM_DOWN: Cellular0 modem is now DOWN.
#
```

**Note**

---

PIN must be in numeric, not letters or any other marks.

---

**Related Commands**


Command	Description
<a href="#">show cellular security</a>	Displays the SIM status and the modem lock state.

# cellular gsm sim lock

To lock or unlock the SIM card provided by your service provider, use the **cellular gsm sim lock** command in privileged EXEC mode.

```
cellular slot/wic_slot/port gsm sim lock <pin>
```

## Syntax Description

<i>slot/wic_slot/port</i>	Numeric values that indicate the router slot, WAN interface card (WIC) slot, and port.
<i>pin</i>	The numeric code provided by your carrier to lock or unlock the SIM card.
 <b>Note</b>	The code is only numeric and cannot be alphabets or other marks.

## Command Default

None.

## Command Modes

Privileged EXEC

## Command History

Release	Modification
12.4(15)T	This command was introduced.
15.0(1)XA	This command was modified.

## Usage Guidelines

To verify the SIM lock, use the **show cellular slot/wic\_slot/port security** command. To change the PIN, use the **cellular gsm sim change-pin** command.

## Examples

The following example shows output for this command:

```
Router#sh cellular 0 security
Card Holder Verification (CHV1) = Disabled
SIM Status = OK
SIM User Operation Required = None
Number of Retries remaining = 3
Router#

Router#cellular 0 gsm sim lock 1234
!!!WARNING: SIM will be locked with pin=1234(4).
Do not enter new PIN to lock SIM. Enter PIN that the SIM is configured with.
Call will be disconnected!!!
Are you sure you want to proceed?[confirm]
Router#
Router#
Router#
*Sep 28 17:33:04.052: %CISCO800-2-MODEM_REMOVAL_DETECTED: Cellular0 modem is now REMOVED
*Sep 28 17:33:04.056: %CISCO800-2-MODEM_DOWN: Cellular0 modem is now DOWN.
*Sep 28 17:33:10.724: Sierra Wireless 501modem is detected
*Sep 28 17:33:10.724: %CISCO800-2-MODEM_INSERTED_DETECTED: Cellular0 modem is now INSERTED
```

```

Router#
Router#
*Sep 28 17:33:46.032: %CELLWAN-2-SIM_LOCKED: [Cellular0]: SIM is locked
*Sep 28 17:33:46.140: %CISCO800-2-MODEM_UP: Cellular0 modem is now UP.
Router#
Router#sh cellular 0 security
Card Holder Verification (CHV1) = Enabled <<<=== lock sim is enabled
SIM Status = Locked <<<=== no authentication, user can not use SIM
SIM User Operation Required = Enter CHV1 <<<=== enter "gsm sim authentication <0|7> <PIN>
Number of Retries remaining = 3
Router#

```

If the modem is not ready, you will see the following output:

```

Router#cellular 0 gsm sim unlock 1234
Cellular0 Modem is still in reset, we recommend to re-execute this cmd after 60 seconds
Router#

```

```

Router(config)#controller cellular 0
Router(config-controller)#gsm sim authenticate ?
  0 Specifies an UNENCRYPTED (cleartext) PIN will follow
  7 Specifies a HIDDEN PIN will follow

Router(config-controller)#gsm sim authenticate 0 1234
CHV1 configured and sent to modem for verification
Router(config-controller)#
Router(config-controller)#end
Router#
*Sep 28 17:38:02.516: %SYS-5-CONFIG_I: Configured from console by console
Router#
Router#sh cellular 0 security
Card Holder Verification (CHV1) = Enabled <<<=== SIM locked is enabled
SIM Status = OK <<<=== authentication is correct, user may use SIM
SIM User Operation Required = None
Number of Retries remaining = 3
Router#

```

Output for **show cellular slot/wic\_slot/port security** to verify lock:

```

Router#show cellular 0/1/0 security
Card Holder Verification (CHV1) = Enabled
SIM Status = Locked
SIM User Operation Required = Enter CHV1
Number of Retries remaining = 3

```

Removing authentication with SIM still in locked state:

```

router(config)#controller cellular 0
router(config-controller)#no gsm sim authenticate 0 1234
WARNING!!!This command will not unlock SIM. Please execute 'cellular <unit> gsm sim unlock
<pin>' to unlock SIM.
Resetting modem. Call will be disconnected.
router(config-controller)#
router(config-controller)#
*Sep 28 17:40:07.808: %CISCO800-2-MODEM_REMOVAL_DETECTED: Cellular0 modem is now REMOVED
*Sep 28 17:40:07.808: %CISCO800-2-MODEM_DOWN: Cellular0 modem is now DOWN
router(config-controller)#
router(config-controller)#end
router#
*Sep 28 17:40:11.256: %SYS-5-CONFIG_I: Configured from console by console
*Sep 28 17:40:14.700: Sierra Wireless 501modem is detected

```



```
*Sep 28 17:40:14.700: %CISCO800-2-MODEM_INSERTED_DETECTED: Cellular0 modem is now INSERTED
router#
router#
*Sep 28 17:40:50.040: %CELLWAN-2-SIM_LOCKED: [Cellular0]: SIM is locked
*Sep 28 17:40:50.148: %CISCO800-2-MODEM_UP: Cellular0 modem is now UP
router#
```

**Note**


---

You will see high CPU when modem is not up and ready

---

You will see the following output if you enter wrong authentication:

```
router(config)#controller cellular 0
router(config-controller)#gsm sim authenticate 0 45689
CHV1 configured and sent to modem for verification
router(config-controller)#end
router#
*Sep 28 17:42:14.700: %CELLWAN-2-SIM_LOCKED: [Cellular0]: SIM is locked
*Sep 28 17:42:14.700: %CELLWAN-2-SIM_CHV1_CONFIG_REMOVED: [Cellular0]: CHV1 verification
failed: Incorrect PIN configured. Erased the CHV1 code from router running configuration
to avoid SIM blocking during modem reset/powercycle.
!!!WARNING: If the incorrect PIN is saved in router start-up configuration, please remove
it manually to avoid SIM blocking during router reload
*Sep 28 17:42:15.468: %SYS-5-CONFIG_I: Configured from console by console
router#
```

Booting up router with locked SIM without authentication configured in Cisco IOS:

```
router#
*Sep 28 21:47:08.411: %CELLWAN-2-SIM_LOCKED: [Cellular0]: SIM is locked
*Sep 28 21:47:08.531: %CISCO800-2-MODEM_UP: Cellular0 modem is now UP.
*Sep 28 21:47:16.675: %CELLWAN-2-SIM_LOCKED: [Cellular0]: SIM is locked
router#
router#sh cellular 0 security
Card Holder Verification (CHV1) = Enabled
SIM Status = Locked
SIM User Operation Required = Enter CHV1
Number of Retries remaining = 3 <<<=== no lost to retries
router#
```

Booting up router with unlock SIM with authentication configured in Cisco IOS:

```
router#
*Sep 28 21:14:42.575: %CISCO800-2-MODEM_UP: Cellular0 modem is now UP.
*Sep 28 21:14:45.575: %CELLWAN-2-SIM_SECURITY_SHUTDOWN: [Cellular0/0]: CHV1 PIN is
configured while SIM is unlocked. Shutting down all PDP interfaces
*Sep 28 21:14:47.771: %CELLWAN-2-SIM_SECURITY_SHUTDOWN: [Cellular0/0]: CHV1 PIN is
configured while SIM is unlocked. Shutting down all PDP interfaces
*Sep 28 21:14:50.611: %CELLWAN-2-SIM_SECURITY_SHUTDOWN: [Cellular0/0]: CHV1 PIN is
configured while SIM is unlocked. Shutting down all PDP interfaces
router#
router#sh run
Building configuration...

Current configuration : 2057 bytes
!
!
```

```

controller Cellular 0
  gsm sim authenticate 0 1234 <<<=== config remains with show run
  !
  !
interface Cellular0
  ip address negotiated
  encapsulation ppp
  shutdown <<<=== PDP context should be shut down
  !
router#

router#sh cellular 0 security
Card Holder Verification (CHV1) = Disabled
SIM Status = OK
SIM User Operation Required = None
Number of Retries remaining = 3 <<<=== no lost of retries
router#

```

The following is a sample output if you lock a locked SIM:

```

router#cellular 0 gsm sim lock 1234
!!!WARNING: SIM will be locked with pin=1234(4).
Do not enter new PIN to lock SIM. Enter PIN that the SIM is configured with.
Call will be disconnected!!!
Are you sure you want to proceed?[confirm]
Lock CHV1 failed: SIM status = Locked
router#

```

The following is a sample output for changing the SIM PIN when SIM is not locked:

```

router#sh cellular 0 security
Card Holder Verification (CHV1) = Disabled
SIM Status = OK
SIM User Operation Required = None
Number of Retries remaining = 3
router#
router#
router#cellular 0 gsm sim change-pin ?
  WORD Old PIN (Length 4 to 8 digits)

router#cellular 0 gsm sim change-pin 1234 5678 ?
  <cr>

router#cellular 0 gsm sim change-pin 1234 5678
!!!WARNING: SIM PIN will be changed from:1234(4) to:5678(4)
Call will be disconnected. If old PIN is entered incorrectly in 3 attempt(s), SIM will be
blocked!!!
Are you sure you want to proceed?[confirm]
Change CHV1 failed: CHV1 verification not enabled <<<=== SIM needs to be locked first
router#

```

Change SIM's PIN with authentication in Cisco IOS:

```

Card Holder Verification (CHV1) = Enabled
SIM Status = OK
SIM User Operation Required = None
Number of Retries remaining = 3
router#

```

```

router#cellular 0 gsm sim change-pin 1234 5678
!!!WARNING: SIM PIN will be changed from:1234(4) to:5678(4)
Call will be disconnected. If old PIN is entered incorrectly in 3 attempt(s), SIM will be
blocked!!!
Are you sure you want to proceed?[confirm]
Change CHV1 failed: Please remove 'gsm sim authenticate' from controller configuration and
then retry this command
router#

```

**Note**


---

You must remove authentication from IOS first before you can change the PIN.

---

```

router(config)#controller cellular 0
router(config-controller)#no gsm sim authenticate 0 1234 <<<=== this needs to be done
first before can change PIN
WARNING!!!This command will not unlock SIM. Please execute 'cellular <unit> gsm sim unlock
<pin>' to unlock SIM.
Resetting modem. Call will be disconnected.
router(config-controller)#
*Sep 28 18:00:44.999: %CISCO800-2-MODEM_REMOVAL_DETECTED: Cellular0 modem is now REMOVED
*Sep 28 18:00:44.999: %CISCO800-2-CELLULAR_INTERFACE_NOT_SHUTDOWN: WARNING: Cellular0
interface should be shutdown before removing modem. Reload Required to reset interface
*Sep 28 18:00:44.999: %CISCO800-2-MODEM_DOWN: Cellular0 modem is now DOWN.
router(config-controller)#end
router#
*Sep 28 18:00:48.167: %SYS-5-CONFIG_I: Configured from console by console
*Sep 28 18:00:51.191: Sierra Wireless 501modem is detected
*Sep 28 18:00:51.191: %CISCO800-2-MODEM_INSERTED_DETECTED: Cellular0 modem is now INSERTED
router#
router#
*Sep 28 18:01:26.535: %CELLWAN-2-SIM_LOCKED: [Cellular0]: SIM is locked
*Sep 28 18:01:26.655: %CISCO800-2-MODEM_UP: Cellular0 modem is now UP.
router#

router#cellular 0 gsm sim change-pin 1234 5678
!!!WARNING: SIM PIN will be changed from:1234(4) to:5678(4)
Call will be disconnected. If old PIN is entered incorrectly in 3 attempt(s), SIM will be
blocked!!!
Are you sure you want to proceed?[confirm]
Resetting modem, please wait...

CHV1 code change has been completed. Please enter the new PIN in controller configuration
for verification
router#
router#
*Sep 28 18:02:32.051: %CISCO800-2-MODEM_REMOVAL_DETECTED: Cellular0 modem is now REMOVED
*Sep 28 18:02:32.051: %CISCO800-2-CELLULAR_INTERFACE_NOT_SHUTDOWN: WARNING: Cellular0
interface should be shutdown before removing modem. Reload Required to reset interface
*Sep 28 18:02:38.159: Sierra Wireless 501modem is detected
*Sep 28 18:02:38.159: %CISCO800-2-MODEM_INSERTED_DETECTED: Cellular0 modem is now INSERTED
*Sep 28 18:02:51.655: %CISCO800-2-MODEM_DOWN: Cellular0 modem is now DOWN.

```

Command	Description
<a href="#">show cellular security</a>	Displays the SIM status and modem lock state.
<a href="#">cellular gsm sim change-pin</a>	Changes the CHV1 PIN for the SIM.

# cellular gsm sim unblock

To unblock the SIM card provided by your service provider if the CHV1 has been blocked, use the **cellular gsm sim unblock** command in privileged EXEC mode.

```
cellular <unit> gsm sim unblock <puk><new pin>]
```

Syntax Description	Parameter	Description
	<i>unit</i>	The cellular device for which SIM is to be unblocked.
	<i>puk</i>	Unlocking 8-digit CHV1 code to be obtained from the carrier.
	<i>pin</i>	A 4 to 8 character code provided by your carrier to lock or unlock the SIM card.

**Command Default** None

**Command Modes** Privileged EXEC

Command History	Release	Modification
	15.1(1)T	This command was introduced.

**Usage Guidelines** You can verify the unlocked mode by using the **show cellular slot/wic\_slot/port security** command.



### Note

The device will become permanently blocked and the SIM completely unusable if the unlocking code is not entered correctly after, usually, 10 attempts. The permitted number of attempts can vary depending on the SIM.

### Examples

The following example shows output for this command:

```
Router#Cellular 0/1/0 gsm sim unblock 60265772 1234
!!!WARNING: SIM will be unblocked with PUK=60265772(8).
If successful, SIM will be locked with new PIN:1234(4)!!!
Are you sure you want to proceed?[confirm]
Resetting modem, please wait...

CHV1 unblock has been completed. Please enter the new PIN in controller configuration for
verification
router#
router#
router#
*Sep 28 18:11:37.263: %CISCO800-2-MODEM_REMOVAL_DETECTED: Cellular0 modem is now REMOVED
*Sep 28 18:11:37.263: %CISCO800-2-CELLULAR_INTERFACE_NOT_SHUTDOWN: WARNING: Cellular0
interface should be shutdown before removing modem. Reload Required to reset interface
*Sep 28 18:11:37.263: %CISCO800-2-MODEM_DOWN: Cellular0 modem is now DOWN.
*Sep 28 18:11:44.183: Sierra Wireless 50lmodem is detected
*Sep 28 18:11:44.183: %CISCO800-2-MODEM_INSERTED_DETECTED: Cellular0 modem is now INSERTED
*Sep 28 18:12:19.467: %CELLWAN-2-SIM_LOCKED: [Cellular0]: SIM is locked
```

```
*Sep 28 18:12:19.575: %CISCO800-2-MODEM_UP: Cellular0 modem is now UP.
router#
router#
router#sh cellular 0 security
Card Holder Verification (CHV1) = Enabled
SIM Status = Locked
SIM User Operation Required = Enter CHV1
Number of Retries remaining = 3
router#
```

Related Commands	Command	Description
	<a href="#">show cellular security</a>	Displays the SIM status and modem lock state.

# cellular gsm sim unlock

To unlock the SIM card provided by your service provider, use the **cellular gsm sim unlock** command in privileged EXEC mode.

```
cellular slot/wic_slot/port gsm sim unlock <pin>]
```

Syntax Description		
<i>slot/wic_slot/port</i>		Numeric values that indicate the router slot, WAN interface card (WIC) slot, and port.
<i>pin</i>		A 4 to 8 digit numeric code provided by your carrier to lock or unlock the SIM card.

**Command Default** None

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.4(15)T1	This command was introduced.

**Usage Guidelines** You can verify the unlocked mode by using the **show cellular slot/wic\_slot/port security** command.

**Examples** The following example shows output for this command:

```
Router#Cellular 0/1/0 gsm sim unlock 1234
!!!WARNING: SIM will be unlocked with pin=1234(4), call will be disconnected!!!
Are you sure you want to proceed?[confirm]
```

Related Commands	Command	Description
	<a href="#">show cellular security</a>	Displays the SIM status and the modem lock state.

# debug cell-hwic driver

To debug the Cisco IOS driver for the cellular interface, use the **debug cell-hwic driver** command in EXEC mode.

```
debug cell-hwic slot/wic_slot/port driver {crcdump | errdump | errors}
```

Syntax Description	<i>slot/wic_slot/port</i>	Numeric values that indicate the router slot, WAN interface card (WIC) slot, and port.
	<b>crcdump</b>	CRC error details.
	<b>errdump</b>	Other error details.
	<b>errors</b>	Errors debugging.

**Command Default** None

**Command Modes** EXEC (#)

Command History	Release	Modification
	12.4(11)XV	This command was introduced.
	12.4(15)T	This command was integrated into Cisco IOS Release 12.4(15)T.
	12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

**Usage Guidelines** Use this command for debugging purposes only.

Related Commands	Command	Description
	<b>debug cellular messages async</b>	Debugs cellular async.
	<b>debug cellular messages data</b>	Prints Cisco IOS data path debug messages.
	<b>debug cellular firmware</b>	Displays Cisco IOS firmware information.
	<b>debug cellular messages management</b>	Prints management path messages, such as CnS.
	<b>debug cellular messages dm</b>	Prints diagnostics monitor (DM) messages from the Qualcomm CDMA chipset.
	<b>debug cell-hwic virt-con</b>	Redirects the Nios II console driver messages to display them in the Cisco IOS router console environment.

## debug cell-hwic firmware

To see the Cisco IOS firmware information, use the **debug cell-hwic firmware** command in EXEC mode.

**debug cellular** *slot/wic\_slot/port* **firmware**

<b>Syntax Description</b>	<i>slot/wic_slot/port</i>	Numeric values that indicate the router slot, WAN interface card (WIC) slot, and port.
---------------------------	---------------------------	--

<b>Command Default</b>	None
------------------------	------

<b>Command Modes</b>	EXEC
----------------------	------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.4(11)XV	This command was introduced.
	12.4(15)T	This command was integrated into Cisco IOS Release 12.4(15)T.
	12.4(22)YB1	This command was integrated into Cisco IOS Release 12.4(22)YB1.

<b>Usage Guidelines</b>	Use this command for debugging purposes only.
-------------------------	---

<b>Related Commands</b>	<b>Command</b>	<b>Description</b>
	<a href="#">debug cellular messages async</a>	Debugs cellular async.
	<a href="#">debug cellular messages data</a>	Prints Cisco IOS data path debug messages.
	<a href="#">debug cell-hwic driver</a>	Debugs the Cisco IOS driver.
	<a href="#">debug cellular messages management</a>	Prints management path messages, such as CnS.
	<a href="#">debug cellular messages dm</a>	Prints diagnostics monitor (DM) messages from the Qualcomm CDMA chipset.
	<a href="#">debug cell-hwic virt-con</a>	Redirects the Nios II console driver messages to display them in the Cisco IOS router console environment.



# debug cell-hwic virt-con

To redirect the Nios II console driver messages to display them in the Cisco IOS router console environment, use the **debug cell-hwic virt-con** command in EXEC mode.

```
debug cell-hwic slot/wic_slot/port virt-con {clear | disable | dump-data-structs | log | monitor | wrapper-on | wrapper-off}
```

Syntax Description		
	<i>slot/wic_slot/port</i>	Numeric values that indicate the router slot, WAN interface card (WIC) slot, and port.
	<b>clear</b>	(Optional) Clears all virtual console debug log messages.
	<b>disable</b>	(Optional) Disables virtual console real-time debug monitoring.
	<b>dump-data-structurs</b>	(Optional) Dumps virtual console data structures.
	<b>log</b>	(Optional) Displays virtual console messages from the debug log.
	<b>monitor</b>	(Optional) Enables monitoring of real-time virtual console debug messages.
	<b>wrapper-on</b>	(Optional) Disables wraparound for virtual console log messages.
	<b>wrapper-off</b>	(Optional) Enables wraparound for virtual console log messages.

**Command Default** There is no default for this command.

**Command Modes** EXEC (#)

Command History	Release	Modification
	12.4(11)XV	This command was introduced.
	12.4(15)T	This command was integrated into Cisco IOS Release 12.4(15)T.
	12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.
	12.4(22)YB1	This command was integrated into Cisco IOS Release 12.4(22)YB1.

**Usage Guidelines** Use this command for debugging purposes only.

Related Commands	Command	Description
	<b>debug cellular messages all</b>	Prints all Cisco IOS driver debug messages.
	<b>debug cellular messages async</b>	Debugs cellular async.
	<b>debug cellular messages data</b>	Prints Cisco IOS data path debug messages.
	<b>debug cell-hwic driver</b>	Debugs the Cisco IOS driver.
	<b>debug cell-hwic firmware</b>	Displays Cisco IOS firmware information.

■ debug cell-hwic virt-con

<b>Command</b>	<b>Description</b>
<b>debug cellular messages management</b>	Prints management path messages, such as CnS.
<b>debug cellular messages dm</b>	Prints diagnostics monitor (DM) messages from the Qualcomm CDMA chipset.

# debug cellular messages all

To print all Cisco IOS driver debug messages, use the **debug cellular messages all** command in EXEC mode.

**debug cellular** *slot/wic\_slot/port* **messages all**

<b>Syntax Description</b>	<i>slot/wic_slot/port</i>	Numeric values that indicate the router slot, WAN interface card (WIC) slot, and port.
---------------------------	---------------------------	--

<b>Command Default</b>	None
------------------------	------

<b>Command Modes</b>	EXEC
----------------------	------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.4(11)XV	This command was introduced.
	12.4(15)T	This command was integrated into Cisco IOS Release 12.4(15)T.

<b>Usage Guidelines</b>	Use this command for debugging purposes only.
-------------------------	---

<b>Related Commands</b>	<b>Command</b>	<b>Description</b>
	<a href="#">debug cellular messages async</a>	Debugs cellular async.
	<a href="#">debug cellular messages data</a>	Prints Cisco IOS data path debug messages.
	<a href="#">debug cellular driver</a>	Debugs the Cisco IOS driver.
	<a href="#">debug cellular firmware</a>	Displays Cisco IOS firmware information.
	<a href="#">debug cellular messages management</a>	Prints management path messages, such as CnS.
	<a href="#">debug cellular messages dm</a>	Prints diagnostics monitor (DM) messages from the Qualcomm CDMA chipset.
	<a href="#">debug cell-hwic virt-con</a>	Redirects the Nios II console driver messages to display them in the Cisco IOS router console environment.

# debug cellular messages async

To debug cellular async, use the **debug cellular messages async** command in EXEC mode.

**debug cellular** *slot/wic\_slot/port* **messages async**

<b>Syntax Description</b>	<i>slot/wic_slot/port</i>	Numeric values that indicate the router slot, WAN interface card (WIC) slot, and port.
---------------------------	---------------------------	--

<b>Command Default</b>	None
------------------------	------

<b>Command Modes</b>	EXEC
----------------------	------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.4(11)XV	This command was introduced.
	12.4(15)T	This command was integrated into Cisco IOS Release 12.4(15)T.

<b>Usage Guidelines</b>	Use this command for debugging purposes only.
-------------------------	---

<b>Related Commands</b>	<b>Command</b>	<b>Description</b>
	<a href="#">debug cellular messages all</a>	Prints all Cisco IOS driver debug messages.
	<a href="#">debug cellular messages data</a>	Prints Cisco IOS data path debug messages.
	<a href="#">debug cellular driver</a>	Debugs the Cisco IOS driver.
	<a href="#">debug cellular firmware</a>	Displays Cisco IOS firmware information.
	<a href="#">debug cellular messages management</a>	Prints management path messages, such as CnS.
	<a href="#">debug cellular messages dm</a>	Prints diagnostics monitor (DM) messages from the Qualcomm CDMA chipset.
	<a href="#">debug cell-hwic virt-con</a>	Redirects the Nios II console driver messages to display them in the Cisco IOS router console environment.

# debug cellular messages data

To print Cisco IOS data path debug messages, use the **debug cellular messages data** command in EXEC mode.

**show cellular *slot/wic\_slot/port* messages data**

<b>Syntax Description</b>	<i>slot/wic_slot/port</i>	Numeric values that indicate the router slot, WAN interface card (WIC) slot, and port.
---------------------------	---------------------------	--

<b>Command Default</b>	None
------------------------	------

<b>Command Modes</b>	EXEC
----------------------	------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.4(11)XV	This command was introduced.
	12.4(15)T	This command was integrated into Cisco IOS Release 12.4(15)T.

<b>Usage Guidelines</b>	Use this command for debugging purposes only.
-------------------------	---

<b>Related Commands</b>	<b>Command</b>	<b>Description</b>
	<a href="#">debug cellular messages all</a>	Prints all Cisco IOS driver debug messages.
	<a href="#">debug cellular messages async</a>	Debugs cellular async.
	<a href="#">debug cellular driver</a>	Debugs the Cisco IOS driver.
	<a href="#">debug cellular firmware</a>	Displays Cisco IOS firmware information.
	<a href="#">debug cellular messages management</a>	Prints management path messages, such as CnS.
	<a href="#">debug cellular messages dm</a>	Prints diagnostics monitor (DM) messages from the Qualcomm CDMA chipset.
	<a href="#">debug cell-hwic virt-con</a>	Redirects the Nios II console driver messages to display them in the Cisco IOS router console environment.

# debug cellular messages management

To print management path messages, such as CnS, use the **debug cellular messages management** command in EXEC mode.

**debug cellular** *slot/wic\_slot/port* **messages management**

<b>Syntax Description</b>	<i>slot/wic_slot/port</i>	Numeric values that indicate the router slot, WAN interface card (WIC) slot, and port.
---------------------------	---------------------------	--

<b>Command Default</b>	None
------------------------	------

<b>Command Modes</b>	EXEC
----------------------	------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.4(11)XV	This command was introduced.
	12.4(15)T	This command was integrated into Cisco IOS Release 12.4(15)T.

<b>Usage Guidelines</b>	Use this command for debugging purposes only.
-------------------------	---

<b>Related Commands</b>	<b>Command</b>	<b>Description</b>
	<a href="#">debug cellular messages all</a>	Prints all Cisco IOS driver debug messages.
	<a href="#">debug cellular messages async</a>	Debugs cellular async.
	<a href="#">debug cellular messages data</a>	Prints Cisco IOS data path debug messages.
	<a href="#">debug cellular driver</a>	Debugs the Cisco IOS driver.
	<a href="#">debug cellular firmware</a>	Displays Cisco IOS firmware information.
	<a href="#">debug cell-hwic virt-con</a>	Redirects the Nios II console driver messages to display them in the Cisco IOS router console environment.

# gsm radio off

To shutdown the radio hardware resources when none of the PDP contexts are in use, particularly in areas where wireless user density is huge, and to turn on power save mode, use the **gsm radio off** command in the configuration mode.

## gsm radio off

Use the no form of this command to turn power save mode off, or to turn radio on. When you use the no form of this command, you also must enter a **no shut** command on the cellular interface.

**Command Default** None

**Command Modes** Configuration

Command History	Release	Modification
	15.1(1)T	This command was introduced.

**Usage Guidelines** To check whether power save mode is ON or OFF on an HWIC or Cisco ISR, use the **show controller cellular <pabay><hwic slot><subslot>** command or the **show run** command and check for the relevant information.

**Examples** The following example shows output for this command when you enter a correct MEP PIN:

```
Router(config-controller)#gsm radio off
Warning: Not all PDP contexts are in shutdown state
Please shutdown all the interfaces manually and re-enter this command.
Router(config-controller)#
Router(config-controller)#int c0
Router(config-if)#shut
Router(config-if)#
Router(config-if)#exit
Router(config)#controller cellular 0
Router(config-controller)#gsm radio off
WARNING(Controller cellular 0/0): Radio power OFF setting will NOT persists if router
or modem resets. Save to startup configuration.Use "no gsm radio off" to turn radio power
ON

Router(config-controller)#end
Router
```

To verify, use the **show run**, **show controller** or the **show cellular radio** commands. The following examples shows the sample output when the radio is turned off for the three commands:

```
show run
Router#sh run
Building configuration...
!
controller Cellular 0
gsm radio off <<<===
```

```

!

show controller c0
Router#sh controller cellular 0

Interface Cellular0
3G Modem-HSPA/UMTS/EDGE/GPRS-850/900/1800/1900/2100MHz / Global,
Power save mode is ON <<<====

show cellular 0 radio
Router#sh cellular 0 radio
Radio power mode = OFF <<<===, Reason = User request
Current Band = None, Channel Number = 0
Current RSSI = -110 dBm
Band Selected = Auto
Number of nearby cells = 1
Cell 1
    Primary Scrambling Code = 0xA9
    RSCP = -100 dBm, ECIO = -12 dBm

Router#
#

```

**Related Commands**

Command	Description
<a href="#">show cellular radio</a>	Displays the cellular modem radio statistics



# gsm sim authenticate

To store the SIM CHV1 code for verification, use the **gsm sim authenticate** *<pin>* command in configuration mode.

**gsm sim authenticate** *<pin>*

**Command Default** None

**Command Modes** Configuration

Command History	Release	Modification
	15.1(1)T	This command was introduced.

**Usage Guidelines** To check whether power save mode is ON or OFF on an HWIC or Cisco ISR, use the **show controller cellular** *<pabay><hwic slot><subslot>* command or the **show run** command and check for the relevant information.

Related Commands	Command	Description

## show cellular all

To display all the modem information in one listing, use the **show cellular all** command in privileged EXEC mode.

**show cellular** *slot/wic\_slot/port* **all**

<b>Syntax Description</b>	<i>slot/wic_slot/port</i>	Numeric values that indicate the router slot, WAN interface card (WIC) slot, and port.
---------------------------	---------------------------	--

<b>Command Default</b>	None
------------------------	------

<b>Command Modes</b>	Privileged EXEC
----------------------	-----------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.4(11)XV	This command was introduced.
	12.4(15)T	This command was integrated into Cisco IOS Release 12.4(15)T.
	15.1(1)T	This command was integrated into Cisco IOS Release 15.1(1)T.

<b>Usage Guidelines</b>	The command usage is the same for Global System for Mobile Communications (GSM) and code division multiple access (CDMA), although the output is different for each.
-------------------------	--

<b>Examples</b>	<p>This section contains:</p> <ul style="list-style-type: none"> <li>• <a href="#">Sample Output for 3G-HWIC-GSM</a></li> <li>• <a href="#">Sample Output for 3G-HWIC-CDMA</a></li> </ul>
-----------------	---

### Sample Output for 3G-HWIC-GSM

The following example shows output from the **show cellular all** command for slot 0, WIC slot 0, port 0:

```
router# show cellular 0/0/0 all

Hardware Information
=====
Modem Firmware Version = U1_2_22MCAP G:/WORK
Modem Firmware built = 04/17/06
Hardware Version = E2
International Mobile Subscriber Identity (IMSI) = 001012345678901
International Mobile Equipment Identity (IMEI) = 352678010002779
Factory Serial Number (FSN) = S2128751274E20K
Modem Status = Online
Current Modem Temperature = 28 deg C, State = Normal

Profile Information
=====
```

```

Profile 1 = INACTIVE*
-----
PDP Type = IPv4, Header Compression = OFF
Data Compression = OFF
Access Point Name (APN) = vpn.com
Authentication = CHAP
Username: wapuser1, Password: wap

* - Default profile

Data Connection Information
=====
Data Transmitted = 0 bytes, Received = 0 bytes
Profile 1, Packet Session Status = INACTIVE
    Inactivity Reason = Normal inactivate state
Profile 2, Packet Session Status = INACTIVE
    Inactivity Reason = Normal inactivate state
Profile 3, Packet Session Status = INACTIVE
    Inactivity Reason = Normal inactivate state
Profile 4, Packet Session Status = INACTIVE
    Inactivity Reason = Normal inactivate state
Profile 5, Packet Session Status = INACTIVE
    Inactivity Reason = Normal inactivate state
Profile 6, Packet Session Status = INACTIVE
    Inactivity Reason = Normal inactivate state
Profile 7, Packet Session Status = INACTIVE
    Inactivity Reason = Normal inactivate state
Profile 8, Packet Session Status = INACTIVE
    Inactivity Reason = Normal inactivate state
Profile 9, Packet Session Status = INACTIVE
    Inactivity Reason = Normal inactivate state
Profile 10, Packet Session Status = INACTIVE
    Inactivity Reason = Normal inactivate state
router#
Network Information
=====
Current Service Status = No service, Service Error = None
Current Service = Invalid
Packet Service = None
Packet Session Status = Inactive
Current Roaming Status = Home
Network Selection Mode = Automatic
Country = 0, Network =
Mobile Country Code (MCC) = 0
Mobile Network Code (MNC) = 0
Location Area Code (LAC) = 0
Routing Area Code (RAC) = 255
Cell ID = 0
Primary Scrambling Code = 0
PLMN Selection = Automatic

Radio Information
=====
Current Band = None, Channel Number = 0
Current RSSI = -110 dBm

Modem Security Information
=====
Card Holder Verification (CHV1) = Disabled
SIM Status = OK
SIM User Operation Required = None
Number of Retries remaining = 3
router#

```

**Sample Output for 3G-HWIC-CDMA**

The following example shows the output from the **show cellular all** command for slot 0, WIC slot 3, port 0:

```

router# show cellular 0/0/0 all

Hardware Information
=====
Modem Firmware Version = p2005600
Modem Firmware built = 11-14-06
Hardware Version = 1.0
Electronic Serial Number (ESN) = 0x6032688F [09603303567]
Preferred Roaming List (PRL) Version = 20224
Current Modem Temperature = 32 degrees Celsius

Profile Information
=====
Electronic Serial Number (ESN) = 0x6032688F [09603303567]
Modem activated = YES

Account Information:
=====
Activation Date: Not available
Phone Number (MDN) : 9135938079
Mobile Station Identifier (MSID) : 9135938079

Data Profile Info:
=====
Number of data profiles configured : 2
Current active data profile : 1

Data Profile 0 Information
=====
NAI (Network Access Identifier) = 6032688F@hcm.sprintpcs.com
MN-HA SS = Set
MN-HA SPI = 1234
MN-AAA SS = Set
MN-AAA SPI = 1234
Reverse Tunneling Preference = Set
Home Address = 0.0.0.0
Primary Home Agent Address = 68.28.15.12
Secondary Home Agent Address = 68.28.31.12

Data Profile 1 Information (Active)
=====
NAI (Network Access Identifier) = productmarketing432@sprintpcs.com
MN-HA SS = Set
MN-HA SPI = 1234
MN-AAA SS = Set
MN-AAA SPI = 1234
Reverse Tunneling Preference = Set
Home Address = 0.0.0.0
Primary Home Agent Address = 68.28.81.76
Secondary Home Agent Address = 68.28.89.76

Data Connection Information
=====
Phone number of outgoing call =
HDR AT State = Idle, HDR Session State = Open
HDR Session Info:
    UATI (Hex) = 0084:0AC0:0000:0000:000A:05DC:A821:DCFC
    Color Code = 32, RATI = 0xFFFFFFFF

```

```

    Session duration = 0 msecs, Session start = 0 msecs
    Session end = 0 msecs, Authentication Status = Not authenticated
HDR DRC Value = 11, DRC Cover = 0, RRI = Pilot only
Current Transmitted = 0 bytes, Received = 0 bytes
Total Transmitted = 0 KB, Received = 0 KB
Current Call Status = DISCONNECTED
Current Call Duration = 30 secs
Total Call Duration = 4482879 seconds
Current Call State =
Last Call Disconnect Reason = Base station release (No reason)
Last Connection Error = None
HDR DDTM (Data Dedicated Transmission Mode) Preference = Off
Mobile IP Error Code (RFC-2002) = 0 (Registration accepted)

```

## Network Information

```
=====
```

```

Current Service = 1xEV-DO (Rev A) and 1xRTT
Current Roaming Status(1xRTT) = HOME, (HDR) = HOME
Current Idle Digital Mode = HDR
Current System Identifier (SID) = 4183
Current Network Identifier (NID) = 87
Current Call Setup Mode = Mobile IP only
Serving Base Station Longitude = 0 deg 0 min 0 sec
Serving Base Station Latitude = 0 deg 0 min 0 sec
Current System Time = Tue Feb 6 15:12:18 2007

```

## Radio Information

```
=====
```

## 1xRTT related info

```
-----
```

```

Current RSSI = -94 dBm, ECIO = -8 dBm
Current Channel Number = 50
Current Channel State = Acquired
Current Band Class = Band Class 1

```

## HDR (1xEVDO) related info

```
-----
```

```

Current RSSI = -83 dBm, ECIO = -0 dBm
Current Channel Number = 25
Current Band Class = Band Class 1
Sector ID (Hex) = 0084:0AC0:0000:0000:000A:05DC:A801:1202
Subnet Mask = 104, Color Code = 32, PN Offset = 240
Rx gain control(Main) = 0 dBm, Diversity = Unavailable
Tx total power = -2 dBm, Tx gain adjust = 1536 dBm
Carrier to interference (C/I) ratio = 7

```

## Modem Security Information

```
=====
```

```

Modem PIN Security UNLOCKED
Power-up lock DISABLED

```

## OMA DM Information

```
=====
```

## Configuration info

```
-----
```

```

DM Support = Enabled
Max DM account = 1, DM account in use = 1
DM account changed = No
Device Configuration:
    Client-Initiated = Supported, Enabled
    Network-Initiated = Supported, Enabled
PRL Update:
    Client-Initiated = Supported, Enabled
    Network-Initiated = Supported, Enabled

```

■ show cellular all

```

Firmware Update:
    Client-Initiated = Not supported, Disabled
    Network-Initiated = Not supported, Disabled
Hands Free Activation:
    Device-Initiated = Supported, Enabled
    Hands Free Activation attempted = Yes

DM session state info
-----
DM session state = Session not active
Last session type = PRL Update
Last session initiator = Unspecified
Last session UI mode = Hidden
Last session result = Failed, Error code:0x100(Client (user) aborted)
Last session updated = No

Network-Initiated alert info
-----
NIA state = No NIA pending
Session type = Unspecified
Standard UI mode = Unspecified
Special UI mode = Unspecified
Router#

```

#### Related Commands

Command	Description
<a href="#">cellular cdma activate otasp</a>	Activates a cellular account using the over the air service provisioning (OTASP).
<a href="#">show cellular hardware</a>	Displays the cellular modem hardware information.
<a href="#">show cellular network</a>	Displays the cellular network (base station) information.
<a href="#">show cellular profile</a>	Displays the cellular profile information.
<a href="#">show cellular oma-dm</a>	Displays OMA-DM session details.
<a href="#">show cellular radio</a>	Displays the cellular modem radio statistics.
<a href="#">show cellular security</a>	Displays the modem lock state.
<a href="#">show controllers cellular</a>	Displays the SMS messages received by the cellular modem.

# show cellular connection

To display the current active connection state and data statistics, use the **show cellular connection** command in privileged EXEC mode.

**show cellular** *slot/wic\_slot/port* **connection**

<b>Syntax Description</b>	<i>slot/wic_slot/port</i>	Numeric values that indicate the router slot, WAN interface card (WIC) slot, and port.
<b>Command Default</b>	None	
<b>Command Modes</b>	Privileged EXEC	
<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.4(11)XV	This command was introduced.
	12.4(15)T	This command was integrated into Cisco IOS Release 12.4(15)T.
	15.1(1)T	This command was integrated into Cisco IOS Release 15.1(1)T.

**Usage Guidelines** The command usage is the same for Global System for Mobile Communications (GSM) and code division multiple access (CDMA), although the output is different for each.

## Examples

This section contains:

- [Sample Output for 3G-HWIC-GSM](#)
- [Sample Output for 3G-HWIC-CDMA](#)

### Sample Output for 3G-HWIC-GSM

The following is sample output for slot 1, wic 0, port 1.

```
router# show cellular 1/0/1 connection
Data Transmitted = 1066807500 bytes, Received = 1066807500 bytes
Profile 1, Packet Session Status = ACTIVE
    IP address = 1.5.97.2
Profile 2, Packet Session Status = INACTIVE
    Inactivity Reason = Normal inactivate state
```

[Table 10](#) describes each output field.

**Table 10**      **Output Description**

Field	Description
Data Transmitted	Total data transmitted by the modem. Can be cleared by the clear counters command.
Data Received	Total data received by the modem. Can be cleared by the clear counters command.
Profile <profile number>	Indicates the profiles configured in the modem. A total of 16 profiles can be configured.
Packet Session Status	Packet Data Protocol (PDP) session status of the profile. Active when the call is made and PDP context has become active in the modem.
IP Address	IP address of the cellular interface received during IPCP negotiation.
Inactivity Reason	Reason why the profile is inactive.

**Sample Output for 3G-HWIC-CDMA**

The following example is sample output for slot 0, WIC slot 0, port 0 from the **show cellular connection** command:

```
router# show cellular 0/0/0 connection

Phone number of outgoing call =
HDR AT State = Idle, HDR Session State = Open
HDR Session Info:
    UATI (Hex) = 0084:0AC0:0000:0000:000A:05DC:A821:DCFC
    Color Code = 32, RATI = 0xFFFFFFFF
    Session duration = 0 msecs, Session start = 0 msecs
    Session end = 0 msecs, Authentication Status = Not authenticated
HDR DRC Value = 11, DRC Cover = 0, RRI = Pilot only
Current Transmitted = 0 bytes, Received = 0 bytes
Total Transmitted = 0 KB, Received = 0 KB
Current Call Status = DISCONNECTED
Current Call Duration = 30 secs
Total Call Duration = 4482879 seconds
Current Call State =
Last Call Disconnect Reason = Base station release (No reason)
Last Connection Error = None
HDR DDTM (Data Dedicated Transmission Mode) Preference = Off
Mobile IP Error Code (RFC-2002) = 0 (Registration accepted)
router#
```

Table 11 describes each output field.

**Table 11**      **Description of Sample Output for CDMA**


Field	Description
Phone number of outgoing call	Shows the phone number of the data call dialed.
HDR AT State	Indicates the AT state. Will show as CONNECTED when the CONNECT is received from the modem while dialing out. This is valid only for 1xEVDO.



**Table 11** Description of Sample Output for CDMA (continued)

Field	Description
HDR Session State	Will indicate as OPEN once the HDR session is established. This is valid only for 1xEVDO
UATI	Unicast Access Terminal Identifier (UATI) obtained by the modem or access terminal (AT) from the base station during session establishment.
Color Code	HDR session color code for the sector.
RATI	HDR Random Access Terminal Identifier used for opening a session.
Session Duration	HDR session duration in milliseconds.
Session Start	Phone uptime in units of milliseconds at session start.
Session End	Phone uptime in units of milliseconds at session end.
Authentication Status	Modem or access terminal authentication status with the base station.
HDR DRC Value	The data rate channel value specified by the access terminal. The access terminal uses DRC value to specify the requested transmission rate
DRC Cover	DRC cover value used by the access terminal to specify the transmitting sector.
RRI	Indicates the rate of the reverse traffic data channel.
Current Transmitted	Number of bytes transmitted by the modem to the base station. This will be cleared when the call is disconnected.
Current Received	Number of bytes received by the modem from the base station. This will be cleared when the call is disconnected.
Current call status	Current call status of the modem, such as CONNECTED, DISCONNECTED, DORMANT, CONNECTING, or ERROR.
Privacy Mode	Current privacy status of the call in progress.
Service Option	Service option for the call in progress.
Current Call Duration	Duration of the call in progress. A call status of DISCONNECTED displays the call duration of the last call.
Total Transmitted	Total number of kilobytes transmitted from the modem. This will be cleared by the <b>clear counters</b> command.
Total Received	Total number of kilobytes received by the modem. This will be cleared by the <b>clear counters</b> command.

**Table 11** Description of Sample Output for CDMA (continued)

Field	Description
Total Call Duration	Total duration of calls made from the modem. This will be updated when the current call in progress is disconnected.
Current Call State	Indicates the type of call made.
Last Call Disconnect Reason	Indicates why the last call was disconnected.
Last Connection Error	Indicates the error code if the call status indicates an error.
Mobile IP Error Code	Indicates the error code in accordance with RFC-2002 if the call is a mobile IP call.
	 <p><b>Note</b> The current call setup mode is in Simple IP only. In this case <b>show cellular connection</b> will not display Mobile IP Error Code. Mobile IP error code is displayed when call setup mode is either “Mobile IP only” mode or “Mobile IP Preferred with SIP fallback” mode.</p>

**Related Commands**

Command	Description
<a href="#">cellular cdma activate manual</a>	Manually activates a cellular account using the over-the-air service (OTA) procedure.
<a href="#">show cellular hardware</a>	Displays the cellular modem hardware information.
<a href="#">show cellular network</a>	Displays the cellular network (base station) information.
<a href="#">show cellular profile</a>	Displays the cellular profile information.
<a href="#">show cellular radio</a>	Displays the cellular modem radio statistics.
<a href="#">show cellular security</a>	Displays the modem lock state.
<a href="#">show controllers cellular</a>	Displays HWIC hardware- and driver-specific information.

# show cellular hardware

To display the cellular modem hardware information, use the **show cellular hardware** command in privileged EXEC mode.

**show cellular** *slot/wic\_slot/port* **hardware**

<b>Syntax Description</b>	<i>slot/wic_slot/port</i>	Numeric values that indicate the router slot, WAN interface card (WIC) slot, and port.
---------------------------	---------------------------	--

<b>Command Default</b>	None
------------------------	------

<b>Command Modes</b>	Privileged EXEC
----------------------	-----------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.4(11)XV	This command was introduced.
	12.4(15)T	This command was integrated into Cisco IOS Release 12.4(15)T.
	15.1(1)T	This command was integrated into Cisco IOS Release 15.1(1)T.

<b>Usage Guidelines</b>	The command usage is the same for Global System for Mobile Communications (GSM) and code division multiple access (CDMA), although the output is different for each.
-------------------------	--

<b>Examples</b>	This section contains:
-----------------	------------------------

- [Sample Output for HWIC-3G-GSM](#)
- [Sample Output for HWIC-3G-CDMA](#)

## Sample Output for HWIC-3G-GSM

The following example shows output for slot 0, WIC slot 0, port 0:

```
router# show cellular 0/0/0 hardware
Modem Firmware Version = H1_0_0_1MCP C:/WS/
Modem Firmware built = 09/08/06
Hardware Version = 1.0
International Mobile Subscriber Identity (IMSI) = <number>
International Mobile Equipment Identity (IMEI) = <number>
Factory Serial Number (FSN) = X2819460254100D
Modem Status = Online
Current Modem Temperature = 33 deg Celsius, State = Normal
```

**Table 12** Output Description for show cellular hardware command

Field	Description
Modem Firmware Version	Firmware version of the modem.
Modem Firmware Built	Date firmware was built in <i>mm-dd-yy</i> format.
Hardware Version	Modem hardware version.
International Mobile Subscriber Identity (IMSI)	IMSI is stored in the SIM. IMSI consists of MCC (mobile country code, 3 digits), MNC (mobile network code, 3 digits for N. America and 2 digits for rest of the world) and MSIN (mobile station identification number). The MCC and MNC in the IMSI identify the subscribers in the PLMN (Public Land Mobile Network).
International Mobile Equipment Identity (IMEI)	Number that uniquely identifies the modem in a GSM/UMTS network.
Factory Serial Number (FSN)	Unique serial number of the modem.
Modem Status	Will be online if the modem has booted up correctly; otherwise will be offline and the modem will not be usable.
Current Modem Temperature	Radio temperature of the modem in degrees Celsius. State is normal when temperature is between 5 to 185°F (-15° to 85°C). If state reaches critical 226.4°F (108°C), the modem will be shutdown.

**Sample Output for HWIC-3G-CDMA**

The following example shows output for slot 0, WIC slot 0, port 0:

```
router# show cellular 0/0/0 hardware

Modem Firmware Version = p2005600
Modem Firmware built = 11-14-06
Hardware Version = 1.0
Electronic Serial Number (ESN) = 0x603C98E1 [1614584033]
Preferred Roaming List (PRL) version = 20224
Current Modem temperature = 31 degrees Celsius
```

Table 13 describes each output field.

**Table 13** Output Description for show cellular hardware command

Field	Description
Modem Firmware Version	Firmware version of the modem.
Modem Firmware Built	Date firmware was built in <i>mm-dd-yy</i> format.
Hardware Version	Modem hardware version.
Electronic Serial Number (ESN)	Unique serial number of the modem. This is displayed in hexadecimal and decimal formats.

**Table 13** *Output Description for show cellular hardware command (continued)*

Field	Description
Preferred Roaming List (PRL) Version	PRL version is unique to a service provider. This indicates to the modem which channels the modem should scan.
Current Modem Temperature	Radio temperature of the modem in degrees Celsius.

**Related Commands**

Command	Description
<a href="#">show cellular radio</a>	Displays the cellular modem radio statistics.
<a href="#">show cellular security</a>	Displays the modem lock state.
<a href="#">show controllers cellular</a>	Displays HWIC hardware- and driver-specific information.

# show cellular network

To display information about the carrier network and service, use the **show cellular network** command in privileged EXEC mode.

**show cellular *slot/wic\_slot/port* network**

<b>Syntax Description</b>	<i>slot/wic_slot/port</i>	Numeric values that indicate the router slot, WAN interface card (WIC) slot, and port.
---------------------------	---------------------------	--

<b>Command Default</b>	None
------------------------	------

<b>Command Modes</b>	Privileged EXEC
----------------------	-----------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.4(11)XV	This command was introduced.
	12.4(15)T	This command was integrated into Cisco IOS Release 12.4(15)T.
	15.1(1)T	This command was integrated into Cisco IOS Release 15.1(1)T.

<b>Usage Guidelines</b>	The command usage is the same for Global System for Mobile Communications (GSM) and code division multiple access (CDMA), although the outputs differ.
-------------------------	--

<b>Examples</b>	This section contains:
-----------------	------------------------

- [Sample Output for HWIC-3G-GSM](#)
- [Sample Output for HWIC-3G-CDMA](#)

## Sample Output for HWIC-3G-GSM

The following example shows output for HWIC-3G-GSM in slot 0, WIC slot 0, port 0:

```
router# show cellular 0/0/0 network
Current Service Status = Normal, Service Error = None
Current Service = Combined
Packet Service = UMTS/WCDMA (Attached)
Packet Session Status = Inactive
Current Roaming Status = Roaming
Network Selection Mode = Automatic
Country = USA, Network = CINGULAR
Mobile Country Code (MCC) = 310
Mobile Network Code (MNC) = 380
Location Area Code (LAC) = 56997
Routing Area Code (RAC) = 253
Cell ID = 4503
Primary Scrambling Code = 169
PLMN Selection = Automatic
```

Registered PLMN = Cingular , Abbreviated =  
Service Provider =

Table 14 describes each output field.

**Table 14** Output Description for show cellular hardware command for GSM

Field	Description
Current Service Status	Indicates whether service is available.
Current Service Error	Shows the error in case there is no service
Current Idle Digital Mode	Idle mode of the modem.
Packet Service	Indicates the type of service available. For normal operation, the modem should be attached.
Packet Session Status	Status of PDP session. When data transfer is taking place, packet session will be active.
Current Roaming Status	Indicates whether the modem is in the home network or is roaming.
Network Selection Mode	Can be manual selection mode or automatic selection mode. Set to automatic by default.
Country	Country string given by the base station.
Network	Network string given by the base station.
Mobile Country Code	Country code given by the base station. The modem will be in the home network only if the country code given by the base station matches the MCC of the IMSI and the network code given by the base station matches the MNC of the IMSI.
Mobile Network Code	Network code given by the base station. The modem will be in the home network only if the country code given by the base station matches the MCC of the IMSI and the network code given by the base station matches the MNC of the IMSI.
Location Area Code	LAC given by the base station.
Routing Area Code	RAC given by the base station.
Cell ID	Cell ID given by the base station.
PLMN Selection	Default is automatic.

#### Sample Output for HWIC-3G-CDMA

The following example shows output for slot 0, WIC slot 0, port 0:

```
router# show cellular 0/0/0 network

Current Service = 1xEV-DO (Rev A) and 1xRTT
Current Roaming Status(1xRTT) = HOME, (HDR) = HOME
Current Idle Digital Mode = HDR
Current System Identifier (SID) = 4183
Current Network Identifier (NID) = 87
Current Call Setup Mode = Mobile IP only
Serving Base Station Longitude = 0 deg 0 min 0 sec
Serving Base Station Latitude = 0 deg 0 min 0 sec
Current System Time = Tue Feb 6 15:16:9 2007
```

**Table 15** Output Description for show cellular hardware command for CDMA

Field	Description
Current Service	Service attached by the modem.
Current Roaming Status	Indicates whether the modem is in the home network or roaming.
Current Idle Digital Mode	Idle mode of the modem.
Current System Identifier	SID received by the modem (applicable only for 1xRTT).
Current Network Identifier	NID received by the modem (applicable only for 1xRTT).
Current BSS Longitude/Latitude	Geographic location of the BSS (if this information is received from the BSS).
Current System Time	System time received from the base station.

**Related Commands**

Command	Description
<a href="#">show cellular radio</a>	Displays the cellular modem radio statistics.
<a href="#">show cellular security</a>	Displays the modem lock state.
<a href="#">show controllers cellular</a>	Displays HWIC hardware and driver-specific information.



# show cellular profile

To display the cellular profile information, use the **show cellular profile** command in privileged EXEC mode.

**show cellular** *slot/wic\_slot/port* **profile**

<b>Syntax Description</b>	<i>slot/wic_slot/port</i>	Numeric values that indicate the router slot, WAN interface card (WIC) slot, and port.
---------------------------	---------------------------	--

<b>Command Default</b>	None
------------------------	------

<b>Command Modes</b>	Privileged EXEC
----------------------	-----------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.4(11)XV	
12.4(15)T		This command was integrated into Cisco IOS Release 12.4(15)T.

<b>Usage Guidelines</b>	The command usage is the same for Global System for Mobile Communications (GSM) and code division multiple access (CDMA), although the output is different for each.
-------------------------	--

<b>Examples</b>	<p>This section contains:</p> <ul style="list-style-type: none"> <li>• <a href="#">Sample Output for HWIC-3G-GSM</a></li> <li>• <a href="#">Sample Output for HWIC-3G-CDMA</a></li> </ul>
-----------------	---

## Sample Output for HWIC-3G-GSM

The following example shows output for HWIC-3G-GSM for slot 0, WIC slot 1, port 1:

```
router# show cellular 0/1/1 profile

Profile 1 = ACTIVE
-----
PDP Type = IPv4, Header Compression = ON
Data Compression = ON
PDP address = 0x7F000201
Access Point Name (APN) = enzo.cisco.com
Authentication = CHAP
Username: cisco, Password: lab
Primary DNS address = 127.0.2.1
Source Address = 127.0.2.1 255.255.255.0

Profile 2 = INACTIVE
-----
PDP Type = IPv4, Header Compression = ON
Data Compression = ON
```

```

PDP address = 0x7F000202
Access Point Name (APN) = enzo.cingular.com
Authentication = CHAP
Username: cisco, Password: lab
Primary DNS address = 127.0.2.1
Source Address = 127.0.2.2 255.255.255.0

```

**Table 16** Field Descriptions for show cellular profile command

Field	Description
Profile <number>	Shows whether a particular profile is ACTIVE or INACTIVE. The profile is ACTIVE when the PDP context is active. This happens when a data call is successfully established.
PDP Type	Indicates the packet data protocol (PDP) type. Supported type is IPv4.
PDP Address	Shows the IP address assigned for the PDP context during PPP negotiation.
Access Point Name	Access Point Name for the profile. This information is provided by the service provider.
Authentication	PPP authentication supported. CHAP and PAP are supported. The type of authentication to be used is provided by the service provider.
Username	Username to be used for PPP authentication. This information is provided by the service provider.
Password	Password to be used for PPP authentication. This information is provided by the service provider.

### Sample Output for HWIC-3G-CDMA

The following example shows output for HWIC-3G-CDMA for slot 0, WIC slot 1, port 1:

```

router# show cellular 0/0/0 profile

Electronic Serial Number (ESN) = 0x6032688F
Modem activated = YES

Account Information:
=====
Activation Date: Not available
Phone Number (MDN) : 1234567890
Mobile Station Identifier (MSID) : 1234567890

Data Profile Info:
=====
Number of data profiles configured : 2
Current active data profile : 1

Data Profile 0 Information
=====
NAI (Network Access Identifier) = 6032688F@hcm.sprintpcs.com
MN-HA SS = Set
MN-HA SPI = 1234
MN-AAA SS = Set
MN-AAA SPI = 1234
Reverse Tunneling Preference = Set
Home Address = 0.0.0.0

```

```

Primary Home Agent Address = 68.28.15.12
Secondary Home Agent Address = 68.28.31.12

Data Profile 1 Information (Active)
=====
NAI (Network Access Identifier) = productmarketing432@sprintpcs.com
MN-HA SS = Set
MN-HA SPI = 1234
MN-AAA SS = Set
MN-AAA SPI = 1234
Reverse Tunneling Preference = Set
Home Address = 0.0.0.0
Primary Home Agent Address = 68.28.81.76
Secondary Home Agent Address = 68.28.89.76
    
```

“\*” Indicates the default profile.

Table 17 describes the output fields from the command.

**Table 17** Field Description

Field	Description
Electronic Serial Number	A unique serial number for the CDMA modem.
Modem Activated	Indicates the activation status of the modem. Yes indicates that the modem is activated on the carrier network.
Data Profile	A data profile consists of the mobile IP (MIP) settings for the data connection. These settings are populated on the modem by the network using OTASP/IOTA.
ProvDate	Date the modem was provisioned, in yyyy/mm/dd format.
MDN	Mobile Directory Number assigned to the modem by the carrier during provisioning.
MIN	Mobile Identity Number assigned to the modem by the carrier during provisioning

**Related Commands**

Command	Description
<a href="#">cellular cdma activate manual</a>	Manually activates a cellular account using the over-the-air service (OTA) procedure.
<a href="#">cellular cdma activate otasp</a>	Activates a cellular account using the over the air service provisioning (OTASP).
<a href="#">cellular cdma activate iota</a>	Provisions data profile using Internet-based over-the-air provisioning (IOTA).
<b>Note</b>	IOTA is supported only with certain wireless service providers. Please check with your wireless service provider.

## show cellular radio

To display the cellular modem radio statistics, use the **show cellular radio** command in user privileged EXEC mode.

**show cellular *slot/wic\_slot/port* radio [history <all | per-hour | per-min | per-sec>]**

Syntax Description		
	<i>slot/wic_slot/port</i>	Numeric values that indicate the router slot, WAN interface card (WIC) slot, and port.
	<b>history</b>	Displays the RSSI history.
	<b>all</b>	Complete RSSI history.
	<b>per-hour</b>	Per-hour RSSI history.
	<b>per-min</b>	Per-minute RSSI history.
	<b>per-sec</b>	Per-second RSSI history.

**Command Default** None

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.4(11)XV	This command was introduced.
	12.4(15)T	This command was integrated into Cisco IOS Release 12.4(15)T.
	15.1(1)T	This command was integrated into Cisco IOS Release 15.1(1)T.

**Usage Guidelines** The command usage is the same for Global System for Mobile Communications (GSM) and code division multiple access (CDMA), although the output is different for each.

**Examples** This section contains:

- [Sample Output for HWIC-3G-GSM](#)
- [Sample Output for HWIC-3G-CDMA](#)

### Sample Output for HWIC-3G-GSM

The following example shows output for HWIC-3G-GSM in slot 0, WIC slot 0, port 0:

```
router# show cellular 0/0/0 radio
```

```
Current Band = WCDMA 1900, Channel Number = 9721
Current RSSI(RSCP) = -91 dBm
```

**Table 18** Output Description for show cellular radio command for GSM

Field	Description
Current Band	GPRS/UMTS band to which the modem is attached.
Channel Number	Channel number to which the modem is attached.
Current RSSI	Current radio signal strength on the modem. (-125 dbm indicates no signal.)

**Sample Output for HWIC-3G-CDMA**

The following example shows output for HWIC-3G-CDMA in slot 0, WIC slot 0, port 0:

```
router#show cellular 0/0/0 radio
1xRTT related info
-----
Current RSSI = -95 dBm, ECIO = -6 dBm
Current Channel Number = 50
Current Channel State = Acquired
Current Band Class = Band Class 1

HDR (1xEVDO) related info
-----
Current RSSI = -88 dBm, ECIO = -2 dBm
Current Channel Number = 25
Current Band Class = Band Class 1
Sector ID (Hex) = 0084:0AC0:0000:0000:000A:05DC:A801:1202
Subnet Mask = 104, Color Code = 32, PN Offset = 240
Rx gain control(Main) = 0 dBm, Diversity = Unavailable
Tx total power = -2 dBm, Tx gain adjust = 1536 dBm
Carrier to interference (C/I) ratio = 2
```

**Table 19** Output Description for show cellular radio command for HWIC-3G-CDMA

Field	Description
Current RSSI	Current radio signal strength in dbm (-125 dbm indicates no signal).
Current ECIO	Current energy per chip (ECIO) in dbm.
Current Channel Number	Current channel number to which the modem is attached to the base station.
Current Channel State	Indicates whether the modem is scanning or has acquired the channel.
Current Band Class	Current band class that the modem is attached to.
Sector ID	Sector ID of the base station to which the modem is attached.
Subnet Mask	Subnet mask of the sector.
Color Code	Color code of the sector.
PN Offset	PN offset for the sector.
Rx Gain Control	Received gain control for the modem.
Tx Total Power	Transmitted power.

■ show cellular radio

Related Commands	Command	Description
	<a href="#">show cellular all</a>	Displays the consolidated information about the modem.
	<a href="#">show controllers cellular</a>	Displays HWIC-hardware and driver-specific information.

# show cellular security

To display the SIM status (only for HWIC-3G-GSM) and modem lock state, use the **show cellular security** command in privileged EXEC mode.

**show cellular** *slot/wic\_slot/port* **security**

<b>Syntax Description</b>	<i>slot/wic_slot/port</i>	Numeric values that indicate the router slot, WAN interface card (WIC) slot, and port.
---------------------------	---------------------------	--

<b>Command Default</b>	None
------------------------	------

<b>Command Modes</b>	Privileged EXEC
----------------------	-----------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.4(11)XV	This command was introduced.
	12.4(15)T	This command was integrated into Cisco IOS Release 12.4(15)T.
	15.1(1)T	This command was integrated into Cisco IOS Release 15.1(1)T.

<b>Usage Guidelines</b>	The command usage is the same for Global System for Mobile Communications (GSM) and code division multiple access (CDMA), although the output is different for each.
-------------------------	--

**Examples** This section contains:

- [Sample Output for HWIC-3G-GSM](#)
- [Sample Output for HWIC-3G-CDMA](#)

### Sample Output for HWIC-3G-GSM

The following example shows output for an HWIC-3G-GSM in slot 0, WIC slot 0, port 0:

```
router# show cellular 0/0/0 security
Card Holder Verification (CHV1) ENABLED
SIM Status = OK
SIM User Operation Required = CHV1
Number of Retries remaining = 3
```

[Table 20](#) describes the output from this command:

**Table 20**      **Output Description**

Field	Description
Card Holder Verification	If enabled, access to the SIM is restricted.
SIM Status	Indicates whether the SIM is present or removed from the SIM socket.
SIM User Operation Required	If the SIM is protected (for example, because of CHV1 enabled), it will indicate the type of user operation required.
Number of Retries Remaining	Indicates the number of attempts remaining in case the SIM is locked. If the number of retries becomes zero, the SIM is blocked and becomes unusable.

**Sample Output for HWIC-3G-CDMA**

The following example shows output for an HWIC-3G-CDMA in slot 0, WIC slot 0, port 0:

```
router# show cellular 0/0/0 security
Modem PIN Security UNLOCKED
Power-up lock DISABLED
```

[Table 21](#) describes the output for this command.

**Table 21**      **Output Description**

Field	Description
Modem PIN Security	If the modem is locked, you cannot make calls without unlocking.
Power-up Lock	Shows whether the modem will be locked on power-up.

**Related Commands**

Command	Description
<a href="#">show cellular all</a>	Displays the consolidated information about the modem.



# show controllers cellular

To display high-speed WAN interface card (HWIC) hardware and driver-specific information, use the **show controllers cellular** command in privilege EXEC mode.

**show controllers cellular** *slot/wic\_slot/port*

<b>Syntax Description</b>	<i>slot/wic_slot/port</i>	Numeric values that indicate the router slot, WAN interface card (WIC) slot, and port.
---------------------------	---------------------------	--

**Command Default** There is no default for this command.

**Command Modes** Privilege EXEC

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.4(11)XV	This command was introduced.
	12.4(15)T	This command was integrated into Cisco IOS Release 12.4(15)T.

**Usage Guidelines** Use this command to capture the output for debugging or troubleshooting purposes only.

<b>Related Commands</b>	<b>Command</b>	<b>Description</b>
	<a href="#">show interfaces cellular</a>	Displays statistics for the cellular interfaces.
	<a href="#">show run interface cellular</a>	Displays the current running configuration for the cellular interface.

## show interfaces cellular

To display statistics for the cellular interface, use the **show interfaces cellular** command in EXEC mode.

**show interfaces cellular** *slot/wic\_slot/port*

<b>Syntax Description</b>	<i>slot/wic_slot/port</i>	Numeric values that indicate the router slot, WAN interface card (WIC) slot, and port.
---------------------------	---------------------------	--

**Command Default** There is no default for this command.

**Command Modes** EXEC

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.4(11)XV	This command was introduced.
	12.4(15)T	This command was integrated into Cisco IOS Release 12.4(15)T.

**Usage Guidelines** When you enter this command, encapsulation should be PPP and all signals, such as DCD, DSR, DTR, RTS, and CTS, should be up during normal operation.

**Examples** This section contains:

- [Sample Output for 3G-HWIC-GSM](#)
- [Sample Output for 3G-HWIC-CDMA](#)

### Sample Output for HWIC-3G-GSM

The following example shows the cellular interface statistics for HWIC-3G-GSM in slot 0, WIC slot 0, port 0 for GSM:

```
router#
router# show interfaces cellular 0/0/0
Cellular0/0/0 is up, line protocol is up
  Hardware is HSDPA/UMTS/EDGE/GPRS-850/900/1800/1900/2100MHz
  Internet address is 1.5.97.2/32
  MTU 1500 bytes, BW 384 Kbit, RxBW 2400000 Kbit, DLY 100000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation PPP, LCP Open
  Open: IPCP, loopback not set
  Keepalive not set
  Time to interface disconnect: idle 3w3d
  Last input 00:20:21, output 00:20:21, output hang never
  Last clearing of "show interface" counters 00:00:01
  Input queue: 1/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: weighted fair
  Output queue: 0/1000/64/0 (size/max total/threshold/drops)
```

```

Conversations 0/16/16 (active/max active/max total)
Reserved Conversations 0/0 (allocated/max allocated)
Available Bandwidth 288 kilobits/sec
30 second input rate 0 bits/sec, 0 packets/sec
30 second output rate 0 bits/sec, 0 packets/sec
0 packets input, 0 bytes, 0 no buffer
Received 0 b
*Feb 7 22:55:33.985: %CLEAR-5-COUNTERS: Clear counter on all interfaces by
consoleroadcasts, 0 runts, 0 giants, 0 throttles
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
0 packets output, 0 bytes, 0 underruns
0 output errors, 0 collisions, 0 interface resets
0 output buffer failures, 0 output buffers swapped out
0 carrier transitions
DCD=up DSR=up DTR=up RTS=up CTS=up

```

### Sample Output for HWIC-3G-CDMA

The following example shows the output for an HWIC-3G-CDMA in slot 0, WIC slot 0, port 0 for the **show interfaces cellular** command.

```

router# show int cellular 0/0/0
Cellular0/0/0 is up (spoofing), line protocol is up (spoofing)
Hardware is EVDO Rev A/Rel 0/1xRTT-800/1900MHz / SP
Internet address will be negotiated using IPCP
MTU 1500 bytes, BW 9 Kbit, DLY 100000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
Encapsulation PPP, LCP Closed, loopback not set
Keepalive not set
Last input never, output never, output hang never
Last clearing of "show interface" counters never
Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
Queueing strategy: weighted fair
Output queue: 0/1000/64/0 (size/max total/threshold/drops)
Conversations 0/0/16 (active/max active/max total)
Reserved Conversations 0/0 (allocated/max allocated)
Available Bandwidth 6 kilobits/sec
30 second input rate 0 bits/sec, 0 packets/sec
30 second output rate 0 bits/sec, 0 packets/sec
0 packets input, 0 bytes, 0 no buffer
Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
0 packets output, 0 bytes, 0 underruns
0 output errors, 0 collisions, 0 interface resets
0 output buffer failures, 0 output buffers swapped out
0 carrier transitions
DCD=up DSR=up DTR=up RTS=up CTS=up

```

### Related Commands

Command	Description
<a href="#">show cellular radio</a>	Displays the cellular modem radio statistics.
<a href="#">show controllers cellular</a>	Displays HWIC hardware and driver-specific information.
<a href="#">show run interface cellular</a>	Displays the current running configuration for the cellular interface.

## show run interface cellular

To see the current running configuration for the cellular interface, use the **show run interface cellular** command in privileged EXEC mode.

**show run interface cellular** *slot/wic\_slot/port*

<b>Syntax Description</b>	<i>slot/wic_slot/port</i>	Numeric values that indicate the router slot, WAN interface card (WIC) slot, and port.
---------------------------	---------------------------	--

<b>Command Default</b>	There is no default for this command.
------------------------	---------------------------------------

<b>Command Modes</b>	Privileged EXEC
----------------------	-----------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.4(11)XV	This command was introduced.
	12.4(15)T	This command was integrated into Cisco IOS Release 12.4(15)T.

**Examples** The following example shows the output of the command for 3G HWIC in slot 0, WIC slot 0, port 0:

```
router#show running-config interface cellular 0/0/0
interface Cellular0/0/0
 ip address negotiated
 ip access-group 10 out
 ip nat outside
 ip virtual-reassembly
 encapsulation ppp
 no ip mroute-cache
 load-interval 30
 dialer in-band
 dialer idle-timeout 2147483
 dialer string cdma
 dialer-group 2
 async mode interactive
 no peer default ip address
 fair-queue
 ppp ipcp dns request
 routing dynamic
end router#
```

<b>Related Commands</b>	<b>Command</b>	<b>Description</b>
	<a href="#">show controllers cellular</a>	Displays HWIC hardware and driver-specific information.
	<a href="#">show interfaces cellular</a>	Displays statistics for the cellular interfaces.

# Troubleshooting

This section provides the necessary background information and resources available for troubleshooting the Cisco 3G HWIC.

## Verifying Data Call Setup

To verify the data call setup, follow these steps:

- 
- Step 1** After you create a modem data profile **cellular profile create** command and configuring DDR on the cellular interface, send a ping from the router to a host across the wireless network.
- Step 2** If the ping fails, debug the failure by using the following **debug** and **show** commands:
- **debug chat**
  - **debug dialer**
  - **debug ppp negotiation**
  - **show cellular all**
  - **show interface cellular**
  - **show running-config**
  - **show ip route**
- Step 3** Save the output from these commands and contact your system administrator.
- 

## Checking Signal Strength

If the Received Signal Strength Indication (RSSI) level is very low (for example, if it is less than -110 dBm) follow these steps:

- 
- Step 1** Check the antenna connection. Make sure the TNC connector is correctly threaded and tightened.
- Step 2** If you are using a remote antenna, move the antenna cradle and check if the RSSI has improved.
- Step 3** Contact your wireless service provider to verify if there is service availability in your area.
- 

## Verifying Service Availability

The following is a sample output for the **show cellular all** command for a scenario where the antenna is disconnected and a modem data profile has not been created. The errors in this case have been highlighted with >>>>>>:

```
3825_GSM_3#show cellular 0/3/0 all
Load for five secs: 0%/0%; one minute: 0%; five minutes: 1%
```

Time source is hardware calendar, 19:40:43.239 UTC Wed Nov 8 2006

Hardware Information

=====

Modem Firmware Version = H1\_0\_0\_7MCAP G:/WS/

Modem Firmware built = 10/26/06

Hardware Version = 1.0

International Mobile Subscriber Identity (IMSI) = <specific sim number>

International Mobile Equipment Identity (IMEI) = <specific modem number>

Factory Serial Number (FSN) = X2819460388100D

Modem Status = Online

Current Modem Temperature = 38 deg C, State = Normal

Profile Information

=====

\* - Default profile >>>>>> no profile here.

Data Connection Information

=====

Profile 1, Packet Session Status = INACTIVE

Inactivity Reason = Normal inactivate state

Profile 2, Packet Session Status = INACTIVE

Inactivity Reason = Normal inactivate state

Profile 3, Packet Session Status = INACTIVE

Inactivity Reason = Normal inactivate state

Profile 4, Packet Session Status = INACTIVE

Inactivity Reason = Normal inactivate state

Profile 5, Packet Session Status = INACTIVE

Inactivity Reason = Normal inactivate state

Profile 6, Packet Session Status = INACTIVE

Inactivity Reason = Normal inactivate state

Profile 7, Packet Session Status = INACTIVE

Inactivity Reason = Normal inactivate state

Profile 8, Packet Session Status = INACTIVE

Inactivity Reason = Normal inactivate state

Profile 9, Packet Session Status = INACTIVE

Inactivity Reason = Normal inactivate state

Profile 10, Packet Session Status = INACTIVE

Inactivity Reason = Normal inactivate state

Profile 11, Packet Session Status = INACTIVE

Inactivity Reason = Normal inactivate state

Profile 12, Packet Session Status = INACTIVE

Inactivity Reason = Normal inactivate state

Profile 13, Packet Session Status = INACTIVE

Inactivity Reason = Normal inactivate state

Profile 14, Packet Session Status = INACTIVE

Inactivity Reason = Normal inactivate state

Profile 15, Packet Session Status = INACTIVE

Inactivity Reason = Normal inactivate state

Profile 16, Packet Session Status = INACTIVE

Inactivity Reason = Normal inactivate state

Network Information

=====

Current Service Status = No service, Service Error = None >>>>>> no service means not  
connected to the network.

Current Service = Combined

Packet Service = None

Packet Session Status = Inactive

Current Roaming Status = Home

Network Selection Mode = Automatic

Country = USA, Network = Cinglr

```

Mobile Country Code (MCC) = 310
Mobile Network Code (MNC) = 380
Location Area Code (LAC) = 6042
Routing Area Code (RAC) = 255
Cell ID = 0
Primary Scrambling Code = 0
PLMN Selection = Automatic

Radio Information
=====
Current Band = None, Channel Number = 0
Current RSSI = -110 dBm      >>>>>> either no antenna, or bad antenna or out of
network.

Modem Security Information
=====
Card Holder Verification (CHV1) = Disabled
SIM Status = OK
SIM User Operation Required = None
Number of Retries remaining = 3

```

## Successful Call Setup

The following is a sample output when a call is set up using a CHAT script. It shows a received IP address from the network. Call setup is successful, and data path is open.

Debugs

```

debug modem
debug chat
debug ppp negotiation
debug ppp event
debug ppp error

```

```

3825_GSM_3#
Nov  8 20:04:42.295: CHAT0/3/0: Attempting async line dialer script
Nov  8 20:04:42.295: CHAT0/3/0: Dialing using Modem script: <carrier> & System script:
none
Nov  8 20:04:42.299: CHAT0/3/0: process started
Nov  8 20:04:42.299: CHAT0/3/0: Asserting DTR
Nov  8 20:04:42.299: CHAT0/3/0: Chat script <carrier> started      >>>>> chat script
invoked
Nov  8 20:04:42.299: CHAT0/3/0: Sending string: atdt*98*1#
Nov  8 20:04:42.299: CHAT0/3/0: Expecting string: CONNECT
Nov  8 20:04:42.343: CHAT0/3/0: Completed match for expect: CONNECT
Nov  8 20:04:42.343: CHAT0/3/0: Chat script <carrier> finished, status = Success >>>>
successful communication with modem
Nov  8 20:04:42.395: TTY0/3/0: no timer type 1 to destroy
Nov  8 20:04:42.395: TTY0/3/0: no timer type 0 to destroy
Nov  8 20:04:42.395: TTY0/3/0: no timer type 2 to destroy
Nov  8 20:04:44.395: %LINK-3-UPDOWN: Interface Cellular0/3/0, changed state to up
Nov  8 20:04:44.395: Ce0/3/0 PPP: Using dialer call direction
Nov  8 20:04:44.395: Ce0/3/0 PPP: Treating connection as a callout
Nov  8 20:04:44.395: Ce0/3/0 PPP: Session handle[7E000089] Session id[46]
Nov  8 20:04:44.395: Ce0/3/0 PPP: Phase is ESTABLISHING, Active Open
Nov  8 20:04:44.395: Ce0/3/0 PPP: No remote authentication for call-out
Nov  8 20:04:44.395: Ce0/3/0 LCP: O CONFREQ [Closed] id 75 len 16
Nov  8 20:04:44.395: Ce0/3/0 LCP:   ACCM 0x000A0000 (0x0206000A0000)
Nov  8 20:04:44.395: Ce0/3/0 LCP:   MagicNumber 0x179E8E46 (0x0506179E8E46)

```

```

Nov 8 20:04:44.395: Ce0/3/0 LCP: I CONFREQ [REQsent] id 83 len 25
Nov 8 20:04:44.395: Ce0/3/0 LCP: ACCM 0x00000000 (0x020600000000)
Nov 8 20:04:44.395: Ce0/3/0 LCP: AuthProto CHAP (0x0305C22305)
Nov 8 20:04:44.395: Ce0/3/0 LCP: MagicNumber 0x374C7C61 (0x0506374C7C61)
Nov 8 20:04:44.395: Ce0/3/0 LCP: PFC (0x0702)
Nov 8 20:04:44.395: Ce0/3/0 LCP: ACFC (0x0802)
Nov 8 20:04:44.395: Ce0/3/0 LCP: O CONFREJ [REQsent] id 83 len 8
Nov 8 20:04:44.395: Ce0/3/0 LCP: PFC (0x0702)
Nov 8 20:04:44.395: Ce0/3/0 LCP: ACFC (0x0802)
Nov 8 20:04:44.399: Ce0/3/0 LCP: I CONFACK [REQsent] id 75 len 16
Nov 8 20:04:44.399: Ce0/3/0 LCP: ACCM 0x000A0000 (0x0206000A0000)
Nov 8 20:04:44.399: Ce0/3/0 LCP: MagicNumber 0x179E8E46 (0x0506179E8E46)
Nov 8 20:04:44.399: Ce0/3/0 LCP: I CONFREQ [ACKrcvd] id 84 len 21
Nov 8 20:04:44.399: Ce0/3/0 LCP: ACCM 0x00000000 (0x020600000000)
Nov 8 20:04:44.399: Ce0/3/0 LCP: AuthProto CHAP (0x0305C22305)
Nov 8 20:04:44.399: Ce0/3/0 LCP: MagicNumber 0x374C7C61 (0x0506374C7C61)
Nov 8 20:04:44.399: Ce0/3/0 LCP: O CONFACK [ACKrcvd] id 84 len 21
Nov 8 20:04:44.399: Ce0/3/0 LCP: ACCM 0x00000000 (0x020600000000)
Nov 8 20:04:44.399: Ce0/3/0 LCP: AuthProto CHAP (0x0305C22305)
Nov 8 20:04:44.399: Ce0/3/0 LCP: MagicNumber 0x374C7C61 (0x0506374C7C61)
Nov 8 20:04:44.399: Ce0/3/0 LCP: State is Open
Nov 8 20:04:44.399: Ce0/3/0 PPP: Phase is AUTHENTICATING, by the peer
Nov 8 20:04:44.403: Ce0/3/0 CHAP: I CHALLENGE id 1 len 35 from "UMTS_CHAP_SRV"
Nov 8 20:04:44.403: Ce0/3/0 CHAP: Using hostname from interface CHAP
Nov 8 20:04:44.403: Ce0/3/0 CHAP: Using password from interface CHAP
Nov 8 20:04:44.403: Ce0/3/0 CHAP: O RESPONSE id 1 len 40 from "<username configured on
the cellular interface>"
Nov 8 20:04:44.407: Ce0/3/0 CHAP: I SUCCESS id 1 len 4
Nov 8 20:04:44.407: Ce0/3/0 PPP: Phase is FORWARDING, Attempting Forward
Nov 8 20:04:44.407: Ce0/3/0 PPP: Phase is ESTABLISHING, Finish LCP
Nov 8 20:04:44.407: Ce0/3/0 PPP: Phase is UP

>>>> pap/chap succeeded

Nov 8 20:04:44.407: Ce0/3/0 IPCP: O CONFREQ [Closed] id 1 len 22
Nov 8 20:04:44.407: Ce0/3/0 IPCP: Address 0.0.0.0 (0x030600000000)
Nov 8 20:04:44.407: Ce0/3/0 IPCP: PrimaryDNS 0.0.0.0 (0x810600000000)
Nov 8 20:04:44.407: Ce0/3/0 IPCP: SecondaryDNS 0.0.0.0 (0x830600000000)
Nov 8 20:04:44.407: Ce0/3/0 PPP: Process pending ncp packets
Nov 8 20:04:45.411: Ce0/3/0 IPCP: I CONFNAK [REQsent] id 1 len 16
Nov 8 20:04:45.411: Ce0/3/0 IPCP: PrimaryDNS 10.11.12.13 (0x81060A0B0C0D)
Nov 8 20:04:45.411: Ce0/3/0 IPCP: SecondaryDNS 10.11.12.14 (0x83060A0B0C0E)
Nov 8 20:04:45.411: Ce0/3/0 IPCP: O CONFREQ [REQsent] id 2 len 22
Nov 8 20:04:45.411: Ce0/3/0 IPCP: Address 0.0.0.0 (0x030600000000)
Nov 8 20:04:45.411: Ce0/3/0 IPCP: PrimaryDNS 10.11.12.13 (0x81060A0B0C0D)
Nov 8 20:04:45.411: Ce0/3/0 IPCP: SecondaryDNS 10.11.12.14 (0x83060A0B0C0E)
Nov 8 20:04:45.459: Ce0/3/0 IPCP: I CONFREQ [REQsent] id 25 len 4
Nov 8 20:04:45.459: Ce0/3/0 IPCP: O CONFACK [REQsent] id 25 len 4
Nov 8 20:04:45.459: Ce0/3/0 IPCP: I CONFNAK [ACKsent] id 2 len 22
Nov 8 20:04:45.459: Ce0/3/0 IPCP: Address 166.138.186.119 (0x0306A68ABA77)
Nov 8 20:04:45.459: Ce0/3/0 IPCP: PrimaryDNS 66.102.163.231 (0x81064266A3E7)
Nov 8 20:04:45.459: Ce0/3/0 IPCP: SecondaryDNS 66.102.163.232 (0x83064266A3E8)
Nov 8 20:04:45.459: Ce0/3/0 IPCP: O CONFREQ [ACKsent] id 3 len 22
Nov 8 20:04:45.459: Ce0/3/0 IPCP: Address 166.138.186.119 (0x0306A68ABA77)
Nov 8 20:04:45.459: Ce0/3/0 IPCP: PrimaryDNS 66.102.163.231 (0x81064266A3E7)
Nov 8 20:04:45.459: Ce0/3/0 IPCP: SecondaryDNS 66.102.163.232 (0x83064266A3E8)
Nov 8 20:04:45.463: Ce0/3/0 IPCP: I CONFACK [ACKsent] id 3 len 22
Nov 8 20:04:45.463: Ce0/3/0 IPCP: Address 166.138.186.119 (0x0306A68ABA77)
Nov 8 20:04:45.463: Ce0/3/0 IPCP: PrimaryDNS 66.102.163.231 (0x81064266A3E7)
Nov 8 20:04:45.463: Ce0/3/0 IPCP: SecondaryDNS 66.102.163.232 (0x83064266A3E8)
Nov 8 20:04:45.463: Ce0/3/0 IPCP: State is Open
Nov 8 20:04:45.463: Ce0/3/0 IPCP: Install negotiated IP interface address 166.138.186.119

```



## Modem Troubleshooting Using the Diagnostic Port

The RJ-45 port on the faceplate of the 3G HWIC provides access to the debug port on the Sierra Wireless modem. By connecting an industry-standard diagnostic tool like Qualcomm CAIT/QXDM or Spirent UDM to this port, you can perform radio-level diagnostics and traffic monitoring on the modem. Use the following test command to turn diagnostics on:

```
router# test cell-hwic slot/port/wic dm-port on
```

The cable used to connect the PC/Laptop running the diagnostic tool is the standard Cisco router console cable (RJ-45 to DB-9).

**Note**

To enable test commands, you must enter the **service internal** command in the global configuration mode.

## Modem Settings for North America and Carriers Operating on 850 MHz and 1900 MHz Bands

For HWIC-3G-GSM deployments in North America and for carriers operating in the 850MHz and 1900 MHz bands, the following changes to the modem settings are required to prevent long network attach times.

The output of **show cellular x/x/x all** command shows the following:

- No network attach
- RSSI value is -110 dB
- Band selection is set to AUTO

### Changing Modem Settings

To change the modem settings to force the modem to scan NA (North American) bands only, follow these steps:

**Step 1** Change the PRL region to '2' (the default is 1). To do this, follow the procedure in [“Changing the PRL Region on the Modem”](#) section.

**Step 2** Set the band to WCDMA/GSM NA using the following Cisco IOS command:

```
router# cellular 0/0/0 gsm band wcdma-gsm-na
```

### Prerequisites

Before you change the PRL region, you must ensure that:

- The interface is in a shutdown mode before the chat-script is executed.
- Interface is un-shut for normal operation after the chat-script is executed.
- You must run the chat-script only once.

## Changing the PRL Region on the Modem

To change the PRL region on the modem, follow these steps:

- Step 1** Go to the configuration mode of the router and configure the PRL change chat-script. The following is an example using “prl” as the name of the chat script and “02” specifying the PRL region:

```
Router# conf t
Router(config)# chat-script prl "" "at" TIMEOUT 5 "OK" AT!ENTERCND="A710" TIMEOUT 5 "OK"
AT!CUSTOM="PRLREGION",02 TIMEOUT 5 "OK" "AT!RESET"
```



**Note** The entire chat script command must be entered in one line. Copy and paste it from this document to avoid typing errors.

- Step 2** Shut down the cellular interface by entering the **shut** command in the configuration mode:

In the following example, 0/0/0 is a sample interface number. Replace it with the correct interface number based on the slot in which the 3G HWIC is plugged in.

```
Router(config)#interface cellular 0/0/0
Router(config-if)#shut
```

- Step 3** Exit the configuration mode.

```
Router(config-if)#exit
```

- Step 4** To execute the chat-script, enter the **start-chat prl** command. In the following example, “prl” is the name of the chat script and 0/0/0 is the corresponding slot/port number that the cellular HWIC is plugged into.

```
Router#start-chat prl 0/0/0
```

Enabling “debug chat” and monitoring the console logs will indicate whether the chat-script executed successfully. For example,

```
Router#config t
Router(config)#logging enable
Router(config)#exit
Router#debug chat
```

- Step 5** Un-shut the cellular interface once the chat-script is over by entering the **no shut** command in the configuration mode:

```
Router#conf t
Router(config)#interface cellular 0/0/0
Router(config-if)#no shut
```

Below is a sample output after the debugs are enabled for a successful PRL change after invoking the chat-script:

```
Router#start-chat prl 0/3/0
Router#
*May  8 11:01:04.598: CHAT0/3/0: Matched chat script prl to string prl
*May  8 11:01:04.598: CHAT0/3/0: Asserting DTR
*May  8 11:01:04.598: CHAT0/3/0: Chat script prl started
*May  8 11:01:04.598: CHAT0/3/0: Sending string: at
*May  8 11:01:04.598: CHAT0/3/0: Expecting string: OK
*May  8 11:01:04.638: CHAT0/3/0: Completed match for expect: OK
*May  8 11:01:04.638: CHAT0/3/0: Sending string: AT!ENTERCND="A710"
*May  8 11:01:04.638: CHAT0/3/0: Expecting string: OK
```

```
*May 8 11:01:04.650: CHAT0/3/0: Completed match for expect: OK
*May 8 11:01:04.650: CHAT0/3/0: Sending string: AT!CUSTOM="PRLREGION",02
*May 8 11:01:04.650: CHAT0/3/0: Expecting string: OK
*May 8 11:01:04.682: CHAT0/3/0: Completed match for expect: OK
*May 8 11:01:04.682: CHAT0/3/0: Sending string: AT!RESET
*May 8 11:01:04.682: CHAT0/3/0: Expecting string: OK
*May 8 11:01:04.690: CHAT0/3/0: Completed match for expect: OK
*May 8 11:01:04.690: CHAT0/3/0: Chat script prl finished, status = Success
*May 8 11:01:05.374: %CELLWAN-2-MODEM_DOWN: Cellular0/3/0 modem is DOWN
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#interface cellular 0/0/0
Router(config-if)#no shut
*May 9 01:48:58.398: %LINK-5-CHANGED: Interface Cellular0/0/0, changed state to up
Router(config-if)#exit
Router(config)#exit
Router#
```

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