



Cellular Interface Modules

This chapter provides configuration details for the cellular interface modules used in the IR807 routers.

- [Cellular Interface Modules, on page 1](#)
- [Cellular Interface, on page 1](#)
- [IR807 Cellular Technology Selection, on page 20](#)
- [GPS, on page 23](#)
- [Upgrading the Modems, on page 26](#)

Cellular Interface Modules

This chapter provides configuration details for the cellular interface modules used in the IR807 routers.

This chapter contains the following sections:

Cellular Interface

The IR807 routers use the Sierra Wireless WP7601 and WP750X series modems supporting Single Input Multiple Output (SIMO) on LTE.

SIMO is an antenna technology for wireless communications in which multiple antennas are used at the destination (receiver). The antennas are combined to minimize errors and optimize data speed. The source (transmitter) has only one antenna. SIMO is one of several forms of smart antenna technology, the others being MIMO (multiple input, multiple output) and MISO (multiple input, single output)

Installation of the SIM card(s) and antennas is covered in the IR807 Hardware Installation Guide under the Cisco 800 Series Industrial Integrated Services Routers page:

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

The software download page can be found here:

<https://software.cisco.com/download/navigator.html?mdfid=286288566&flowid=76082>

The Firmware Upgrade Guide for Cellular Modems can be found here:

http://www.cisco.com/c/en/us/td/docs/routers/access/interfaces/firmware/Firmware_Upgrade.html

Cisco 4G LTE Software Installation Guide

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

After installing the SIM card(s) and antennas, check the cellular hardware, radio, network and SIM (Unlock SIM card if necessary).

4G LTE Dual SIMs

The Dual SIMs feature provides the following:

- A fail over mechanism in the event the primary SIM loses connectivity to one of the Mobile Service Provider networks. There is no automatic fall-back to the primary SIM, since a change only occurs when there is no signal from the carrier in use. A script is needed to reverse back to the primary. Both mobile provider networks must be supported by the given IR807 SKU, and it must be in an applicable region.
 - By default, SIM slot 0 is the primary, and SIM slot1 is the backup. Behavior may be changed using the `lte sim primary` command.
 - Profiles for each SIM are assigned by using the `lte sim profile` command. Each SIM has an associated Internet profile and an IMS profile in the CLI.
 - The fail-overs happen when there is no signal from the current carrier, and generally happen depending on the fail-over timer value that is set. The default value is 2 minutes. The range is from 0-7 minutes.

Radio Configuration

The following examples are of an IR807 cellular configuration:

```
IR807> enable
IR807# show ip int brief
Interface      IP-Address      OK?  Method  Status  Protocol
Async0         unassigned     YES  unset   up       down
Async1         unassigned     YES  unset   up       down
Cellular0      166.140.43.237 YES  IPCP    up       up
Single APN
Cellular1      10.61.25.231   YES  IPCP    up       up
Multi APN
FastEthernet0  10.65.217.109 YES  TFTP    administratively down  down
FastEthernet1  unassigned     YES  unset   administratively down  down
```

The output of this running configuration example has been edited for brevity:

```
! Last configuration change at 10:22:51 CET Thu Oct 12 2017 by admin
! NVRAM config last updated at 10:24:19 CET Thu Oct 12 2017 by admin
!
version 15.7
no service pad
service tcp-keepalives-in
service tcp-keepalives-out
service timestamps debug datetime msec localtime show-timezone
service timestamps log datetime msec localtime show-timezone year
service password-encryption
service sequence-numbers
!
hostname ir807
!
boot-start-marker
boot system flash:ir8001-universalk9-mz.SSA
boot-end-marker
!
```

```
security authentication failure rate 10 log
security passwords min-length 6
logging buffered warnings
logging persistent size 850000000
no logging console
no logging monitor
enable secret 5 $1rAjYmLz2e6K0lxR2bOo0
!
aaa new-model
!
aaa authentication login local_auth local
!
aaa session-id common
clock timezone CET 1 0
clock summer-time CET recurring last Sun Mar 3:00 last Sun Oct 2:00
clock calendar-valid
!
crypto pki trustpoint TP-self-signed-4288165946
  enrollment selfsigned
  subject-name cn=IOS-Self-Signed-Certificate-4288165946
  revocation-check none
  rsakeypair TP-self-signed-4288165946
!
crypto pki certificate chain TP-self-signed-4288165946
no ip source-route
no ip gratuitous-arps
!
ip dhcp excluded-address 192.168.1.1
ip dhcp excluded-address 192.168.15.5
!
ip dhcp pool Test
  network 192.168.15.4 255.255.255.252
  default-router 192.168.15.5
!
no ip bootp server
no ip domain lookup
ip domain name local.cisco.com
ip cef
login block-for 20 attempts 3 within 15
login on-failure log
login on-success log
!
ipv6 unicast-routing
ipv6 cef
!
multilink bundle-name authenticated
!
chat-script lte "" "AT!CALL" TIMEOUT 20 "OK"
license udi pid IR807G-LTE-GA-K9 sn FCW211700GN
!
!
memory reserve console 4096
vtp mode transparent
username admin privilege 15 secret 5 $1$e2C.$DUDXjmv0
!
!
redundancy
!
controller Cellular 0
  lte modem link-recovery disable
no cdp advertise-v2
no cdp run
!
interface Cellular0
```

```
ip address negotiated
no ip redirects
no ip unreachableables
no ip proxy-arp
ip nat outside
ip virtual-reassembly in
encapsulation slip
dialer in-band
dialer idle-timeout 0
dialer string lte
dialer watch-group 1
ipv6 address autoconfig
async mode interactive
!
interface Cellular1
no ip address
no ip redirects
no ip unreachableables
no ip proxy-arp
encapsulation slip
shutdown
!
interface FastEthernet0
ip address 192.168.101.1 255.255.255.0
no ip redirects
no ip unreachableables
no ip proxy-arp
ip nat inside
ip virtual-reassembly in
duplex auto
speed auto
!
interface FastEthernet1
no ip address
no ip redirects
no ip unreachableables
no ip proxy-arp
ip nat inside
ip virtual-reassembly in
shutdown
duplex auto
speed auto
!
interface Async0
no ip address
no ip redirects
no ip unreachableables
no ip proxy-arp
encapsulation scada
shutdown
!
interface Async1
no ip address
no ip redirects
no ip unreachableables
no ip proxy-arp
encapsulation scada
shutdown
!
!
no ip forward-protocol nd
no ip http server
no ip http secure-server
!
```

```
!  
ip nat inside source list 1 interface Cellular0 overload  
ip nat inside source static tcp 192.168.101.10 80 interface Cellular0 80  
ip ssh logging events  
ip ssh version 2  
ip ssh server algorithm encryption aes128-ctr aes192-ctr aes256-ctr  
ip ssh client algorithm encryption aes128-ctr aes192-ctr aes256-ctr  
!  
!  
logging history size 500  
no logging trap  
logging facility local2  
dialer watch-list 1 ip 8.8.8.8 0.0.0.0  
dialer-list 1 protocol ip permit  
dialer-list 1 protocol ipv6 permit  
ipv6 ioam timestamp  
!  
!  
access-list 1 permit 0.0.0.0 252.255.255.255  
!  
!  
!  
control-plane  
!  
!  
!  
no vstack  
banner login  
=====
```

Test

```
=====
```

```
!  
line con 0  
  exec-timeout 5 0  
  logging synchronous  
  login authentication local_auth  
  transport output telnet  
line 2  
  exec-timeout 5 0  
  privilege level 0  
  no activation-character  
  no exec  
  transport preferred none  
  transport input all  
  transport output none  
  stopbits 1  
line 3  
  exec-timeout 5 0  
  script dialer lte  
  modem InOut  
  no exec  
  rxspeed 100000000  
  txspeed 50000000  
line 4  
  exec-timeout 5 0  
  privilege level 0  
  no exec  
  transport output none  
line 5  
  exec-timeout 5 0  
  privilege level 0  
  no exec  
  transport output none  
  stopbits 1
```

```

line 8
  exec-timeout 5 0
  privilege level 0
  no exec
  transport output none
  rxspeed 100000000
  txspeed 50000000
line vty 0 4
  exec-timeout 15 0
  login authentication local_auth
  transport input telnet ssh
  transport output none
!
exception memory ignore overflow processor
exception memory ignore overflow io
scheduler allocate 20000 1000
!
end

```

Test the modem configuration with a ping command:

```

IR807# ping 8.8.8.8
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 8.8.8.8, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 30/88/292 ms
IR807#

```

Cellular Provider Profiles

The following examples show modem profiles.

Verizon Profile

```

IR807# show cellular 0 profile

Profile 1 = INACTIVE **
-----
PDP Type = IPv4v6
Access Point Name (APN) = vzwims
Authentication = None
Profile 2 = INACTIVE
-----
PDP Type = IPv4v6
Access Point Name (APN) = vzwadmin
Authentication = None
Profile 3 = ACTIVE*

Profile 3 is used for Verizon
-----
PDP Type = IPv4v6
PDP address = 166.140.43.237
Access Point Name (APN) = we01.VZWSTATIC
Authentication = None
    Primary DNS address = 198.224.173.135
    Secondary DNS address = 198.224.174.135
Profile 4 = INACTIVE
-----
PDP Type = IPv4v6
Access Point Name (APN) = vzwapp

```

```

Authentication = None
Profile 5 = INACTIVE
-----
PDP Type = IPv4v6
Access Point Name (APN) = vzw800
Authentication = None
Profile 6 = INACTIVE
-----
PDP Type = IPv4v6
Access Point Name (APN) = vzwenterprise
Authentication = None
  * - Default profile
  ** - LTE attach profile

```

ATT Profile

```

IR807# show cellular 0 profile
Profile 1 = ACTIVE* **
-----
PDP Type = IPv4
PDP address = 192.168.1.51
Access Point Name (APN) = keysight
Authentication = None
Primary DNS address = 0.0.0.0
Secondary DNS address = 0.0.0.0
* - Default profile
** - LTE attach profile
  * - Default profile
  ** - LTE attach profile

```

Sprint Profile

```

IR807#show cellular 0 profile
Profile 1 = INACTIVE* **
-----
PDP Type = IPv4v6
Access Point Name (APN) = otasn
Authentication = None
Profile 9 = INACTIVE
-----
PDP Type = IPv4v6
Access Point Name (APN) = cinet.spcs
Authentication = None
Profile 16 = INACTIVE
-----
PDP Type = IPv4v6
Access Point Name (APN) = otasn
Authentication = None
* - Default profile
** - LTE attach profile

```

Generic Profile

```

Profile 1 = INACTIVE* **
-----
PDP Type = IPv4
Access Point Name (APN) = keysight
Authentication = None
* - Default profile
** - LTE attach profile

```

Use the **show cellular hardware** command to view information about your device.

```
IR807# show cellular 0 hardware
Modem Firmware Version = SWI9X15Y_07.12.09.00
Modem Firmware built = 2017/04/26 23:34:19
Hardware Version = 1.0
Device Model ID: WP7504
Package Identifier ID: 1103235_9906722_WP7504_07.12.09.00_00_Cisco_001.001_000
International Mobile Subscriber Identity (IMSI) = 001012345678901
International Mobile Equipment Identity (IMEI) = 354937080100642
Integrated Circuit Card ID (ICCID) = 89600114082100035643
Mobile Subscriber Integrated Services
Digital Network-Number (MSISDN) =
Modem Status = Online
Current Modem Temperature = 37 deg C
PRI SKU ID = 1103235, PRI version = 001.028_000, Carrier = ATT
OEM PRI version = 01.01
IR807#
```

Creating a Cellular Profile for ATT

```
IR807#cellular 0 lte profile create 1 keysight none ipv4
Warning: You are attempting to modify a currently ACTIVE data profile.
This is not recommended and may affect the connection state
PDP Type = IPv4
Access Point Name (APN) = keysight
Authentication = NONE
Profile 1 already exists with above parameters. Do you want to overwrite? [confirm] <return>
Profile 1 will be overwritten with the following values:
PDP type = IPv4
APN = keysight
Authentication = NONE
Are you sure? [confirm] <return>
Profile 1 written to modem
IR807#
IR807#conf
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
IR807(config)#controller cellular 0
IR807(config-controller)#
IR807(config-controller)#lte sim data-profile 1 attach-profile 1 slot 0
IR807#sh cellular 0 profile
Profile 1 = ACTIVE* **
-----
PDP Type = IPv4
PDP address = 192.168.1.51
Access Point Name (APN) = keysight
Authentication = None
Primary DNS address = 0.0.0.0
Secondary DNS address = 0.0.0.0
Profile 2 = INACTIVE
-----
PDP Type = IPv4
Access Point Name (APN) = keysight2
Authentication = None
Profile 3 = INACTIVE
-----
PDP Type = IPv4
Access Point Name (APN) = keysight
Authentication = None
* - Default profile
** - LTE attach profile
```



```
Configured default profile for active SIM 0 is profile 1.
IR807#
```

Creating a Cellular Profile for Verizon.

```
IR807# cellular 0/0 lte profile create 3 we01.VZWSTATIC
Warning: You are attempting to modify a currently ACTIVE data profile.

This is not recommended and may affect the connection state
PDP Type = IPv4v6
Access Point Name (APN) = we01.VZWSTATIC
Authentication = NONE
Profile 3 already exists with above parameters. Do you want to overwrite? [confirm] <return>
Profile 3 will be overwritten with the following values:
PDP type = IPv4
APN = we01.VZWSTATIC
Authentication = NONE
Are you sure? [confirm] <return>
Profile 3 written to modem
IR807# conf t
Enter configuration commands, one per line. End with CNTL/Z.
IR807(config)# controller cellular 0
IR807(config-controller)# lte sim data-profile 3 attach-profile 1
IR807(config-controller)# end
IR807#
IR807# show

*Oct 24 19:43:44.841: %SYS-5-CONFIG_I: Configured from console by consolecell
IR807# show cellular 1/0 profile
Profile 1 = ACTIVE* **
-----
PDP Type = IPv4
PDP address = 10.61.185.213
Access Point Name (APN) = m2m.com.attz
Authentication = None
    Primary DNS address = 8.8.8.8
    Secondary DNS address = 8.8.4.4
* - Default profile
** - LTE attach profile
```

Creating a Cellular Profile for ATT

```
IR807# cellular 1/0 lte profile create 1 m2m.com.attz
Warning: You are attempting to modify a currently ACTIVE data profile.

This is not recommended and may affect the connection state
PDP Type = IPv4
Access Point Name (APN) = m2m.com.attz
Authentication = NONE
Profile 1 already exists with above parameters. Do you want to overwrite? [confirm] <return>
Profile 1 will be overwritten with the following values:
PDP type = IPv4
APN = m2m.com.attz
Authentication = NONE
Are you sure? [confirm] <return>
Profile 1 written to modem
IR807#
IR807# conf t
Enter configuration commands, one per line. End with CNTL/Z.
IR807(config)# controller cellular 1
IR807(config-controller)#
```

```
IR807(config-controller)# lte sim data-profile 1 attach-profile 1
```

Note: Please issue a modem reset for the modified attach-profile to take effect.

```
IR807(config-controller)# end
IR807#
```

Controller Cellular 0 and NAT Configuration

Controller Cellular 0 is configured with default parameters. If a profile different from Profile 1 is set-up, it must be attached to controller cellular 0.

If the SIM in slot #1 must be used as primary, it is done under controller cellular 0

1. Show the controller cellular 0

```
IR807#show run | begin controller
controller Cellular 0
  lte sim data-profile 1 attach-profile 1 slot 0 !
Value set-up for configuration example
  lte sim max-retry 0
  lte failovertimer 0
  lte modem link-recovery rssi onset-threshold -110
  lte modem link-recovery monitor-timer 20
  lte modem link-recovery wait-timer 10
  lte modem link-recovery debounce-count 6
!
```

1. If the cellular interface obtains an IPv4 private address, NAT should be configured.

```
IR807#conf term
Enter configuration commands, one per line. End with CNTL/Z.
IR807(config)#inter cellular 0
IR807(config-if)#ip nat outside
IR807(config-if)interface fastethernet 0
IR807(config-if)ip nat inside
IR807(config-if) ip virtual-reassembly in
IR807(config)#access-list 10 permit 10.20.20.0 0.0.0.255
!
IPv4 subnet to be NATed
IR807(config)#ip nat inside source list 10 interface Cellular0 overload
!
NAT interface association
```

1. Once the Cellular configuration is done, ping a well-known IP address to test the connectivity.

```
IR807#ping 8.8.8.8

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 8.8.8.8, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 340/472/740 ms
IR807#
```

1. Attached Cellular 0 profile must become “active” and “connection” shows IP address and traffic.

```
IR807#show cellular 0 profile
Profile 1 = ACTIVE* **
-----
PDP Type = IPv4
PDP address = 10.60.159.255
Access Point Name (APN) = LTE
```

```

Authentication = None
Primary DNS address = 212.27.40.240
Secondary DNS address = 212.27.40.241
* - Default profile
** - LTE attach profile
Configured default profile for active SIM 0 is profile 1.
IR807#show cellular 0 connection
Profile 1, Packet Session Status = ACTIVE
Cellular0:
Data Transmitted = 700 bytes, Received = 600 bytes
IP address = 10.60.159.255
Primary DNS address = 212.27.40.240
Secondary DNS address = 212.27.40.241
Profile 2, Packet Session Status = INACTIVE

```

What to do Next

Use the show interface cellular 0 command to display the negotiated IP address if operational.

```

IR807#show interfaces cellular 0
Cellular0 is up, line protocol is up
Hardware is 4G WWAN Modem - Global (Europe & Australia) Multimode LTE/DC-HSPA+/HSPA+/HSPA/U

Internet address is 10.123.161.59/32
MTU 1500 bytes, BW 384 Kbit/sec, DLY 100000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
Encapsulation SLIP, loopback not set
Keepalive not supported
Last input 00:22:41, 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: fifo
Output queue: 0/10 (size/max)
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
 12 packets input, 1128 bytes, 0 no buffer
  Received 0 broadcasts (0 IP multicasts)
  0 runts, 0 giants, 0 throttles
  0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
 51 packets output, 3364 bytes, 0 underruns
  0 output errors, 0 collisions, 0 interface resets
  0 unknown protocol drops
  0 output buffer failures, 0 output buffers swapped out
  0 carrier transitions
DCD=up DSR=up DTR=up RTS=up CTS=up
IR807#

```

If the negotiated IP address is not operational:

```

IR807#show interfaces cellular 0
Cellular0 is up (spoofing), line protocol is up (spoofing)
Hardware is 4G WWAN Modem - Global (Europe & Australia) Multimode LTE/DC-HSPA+/HSPA+/HSPA/U

Internet address will be assigned dynamically by the network

```

Other Useful Commands

```

IR807# show cell 0 hardware

```

```

Modem Firmware Version = SWI9X15Y_07.12.09.00
Modem Firmware built = 2017/04/26 23:34:19
Hardware Version = 1.0
Device Model ID: WP7504
Package Identifier ID: 1103235_9906722_WP7504_07.12.09.00_00_Cisco_001.001_000
International Mobile Subscriber Identity (IMSI) = 001012345678901
International Mobile Equipment Identity (IMEI) = 354937080100642
Integrated Circuit Card ID (ICCID) = 89600114082100035643
Mobile Subscriber Integrated Services
Digital Network-Number (MSISDN) =
Modem Status = Online
Current Modem Temperature = 37 deg C
PRI SKU ID = 1103235, PRI version = 001.028_000, Carrier = ATT
OEM PRI version = 01.01
IR807#
IR807# show cell 0 security

Active SIM = 1
SIM switchover attempts = 0
Card Holder Verification (CHV1) = Disabled
SIM Status = OK
SIM User Operation Required = None
Number of CHV1 Retries remaining = 3
IR807#sh cellular 0 radio
Radio power mode = online
LTE Rx Channel Number = 2525
LTE Tx Channel Number = 20525
LTE Band = 5
LTE Bandwidth = 10 MHz
Current RSSI = -60 dBm
Current RSRP = -86 dBm
Current RSRQ = -10 dB
Current SNR = 30.0 dB
Physical Cell Id = 0x0
Number of nearby cells = 1
Idx PCI (Physical Cell Id)
-----
1 0
Radio Access Technology(RAT) Preference = LTE
Radio Access Technology(RAT) Selected = LTE
IR807# show cell 0 network

Current System Time = Sat Oct 10 9:12:59 2015
Current Service Status = Normal
Current Service = Packet switched
Current Roaming Status = Home
Network Selection Mode = Automatic
Network = LTE
Mobile Country Code (MCC) = 208
Mobile Network Code (MNC) = 15
Packet switch domain(PS) state = Attached
Location Area Code (LAC) = 3910
Cell ID = 222094374
IR807#
IR807# show cell 0 radio

Radio power mode = ON
Channel Number = 3037
Current Band = Unknown
Current RSSI(RSCP) = -99 dBm
Current ECIO = -10 dBm
Radio Access Technology(RAT) Preference = AUTO
Radio Access Technology(RAT) Selected = UMTS ( UMTS/WCDMA )
IR807# show cell 0 network

```

```

Current System Time = Sat Oct 10 9:12:59 2015
Current Service Status = Normal
Current Service = Packet switched
Current Roaming Status = Home
Network Selection Mode = Automatic
Network = LTE
Mobile Country Code (MCC) = 208
Mobile Network Code (MNC) = 15
Packet switch domain(PS) state = Attached
Location Area Code (LAC) = 3910
Cell ID = 222094374

```

Output example showing the 7504 modem

```

IR807# show cell 0 all
Hardware Information
=====
Modem Firmware Version = SWI9X15Y_07.12.09.00
Modem Firmware built = 2017/04/26 23:34:19
Hardware Version = 1.0
Device Model ID: WP7504
Package Identifier ID: 1103235_9906722_WP7504_07.12.09.00_00_Cisco_001.001_000
International Mobile Subscriber Identity (IMSI) = 001012345678901
International Mobile Equipment Identity (IMEI) = 354937080100642
Integrated Circuit Card ID (ICCID) = 89600114082100035643
Mobile Subscriber Integrated Services
Digital Network-Number (MSISDN) =
Modem Status = Online
Current Modem Temperature = 37 deg C
PRI SKU ID = 1103235, PRI version = 001.028_000, Carrier = ATT
OEM PRI version = 01.01
Profile Information
=====
Profile 1 = ACTIVE* **
-----
PDP Type = IPv4
PDP address = 192.168.1.51
Access Point Name (APN) = keysight
Authentication = None
Primary DNS address = 0.0.0.0
Secondary DNS address = 0.0.0.0
Profile 2 = ACTIVE
-----
PDP Type = IPv4
PDP address = 192.168.1.54
Access Point Name (APN) = keysight2
Authentication = None
Primary DNS address = 0.0.0.0
Secondary DNS address = 0.0.0.0
Profile 3 = INACTIVE
-----
PDP Type = IPv4
Access Point Name (APN) = keysight
Authentication = None
* - Default profile
** - LTE attach profile
Configured default profile for active SIM 1 is profile 1.
Data Connection Information
=====
Profile 1, Packet Session Status = ACTIVE
Celluansmitted = 0 bytes, Received = 0 bytes
IP address = 192.168.1.51

```

Output example showing the 7504 modem

```

        Primary DNS address = 0.0.0.0
        Secondary DNS address = 0.0.0.0
Profile 2, Packet Session Status = ACTIVE
Cellular1:
    Data Transmitted = 0 bytes, Received = 0 bytes
    IP address = 192.168.1.54
    Primary DNS address = 0.0.0.0
    Secondary DNS address = 0.0.0.0
Profile 3, Packet Session Status = INACTIVE
Profile 4, Packet Session Status = INACTIVE
Profile 5, Packet Session Status = INACTIVE
Profile 6, Packet Status = INACTIVE
Profile 7, Packet Session Status = INACTIVE
Profile 8, Packet Session Status = INACTIVE
Profile 9, Packet Session Status = INACTIVE
Profile 10, Packet Session Status = INACTIVE
Profile 11, Packet Session Status = INACTIVE
Profile 12, Packet Session Status = INACTIVE
Profile 13, Packet Session Status = INACTIVE
Profile 14, Packet Session Status = INACTIVE
Profile 15, Packet Session Status = INACTIVE
Profile 16, Packet Session Status = INACTIVE
Network Information
=====
Current System Time = Mon Apr 3 23:39:5 2000
Current Service Status = Normal
Current Service = Packet switched
Current Roaming Status = Home
Network Selection Mode = Automatic
Network = Test PLMN 1-1
Mobile Country Code (MCC) = 1
Mobile Network Code (MNC) = 1
Packet switch doma Attached
Registration state(EMM) = Registered
EMM Sub State = Normal Service
Tracking Area Code (TAC) = 1
Cell ID = 1
Negotiated network MTU is 1430
Radio Information
=====
Radio power mode = online
LTE Rx Channel Number = 2525
LTE Tx Channel Number = 20525
LTE Band = 5
LTE Bandwidth = 10 MHz
Current RSSI = -60 dBm
Current RSRP = -86 dBm
Current RSRQ = -10 dB
Current SNR = 30.0 dB
Physical Cell Id = 0x0
Number of nearby cells = 1
Idx      PCI (Physical Cell Id)
-----
1
Radio Access Technology(RAT) Preference = LTE
Radio Access Technology(RAT) Selected = LTE
Modem Security Information
=====
Active SIM = 1
SIM switchover attempts = 0
Card Holder Verification (CHV1) = Disabled
SIM Status = OK
SIM User Operation Required = None
Number of CHV1 Retries remaining = 3

```

```

GPS Information
=====
GPS Info
-----
GPS Feature: enabled
GPS Port Sated GPS port
GPS Status: GPS mode or nmea not enabled
GPS auto tracking status: disabled (Mode is not set)
GPS auto tracking config: disabled
GPS Mode Configured: not configured/unknown
SMS Information
=====
Incoming Message Information
-----
SMS stored in modem = 0
SMS archived since booting up = 0
Total SMS deleted since booting up = 0
Storage records allocated = 25
Storage records used = 0
Number of callbacks triggered by SMS = 0
Number of successful archive since booting up = 0
Number of failed archive since booting up = 0
Outgoing Message Information
-----
Total SMS sent successfully = 0
Total SMS send failure = 0
Number of outgoing SMS pending = 0
Number of successful archive since booting up = 0
Number of failed archive since booting up = 0
Last Outgoing SMS Status = SUCCESS
Copy-to-SIM Status = 0x0
Send-to-Network Status = 0x0
Report-Outgoing-Message-Number:
  Reference Number = 0
  Result Code = 0x0
  Diag Code = 0x0 0x0 0x0 0x0 0x0
SMS Archive URL =
Error Information
=====
This command is not supported on this platform.
Modem Crashdump Information
=====
Chassis Model Name is IR807G-LTE-NA-K9
Platform is MC73xx based
Modem crashdump logging: off
IR807#

```

Output example showing the 7502 modem

```

IR807#sh cell 0 all
Hardware Information
=====
Modem Firmware Version = SWI9X15Y_07.12.09.00
Modem Firmware built = 2017/04/26 23:34:19
Hardware Version = 1.0
Device Model ID: WP7502
Package Identifier ID: 1103234_9906721_WP7502_07.12.09.00_00_Cisco_001.001_000
International Mobile Subscriber Identity (IMSI) = 208103796469544
International Mobile Equipment Identity (IMEI) = 354938080100327
Integrated Circuit Card ID (ICCID) = 89331037162704055456
Mobile Subscriber Integrated Services
Digital Network-Number (MSISDN) =
Modem Status = Online

```

Output example showing the 7502 modem

```
Current Modem Temperature = 29 deg C
PRI SKU ID = 1103234, PRI version = 001.033_000, Carrier = Generic
OEM PRI version = 01.01
```

```
Profile Information
=====
```

```
Profile password Encryption level: 7
```

```
Profile 1 = INACTIVE* **
-----
```

```
PDP Type = IPv4
Access Point Name (APN) = sl2sfr
Authentication = None
```

```
* - Default profile
** - LTE attach profile
```

```
Configured default profile for active SIM 0 is profile 1.
```

```
Data Connection Information
=====
```

```
Profile 1, Packet Session Status = INACTIVE
Profile 2, Packet Session Status = INACTIVE
Profile 3, Packet Session Status = INACTIVE
Profile 4, Packet Session Status = INACTIVE
Profile 5, Packet Session Status = INACTIVE
Profile 6, Packet Session Status = INACTIVE
Profile 7, Packet Session Status = INACTIVE
Profile 8, Packet Session Status = INACTIVE
Profile 9, Packet Session Status = INACTIVE
Profile 10, Packet Session Status = INACTIVE
Profile 11, Packet Session Status = INACTIVE
Profile 12, Packet Session Status = INACTIVE
Profile 13, Packet Session Status = INACTIVE
Profile 14, Packet Session Status = INACTIVE
Profile 15, Packet Session Status = INACTIVE
Profile 16, Packet Session Status = INACTIVE
```

```
Network Information
=====
```

```
Current System Time = Wed Oct 11 8:24:34 2017
Current Service Status = Normal
Current Service = Packet switched
Current Roaming Status = Home
Network Selection Mode = Automatic
Network = F SFR
Mobile Country Code (MCC) = 208
Mobile Network Code (MNC) = 10
Packet switch domain(PS) state = Attached
Registration state(EMM) = Registered
EMM Sub State = Normal Service
Tracking Area Code (TAC) = 46506
Cell ID = 604934
Network MTU is not Available
```

```
Radio Information
=====
```

```
Radio power mode = online
LTE Rx Channel Number = 1501
LTE Tx Channel Number = 19501
LTE Band = 3
```



```
LTE Bandwidth = 20 MHz
Current RSSI = -84 dBm
Current RSRP = -114 dBm
Current RSRQ = -13 dB
Current SNR = -1.0 dB
Physical Cell Id = 0x102
Number of nearby cells = 1
Idx      PCI (Physical Cell Id)
-----
1        258
Radio Access Technology(RAT) Preference = AUTO
Radio Access Technology(RAT) Selected = LTE

Modem Security Information
=====
Active SIM = 0
SIM switchover attempts = 0
Card Holder Verification (CHV1) = Disabled
SIM Status = OK
SIM User Operation Required = None
Number of CHV1 Retries remaining = 3

GPS Information
=====

GPS Info
-----
GPS Feature: enabled
GPS Port Selected: Dedicated GPS port
GPS Status: GPS mode or nmea not enabled
GPS auto tracking status: disabled (Mode is not set)
GPS auto tracking config: disabled
GPS Mode Configured: not configured/unknown

SMS Information
=====
Incoming Message Information
-----
SMS stored in modem = 6
SMS archived since booting up = 0
Total SMS deleted since booting up = 0
Storage records allocated = 25
Storage records used = 6
Number of callbacks triggered by SMS = 0
Number of successful archive since booting up = 0
Number of failed archive since booting up = 0

Outgoing Message Information
-----
Total SMS sent successfully = 0
Total SMS send failure = 0
Number of outgoing SMS pending = 0
Number of successful archive since booting up = 0
Number of failed archive since booting up = 0
Last Outgoing SMS Status = SUCCESS
Copy-to-SIM Status = 0x0
Send-to-Network Status = 0x0
Report-Outgoing-Message-Number:
  Reference Number = 0
  Result Code = 0x0
  Diag Code = 0x0 0x0 0x0 0x0 0x0

SMS Archive URL =
```

```
Error Information
=====
```

This command is not supported on this platform.

```
Modem Crashdump Information
=====
Chassis Model Name is IR807G-LTE-GA-K9
Platform is MC73xx based
Modem crashdump logging: off
```

```
ir807-htabt#sh run int async 0
Building configuration...
```

```
Current configuration : 124 bytes
!
interface Async0
no ip address
no ip redirects
no ip unreachable
no ip proxy-arp
encapsulation scada
shutdown
end
```

Accessing 4G Modem AT Commands

Note: A password must be added to the line configuration for security.

Get the line number associated to Cellular 0:

```
IR807#show line
Tty Typ Tx/Rx A Modem Roty AccO AccI Uses Noise Overruns Int
A 3 TTY - inout - - - 0 0 611/0 Ce0 - Single APN
I 8 TTY - inout - - - 0 0 0/0 Ce1 - Multi APN
```

Use one of the IR807 IP addresses along with 2000 + line number (2003)

```
IR807#telnet 1.1.1.1 2003
Trying 1.1.1.1, 2003 ... Open
```

Execute the 4G modem AT commands, for example AT!GSTATUS?:

```
at!gstatus?
Current Time: 1418Temperature: 37
Bootup Time: 5Mode: ONLINE
System mode: LTE PS state: Attached
LTE band: B5 LTE bw: 10 MHz
LTE Rx chan: 2525LTE Tx chan: 20525
EMM state: Registered Normal Service
EMM connection:RRC Connected RSSI (dBm): -60Tx Power: 1
RSRP (dBm): -86TAC: 0001 (1)
RSRQ (dB): -10Cell ID: 00000001 (1)
SINR (dB): 30.0
IMS Reg State: UNKNOWN IMS Mode: Not Support
IMS Srv State: UNKNOWN SMS,UNKNOWN VoIP
```

Disconnect using “SHIFT+CONTROL+6+x”, then confirm:

```
IR807#disc
Closing connection to 1.1.1.1 [confirm]enter
IR807#
```

Checking 4G Modem Firmware through AT Commands

To check the IR807 4G modem firmware, execute the 4G modem AT commands after connecting to the modem:

```
IR807#telnet 1.1.1.1 2002
Trying 1.1.1.1, 2002 ... Open
Connecting to virtual console, enter Ctrl-^ followed by x,
then "disconnect" to return to router prompt
/ #
/ #
/ # echo -e 'at!gstatus?\r\n' > /dev/ttyUSB2
/ # at!gstatus?
!GSTATUS:
Current Time: 1418Temperature: 37
Bootup Time: 5Mode: ONLINE
System mode: LTE PS state: Attached
LTE band: B5 LTE bw: 10 MHz
LTE Rx chan: 2525LTE Tx chan: 20525
EMM state: Registered Normal Service
EMM connection:RRC Connected
RSSI (dBm): -60Tx Power: 1
RSRP (dBm): -86TAC: 0001 (1)
RSRQ (dB): -10Cell ID: 00000001 (1)
SINR (dB): 30.0
IMS Reg State: UNKNOWN IMS Mode: Not Support
IMS Srv State: UNKNOWN SMS,UNKNOWN VoIP
OK
/ #
/ # echo -e 'at+cgcontrdp\r\n' > /dev/ttyUSB2
/ # at+cgcontrdp
+CGCONTRDP: 1,5,keysight,192.168.1.51,,,,
+CGCONTRDP: 2,8,keysight2,192.168.1.54,,,,
OK
/ # echo -e 'at+cgdcont?\r\n' > /dev/ttyUSB2
/ # at+cgdcont?
+CGDCONT: 1,"IP","keysight","0.0.0.0",0,0
+CGDCONT: 2,"IP","keysight2","0.0.0.0",0,0
+CGDCONT: 3,"IP","keysight","0.0.0.0",0,0
OK
/ # echo -e 'at!priid?\r\n' > /dev/ttyUSB2
/ # at!priid?
PRI Part Number: 9906722
Revision: 01.01
Carrier PRI: 9999999_9904367_SWI9X15Y_07.12.09.00_00_ATT_001.028_000OK
/ # echo -e 'at!impref?\r\n' > /dev/ttyUSB2
/ # at!impref?
!IMPREF:
preferred fw version: 07.12.09.00
preferred carrier name: ATT
preferred config name: ATT_001.028_000
current fw version: 07.12.09.00
current carrier name: ATT
current config name: ATT_001.028_000
OK
/ #
/ # echo -e 'at!gpsstatus?\r\n' > /dev/ttyUSB2
```

```

/ # at!gpsstatus?
Current time: 1980 01 06 6 00:45:40
1980 01 06 6 00:45:40 Last Fix Status = NONE
1980 01 06 6 00:45:40 Fix Session Status = NONE
No TTFE available
OK
/ # echo -e 'at!band=?\r\n' > /dev/ttyUSB2
/ # at!band=?
Index, Name
00, All Bands
02, North America 3G
07, merica
08, WCDMA ALL
09, LTE ALL
OK
/ #

```

IR807 Cellular Technology Selection

The cellular interface supports 4G/LTE networks. The IOS CLI can be used to select a particular technology that is most desirable in your local zone.

Use the cellular 0 lte technology command:

Verizon modem WP7601

```

IR807# cellular 0 lte technology ?
auto      Automatic LTE Technology Selection
lte       LTE

```

GA modem WP7502

```

IR807# cellular 0 lte technology ?
auto      Automatic Radio Access Technology(RAT) Selection
gsm       GSM
lte       LTE
umts      UMTS

```

NA modem WP7504 with ATT Firmware

```

IR807# cellular 0 lte technology ?

```

```

auto      Automatic Radio Access Technology(RAT) Selection
lte       LTE
umts      UMTS

```

NA modem WP7504 with Sprint Firmware

```

IR807# cellular 0 lte technology ?

```

```

auto      Automatic Radio Access Technology(RAT) Selection
lte       LTE
umts      UMTS
cdma-1xrtt CDMA 1xRTT
cdma-evdo CDMA EVDO Rev A

```

Note: The default technology type selection is **auto** and it is recommended to be used at all times. Although **gsm & umts** as part of the selection, the modem firmware does not support them on gsm/umts network. They will be used as **lte** selection on Verizon network.

Show the completed configuration: (output edited for brevity)

```
IR807#show run
Building configuration...
!
! Last configuration change at 16:59:31 UTC Thu Jun 29 2017
!
version 15.7
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
service internal
!
hostname IR807
!
boot-start-marker
boot-end-marker
!
!
enable password lab
!
no aaa new-model
memory-size iomem 5
!
ip inspect WAAS flush-timeout 10
ip cef
no ipv6 cef
!
multilink bundle-name authenticated
!
chat-script lte "" "AT!CALL" TIMEOUT 20 "OK"
license udi pid IR807G-LTE-NA-K9 sn FCW211700HD
license boot module ir8001 level advipservices
!
!
!
redundancy
 notification-timer 120000
!
controller Cellular 0
 lte sim data-profile 1 attach-profile 1 slot 0
 lte modem link-recovery disable
!
interface Loopback1
 ip address 1.1.1.1 255.255.255.0
!
interface Cellular0
 ip address negotiated
 ip nat outside
 ip virtual-reassembly in
 encapsulation slip
 load-interval 30
 dialer in-band
 dialer idle-timeout 0
 dialer string lte
 dialer string multimode
 dialer-group 1
 no peer default ip address
```

```

    ipv6 address autoconfig
    async mode interactive
    routing dynamic
    !
interface Cellular1
    ip address negotiated
    ip nat outside
    ip virtual-reassembly in
    encapsulation slip
    load-interval 30
    dialer in-band
    dialer idle-timeout 0
    dialer string lte
    dialer string multimode
    dialer-group 1
    no peer default ip address
    async mode interactive
    routing dynamic
    !
interface FastEthernet0
    ip address 10.65.217.109 255.255.255.224
    duplex auto
    speed auto
    !
interface FastEthernet1
    no ip address
    duplex auto
    speed auto
    !
interface Async0
    no ip address
    encapsulation slip
    hold-queue 10 out
    !
interface Async1
    no ip address
    encapsulation scada
    !
ip forward-protocol nd
no ip http server
no ip http secure-server
!
!
ip route 10.0.0.0 255.0.0.0 FastEthernet0
ip route 192.168.1.51 255.255.255.255 Cellular0
ip route 192.168.1.52 255.255.255.255 Cellular1
ip ssh server algorithm encryption aes128-ctr aes192-ctr aes256-ctr
ip ssh client algorithm encryption aes128-ctr aes192-ctr aes256-ctr
!
dialer watch-list 1 ip 8.8.8.8 255.255.255.255
dialer watch-list 1 delay route-check initial 60
dialer watch-list 1 delay connect 1
dialer-list 1 protocol ip permit
dialer-list 1 protocol ipv6 permit
ipv6 ioam timestamp
!
access-list 1 permit any
access-list 101 permit ip any any
!
control-plane
line con 0
line 2
    no activation-character
    no exec

```

```

transport preferred none
transport input all
stopbits 1
line 3
  script dialer lte
  modem InOut
  no exec
  monitor
  transport input all
  transport output all
  rxspeed 100000000
  txspeed 50000000
line 4
line 5
  stopbits 1
line 8
  script dialer lte
  modem InOut
  no exec
  monitor
  transport input all
  transport output all
line vty 0 3
  password lab
  login
  transport input all
  transport output all
line vty 4
  password lab
  login local
  transport input all
  transport output all
!
scheduler allocate 20000 1000
!
end

```

GPS

The IR807 series can be configured to enable real-time location tracking of remote assets and geo-fence when used with IOT Field Network Director. Field Network Director receives GPS data directly from IOS, not NMEA.

Key Points:

- GPS must be configured under *controller cellular 0*.
- GPS data can be seen locally, or data stream can be forwarded to applications, i.e. RUBAN.

To configure GPS on the IR807 series, refer to the following examples.

```

IR807# conf term
IR807(config)#controller cellular 0
IR807(config-controller)#lte gps ?
  enable  enable GPS feature
  mode    select GPS mode
  nmea    enable NMEA data
IR807(config-controller)#lte gps mode standalone

IR807(config-controller)#lte gps nmea ip

```

```

IR807#show cellular 0 gps

GPS Info
-----
GPS Feature: enabled
GPS Port Selected: Dedicated GPS port
GPS State: GPS enabled
GPS Mode Configured: standalone
Latitude: 48 Deg 38 Min 31.2114 Sec North
Longitude: 2 Deg 13 Min 47.3992 Sec East
Timestamp (GMT): Wed Jul 22 08:05:28 2015
Fix type index: 0, Height: 94 m
Satellite Info
-----
Satellite #14, elevation 28, azimuth 310, SNR 31 *
Satellite #15, elevation 22, azimuth 171, SNR 39 *
Satellite #17, elevation 25, azimuth 45, SNR 34 *
Satellite #18, elevation 8, azimuth 248, SNR 25
Satellite #22, elevation 12, azimuth 281, SNR 24
Satellite #24, elevation 78, azimuth 90, SNR 35 *
Satellite #25, elevation 23, azimuth 241, SNR 27
Satellite #1, elevation 0, azimuth 0, SNR 0
Satellite #2, elevation 0, azimuth 0, SNR 0
Satellite #6, elevation 6, azimuth 85, SNR 0
Satellite #12, elevation 62, azimuth 241, SNR 0
Satellite #26, elevation 0, azimuth 0, SNR 0
Satellite #29, elevation 0, azimuth 0, SNR 0
IR807#

```

You can also configure IOS so that GPS can be streamed to another destination (port or address).

For example:

```

IR807#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
IR807(config)#controller cellular 0
IR807(config-controller)#lte gps nmea ?
    ip      NMEA over IP interface
    serial  NMEA over serial interface
IR807(config-controller)#lte gps nmea ip ?
    udp    UDP Transport
    <cr>
IR807(config-controller)#lte gps nmea ip udp ?
    A.B.C.D Source address
IR807(config-controller)#lte gps nmea ip udp 10.3.4.5 ?
    A.B.C.D Destination address
IR807(config-controller)#lte gps nmea ip udp 10.1.1.1 10.3.4.5 ?
    <0-65535> Destination port
IR807(config-controller)#lte gps nmea ip udp 10.1.1.1 10.3.4.5 3456
Cellular Modem in HWIC slot 0/0 is still in reset, we recommend to re-execute this cmd after
60 seconds
IR807(config-controller)#

```

GPS NMEA Multiple Stream

Feature is new for release 15.8(3)M1.

Previous versions of IOS only allowed for a GPS NMEA Stream for one device. This release has support for up to 6 devices at one time. The existing CLI `lte gps nmea ip udp <src ip> <dest ip> <dest portno>` under controller configuration has been enhanced.

Setting up the Configuration

To Enable GPS NMEA Multiple Stream:

```
Router# Config t
Router(config)#Controller Cellular
<Cellular Interface Number>
Router(config-controller)#lte gps nmea ip udp
<source ip> <destination ip> <destination port> stream <1-6>
```

To Disable GPS NMEA Multiple Stream:

```
Router(config-controller)#no lte gps nmea ip udp
<source ip> <destination ip> <destination port> stream <1-6>
```

Examples for Enabling/Disabling GPS NMEA Multiple Stream

Enable Example:

```
Router#(config-controller)#lte gps nmea ip udp 10.0.0.1 10.0.0.11 2020 ? stream GPS NMEA
multiple stream suppor
t
Router#(config-controller)#lte gps nmea ip udp 10.0.0.1 10.0.0.11 2020 stream ? <1-6> Stream
Number
Router#(config-controller)#lte gps nmea ip udp 10.0.0.1 10.0.0.11 2020 stream 6
```

Disable Example:

```
Router#(config-controller)#no lte gps nmea ip udp 10.0.0.1 10.0.0.11 2020 stream 6
```

Warning Messages

If the destination ip address and port number already exists:

```
Router#sh run | sec cont
controller Cellular 0
lte gps mode standalone
lte gps nmea ip udp 10.10.0.1 10.10.0.10 2067 stream 1
Router(config-controller)#lte gps nmea ip udp 10.10.0.1 10.10.0.10 2067 stream 5
Destination ip address 10.10.0.10 and destination port number 2067 is already exists for
the stream no:1.
```

Please use different destination ip address and port number.

If the stream number already exists:

```
Router#sh run | sec cont
controller Cellular 0
lte gps mode standalone
lte gps nmea ip udp 10.10.0.1 10.10.0.10 2067 stream 1
```

```
Router(config-controller)#lte gps nmea ip udp 20.20.0.1 20.20.0.10 2057 stream 1
Stream number 1 is already active.
```

Please remove stream number configuration before creating it with different destination ip address and port number.

Upgrading the Modems

This section provides information about upgrading Cisco cellular modem firmware on the IR807. To make sure that the modem's firmware and other settings are upgraded correctly, certain packages need to be downloaded and upgraded on the modem. It is important to identify the modem and SKU type and follow the corresponding sequence.

There are three file types that will be upgraded on the WP75xx and WP76xx modems:

- Modem firmware with carrier PRI which is a .spk file
- Modem Legato and Yocto firmware file which is a .spk file
- Modem OEM PRI file which is a .nvu file

Refer to the following table for the SKU, Modem Type, and Firmware.

Table 1: Modem Firmware associated with each SKU

SKU ID	Modem Type	Firmware
IR807G-LTE-VZ-K9	WP7601	WP7601_02.18.05.00_00_VERIZON_002.041_001_fw.spk WP7601_02.18.05.00_Legato_Yocto_MCU.spk
IR807G-LTE-NA-K9	WP7504	WP7504_07.12.09.00_00_ATT_001.028_000.spk (For ATT) WP7504_07.12.09.00_00_SPRINT_001.020_000.spk (For Sprint) WP75xx_07.12.09.00_00_GENERIC_001.033_000.spk (For other carriers) WP7504_1103235_07.12.09.00_00_Cisco_001.001_000.nvu WP75xx_07.12.09.00_Legato_Yocto_MCU.spk
IR807G-LTE-GA-K9	WP7502	WP7502_1103234_07.12.09.00_00_Cisco_001.001_000.nvu WP75xx_07.12.09.00_00_GENERIC_001.033_000.spk WP75xx_07.12.09.00_Legato_Yocto_MCU.spk

The following rules apply when upgrading modems:

- Each of the files need to be upgraded separately. You cannot place them together in the same folder and perform a simultaneous upgrade.
- When switching from one carrier to another, only the Firmware file corresponding to the carrier needs to be upgraded. You do not need to re-upgrade with the OEM PRI and Legato-Yocto files. For example: If using an IR807G-LTE-NA-K9 with the ATT SIM in one slot and Sprint SIM in the other slot, simply upgrade with the firmware corresponding to the active SIM.

Firmware Upgrade Procedure

Note: The following example illustrates how to perform an upgrade using only a single file. You will need to perform the same steps with each modem file (*.spk and *.nvu) to complete the firmware upgrade. For more information refer to the Cisco Firmware Upgrade Guide for Cellular Modems guide, “Upgrading the modem firmware manually”:

https://www.cisco.com/c/en/us/td/docs/routers/access/interfaces/firmware/Firmware_Upgrade.html#pgfid-1023076

Perform the following steps to upgrade the modem firmware:

1. Go to the Cisco web page to download the latest certified firmware for your carrier by going to the following location: Products -> Cisco Interfaces and Modules -> LTE Wireless WAN Interfaces.
2. Create a directory in flash to host the firmware, which will be downloaded in step 3.

```
IR807# mkdir flash
Create directory filename [flash]? <enter>
>
Created dir flash:/flash
```

3. Download the firmware to the directory in the router flash over Ethernet/cellular /WAN interface. This can be done by hosting the firmware on an FTP or TFTP server, and connecting to that server via any WAN interface on the router. Below is a example showing the modem firmware downloaded onto the router flash over the FastEthernet interface:**Note:** Output edited for brevity.

```
IR807# copy tftp flash
Address or name of remote host []? 192.168.1.1
Source filename []? /<directory>
/WP75xx_07.12.09.00_Legato_Yacto_MCU.spk
Destination filename [WP75xx_07.12.09.00_Legato_Yacto_MCU.spk]?<enter>
>
/<directory>
/ WP75xx_07.12.09.00_Legato_Yacto_MCU.spk
Accessing tftp://192.168.1.1//<directory>
/WP75xx_07.12.09.00_Legato_Yacto_MCU.spk...
Loading /<directory>
/WP75xx_07.12.09.00_Legato_Yacto_MCU.spk from 192.168.1.1 (via FastEthernet0):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 24444106 bytes]
24444106 bytes copied in 132.368 secs
```

4. Verify that the firmware is available on the newly created directory inside router flash by using the following command:

```
IR807# dir flash:WP75xx_07.12.09.00_Legato_Yacto_MCU
Directory of flash:/WP75xx_07.12.09.00_Legato_Yacto_MCU/
-rw- 24444106 Sep 4 2017 09:58:34 -08:00 WP75xx_07.12.09.00_Legato_Yacto_MCU.spk
```

5. Initiate a modem firmware upgrade using the microcode reload command. Ex : IR807# **microcode reload cellular 0 lte modem-provision flash:<directory>?**

```
IR807#microcode reload cellular 0 0 modem-provision flash:new-modem
Reload microcode? [confirm]<enter>
>
Log status of firmware download in router flash system?[confirm]<enter>
>
Firmware download status will be logged in flash:/fwlogfile
Microcode Reload Process launched for Cellular 33133484; hw type = 0x6F3
```

```

IR807#
*****
The interface will be Shut Down for Firmware Upgrade
This will terminate any active data connections.
*****
*Sep  4 05:55:01.570: %LINK-5-CHANGED: Interface Cellular0, changed state to reset
*Sep  4 05:55:02.570: %LINEPROTO-5-UPDOWN: Line protocol on Interface Cellular0, changed
state to down
*Sep  4 05:55:06.570: %LINK-5-CHANGED: Interface Cellular0, changed state to administratively
down
*Sep  4 05:55:11.586: %LINK-5-CHANGED: Interface Cellular1, changed state to reset
*Sep  4 05:55:12.586: %LINEPROTO-5-UPDOWN: Line protocol on Interface Cellular1, changed
state to down
*Sep  4 05:55:16.586: %LINK-5-CHANGED: Interface Cellular1, changed state to administratively
down
*****
Modem will be upgraded!
Upgrade process will take up to 15 minutes. During
this time the modem will be unusable.
Please do not remove power or reload the router during
the upgrade process.
*****
Sending F/W[WP75xx_07.12.09.00_Legato_Yacto_MCU.spk] to the card [24444106 bytes]:
Firmware file: WP75xx_07.12.09.00_Legato_Yacto_MCU.spk sent to the card
Modem Device ID: WP7502  MODEM F/W Boot Version: SWI9X15Y_07.12.09.00 r34123 CARMD-EV-FRMWR1
2017/04/26 23:34:19
Modem F/W App Version: SWI9X15Y_07.12.09.00 r34123 CARMD-EV-FRMWR1 2017/04/26 23:34:19
Modem SKU ID: 1103234
Modem Package Identifier: 1103234_9906721_WP7502_07.11.22.00_00_Cisco_001.000_000  Modem
Carrier String: 1
Modem PRI Ver: 01.00  Modem Carrier Name: GENERIC
Modem Carrier Revision: 001.033_000
Firmware Upgrade is in Progress...
F/W Upgrade: Firmware Upgrade has Completed Successfully
IR807#

```

Verifying the firmware

```

IR807#sh cellular 0 hardware

Modem Firmware Version = SWI9X15Y_07.12.09.00
Modem Firmware built = 2017/04/26 23:34:19
Hardware Version = 1.0
Device Model ID: WP7502
Package Identifier ID: 1103234_9906721_WP7502_07.11.22.00_00_Cisco_001.000_000
International Mobile Subscriber Identity (IMSI) = 001012345678901
International Mobile Equipment Identity (IMEI) = 354938080100459
Integrated Circuit Card ID (ICCID) = 89600114082100035643
Mobile Subscriber Integrated Services
Digital Network-Number (MSISDN) =
Modem Status = Online
Current Modem Temperature = 33 deg C
PRI SKU ID = 1103234, PRI version = 001.033_000, Carrier = Generic
OEM PRI version = 01.00
IR807#

```

AutoSim and Firmware Based Switching running the WP7504 Modem

The AutoSim feature will identify the SIM card of the Carrier inserted and correspondingly load the correct modem firmware. The advantages of the AutoSim feature are:

- Ease of Ordering Carrier Specific SKUs
- Quicker failover times in dual-sim deployments

Auto-SIM is supported in Sierra wireless WP7504 modem on the IR807. The WP7502 and WP7601 modems do not support this feature. A CLI is available in the cellular controller to enable/disable Auto-SIM. The modem in Auto-SIM mode selects the right carrier firmware after a SIM slot switch and an automatic modem reset. During bootup, if the Auto-SIM configuration on the modem doesn't match to the IOS configuration, the corresponding Auto-SIM or manual mode is pushed to the modem.

After an Auto-SIM configuration change, the modem is automatically reset; the default is "auto-sim" enabled:
controller cellular 0

```
[no] lte firmware auto-sim
```

If Auto-SIM is disabled and the modem is in manual mode, select a carrier with a new exec CLI:

```
cellular lte firmware-activate <firmware-index>
```

Enable/Disable Auto-SIM:

```
(config)#controller cellular 0
(config)# [no] lte firmware auto-sim
default is auto-sim enabled
```

Manual mode:

```
controller cellular 0
no lte firmware auto-sim
```

The following CLI shows the firmware-index of the carrier in the modem:

```
show cellular 0 firmware
```

For additional information, see the following guide:

[Cisco 4G LTE and Cisco 4G LTE-Advanced Network Interface Module Software Configuration Guide](#)

MTU Selection for WP76xx modems

This new feature allows the user to configure the mtu setting under the controller, up to a value of 2000, for the WP76xx modems. This requires setting the mtu on the corresponding cellular interface to match the same value as the controller.

The following example shows the controller configuration commands:

```
router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
router#(config-controller)#lte modem mtu ?
<64-2000> Mtu value
```

Low Power Mode

This feature provides the reason for the modem going into a low power mode if the situation ever occurs. It uses the device power control information provided by the modem. A new CLI has been implemented **show cellular <interface> radio details**.

The following examples show the controller show commands:

```
router# show cellular <interface number> radio
Radio power mode = OFF, Reason = User Request
Channel Number = 0
Current Band = Unknown
Current RSSI = -128 dBm
Current ECIO = -2 dBm
Radio Access Technology(RAT) Preference = AUTO
Radio Access Technology(RAT) Selected = AUTO
router# show cellular <interface number> radio details
  Radio turned off under cellular controller configuration.
router#
```

Note: In the above **show cellular <interface number> radio** output, the Radio power mode shows **OFF** because the user has turned the radio off by choice. In all other cases, when the radio goes to Low Power mode, you will see the display Radio power mode = **low power**.

Enhancement to Modem Crash Action

If the modem corresponding to the cellular interface crashes, the modem will reset itself and come back up. However, in order to debug the cause of the crash, a full crash dump can be captured on the modem. The steps to capture the crashdump are outlined in:

[Generate 4G Modem Crash Dump](#)

-or

<https://www.cisco.com/c/en/us/td/docs/routers/access/800/819/user/guide/3G4G-enhancements-userguide.html#pgfid-1076594>

A new CLI has been added to simplify the configuration to put the modem in a diagnostic mode upon a crash. The CLI is **lte modem crash-action**. The device can be set to either reset, or to boot and hold.

The following examples show the new functionality of the configuration CLI:

```
Router(config-controller)#lte modem crash-action ?
boot-and-hold
Remain in crash state
reset
Reset the modem on crash
```

This CLI will set the flag to either 1 or 0 for reset and boot and hold respectively. This is the same as AT command **at!eroption= 0 / 1**

```
The following examples show the new functionality of the exec CLI:
Router(config-controller)#lte modem crash-action ?
boot-and-hold Remain in crash state
```

This CLI will set the flag on the modem, to either 1 - reset or 0 - boot and hold respectively. This is the same as AT command **at!eroption=?**.

The following examples show the new functionality of the exec CLI:

```
router#show cellular <your interface> logs modem-crash-action  
Current modem crash action: Reset
```

Note: This feature is only used while debugging modem crash dump and should be used **ONLY** as advised by Cisco TAC. **Please do not enable this feature before consulting with Cisco TAC.**

