Cellular Interface Modules

This chapter provides configuration details for the cellular interface modules used in the IR800 series routers. It is important to understand the architecture of the IR800 series and the relationship between Modems, SIMs, Interface and Controller. The following table helps to illustrate these relationships.

<table>
<thead>
<tr>
<th>Router</th>
<th>Controller</th>
<th>SIM</th>
<th>Modem Slot</th>
<th>PDN Interface</th>
<th>Line</th>
</tr>
</thead>
<tbody>
<tr>
<td>IR829</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>Cellular 0</td>
</tr>
<tr>
<td>IR829</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>Cellular 1</td>
</tr>
<tr>
<td>IR829 (dual modem) *</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Cellular 0/0</td>
</tr>
<tr>
<td>IR829 (dual modem) *</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Cellular 0/1</td>
</tr>
<tr>
<td>IR829 (dual modem) *</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Cellular 1/0</td>
</tr>
<tr>
<td>IR829 (dual modem) *</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Cellular 1/1</td>
</tr>
<tr>
<td>IR809</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>Cellular 0</td>
</tr>
<tr>
<td>IR809</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>Cellular 1</td>
</tr>
</tbody>
</table>

* As of Release 15.5(3)M2, the only dual-modem scenario supported is two MC7455 modems.

With the introduction of the next generation SKUs, some functionality has changed. Refer to the following table for details.

<table>
<thead>
<tr>
<th>Description</th>
<th>IR829GW-[LA/GA/NA/VZ]-*K9</th>
<th>IR829-2LTE-EA-*K9</th>
</tr>
</thead>
<tbody>
<tr>
<td>North American</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Description</td>
<td>IR829GW-[LA/GA/NA/VZ]-*K9</td>
<td>IR829-2LTE-EA-*K9</td>
</tr>
<tr>
<td>---------------------</td>
<td>----------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>APJC</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>EMER</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>EMEA</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>2G Support</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>3G Support</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>LTE Support</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>GPS</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Wi-Fi (2.4/5 GHZ)</td>
<td>2.4 GHz and 5GHz use separate antenna connector</td>
<td>2.4 GHz + 5GHz coexist on the same antenna connector</td>
</tr>
<tr>
<td>Dual SIM</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Band 30</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>LTE category supported</td>
<td>cat4</td>
<td>cat4</td>
</tr>
</tbody>
</table>

This chapter contains the following sections:

- Cellular Interface, page 2
- IR800 Cellular Technology Selection, page 13
- GPS, page 15
- Troubleshooting the Cellular Interface, page 16

**Cellular Interface**

The Cisco IR800 series Industrial routers use the Sierra Wireless MC73XX and MC74XX series modems supporting MIMO on LTE. WCDMA UMTS HSPA DC-HSPA+ is diversity only, without MIMO.

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


The software download page can be found here:


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

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 failover 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 IR829 SKU, and it must be in an applicable region.

  - By default, SIM slot 0 is the primary, and SIM slot 1 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.

  - Dual-SIM behavior is managed under Cellular 0 CLI configuration.

  - 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.

- Dual active LTE radios providing Multi-carrier support for active and backup use cases. Newer cellular modems have been added (MC74xx) with FDD/TDD LTE on LA and EA 829 models.

  - New WiFi domains for APAC and LATAM

---

**Note**

The 7455 modems do not support dual SIM capabilities.

---

## Dual Radio Configuration and Single Radio Configuration

The following examples are of an IR800 cellular configuration using dual modems. A single modem example will look much the same, without the `Cellular1/0` and `Cellular1/1` entries.

```
DUAL-Modem> enable
DUAL-Modem# show ip int brief

Interface     IP-Address     OK? Method Status Protocol
GigabitEthernet0      unassigned     YES NVRAM administratively down down
GigabitEthernet1      unassigned     YES unset      down      down
GigabitEthernet2      unassigned     YES unset      down      down
GigabitEthernet3      unassigned     YES unset      down      down
GigabitEthernet4      unassigned     YES unset      down      down
Wlan-GigabitEthernet0      unassigned     YES unset      up        up
Async0               unassigned     YES unset      up        down
Async1               unassigned     YES unset      up        down
GigabitEthernet5      unassigned     YES NVRAM administratively down down
Cellular0/0            192.168.43.237 YES IPCP       up        up
Cellular1/0            10.61.25.231  YES IPCP       up        up
```
Building configuration...
Current configuration : 4021 bytes

! Last configuration change at 18:31:06 UTC Mon Oct 24 2016
!
version 15.6
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption

hostname DUAL-Modem
!
no aaa new-model
ethernet lmi ce
service-module wlan-ap 0 bootimage autonomous
!
ignition off-timer 900
!
ignition undervoltage threshold 9
!
no ignition enable
!
no ip domain lookup
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 IR829-2LTE-EA-BK9 sn FGL2032219N
!
redundancy
notification-timer 120000
controller Cellular 0
lte sim data-profile 3 attach-profile 1

#When using Verizon, use data profile 3 and attach to profile 1
#When using AT&T, use data profile 1 and attach to profile 1

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

controller Cellular 1
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
interface GigabitEthernet0
no ip address
shutdown
!
interface GigabitEthernet1
no ip address
!
interface GigabitEthernet2
no ip address
! interface GigabitEthernet3
no ip address
!
interface GigabitEthernet4
no ip address
!
interface Wlan-GigabitEthernet0
no ip address
!
interface GigabitEthernet5
no ip address
shutdown
duplex auto
speed auto
!
interface Cellular0/0
  #Both interfaces need to be configured in the IOS software
ip address negotiated
ip virtual-reassembly in
encapsulation slip
load-interval 30
dialer in-band
dialer string lte
dialer-group 1
no peer default ip address
async mode interactive
routing dynamic
!
interface Cellular1/0
  #Both interfaces need to be configured in the IOS software
ip address negotiated
ip virtual-reassembly in
encapsulation slip
load-interval 30
dialer in-band
dialer string lte
dialer-group 1
no peer default ip address
async mode interactive
routing dynamic
!
interface Cellular0/1
no ip address
encapsulation slip
!
interface Cellular1/1
no ip address
encapsulation slip
!
interface wlan-ap0
no ip address
!
interface Vlan1
no ip address
!
interface Async0
no ip address
encapsulation scada
!
interface Async1
no ip address
encapsulation scada
!
! ip forward-protocol nd
! no ip http server
no ip http secure-server
!
ip route 0.0.0.0 0.0.0.0 Cellular1/0
ip route 8.8.8.8 255.255.255.255 Cellular0/0
Route values added

```
dialer-list 1 protocol ip permit
ipv6 ioam timestamp
!
access-list 1 permit any
!
control-plane
!
line con 0
stopbits 1
line 1 2
stopbits 1
line 3
script dialer lte
no exec
transport preferred lat pad telnet rlogin lapb-ta mop udptn v120 ssh
transport output lat pad telnet rlogin lapb-ta mop udptn v120 ssh
rxspeed 150000000
txspeed 500000000
line 4
no activation-character
no exec
transport preferred none
transport input all
transport output lat pad telnet rlogin lapb-ta mop udptn v120 ssh
line 8
script dialer lte
no exec
transport preferred lat pad telnet rlogin lapb-ta mop udptn v120 ssh
transport output lat pad telnet rlogin lapb-ta mop udptn v120 ssh
rxspeed 150000000
txspeed 500000000
line 9
script dialer lte
no exec
transport preferred lat pad telnet rlogin lapb-ta mop udptn v120 ssh
transport output lat pad telnet rlogin lapb-ta mop udptn v120 ssh
rxspeed 236800
txspeed 118000
line 15
no exec
transport preferred lat pad telnet rlogin lapb-ta mop udptn v120 ssh
transport output lat pad telnet rlogin lapb-ta mop udptn v120 ssh
rxspeed 236800
txspeed 118000
line 1/3 1/6
transport preferred none
transport output none
stopbits 1
line vty 0 4
login
transport input none
!
no scheduler max-task-time
!!
End
```

Test the modem configuration with a ping command:

DUAL-Modem# **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
DUAL-Modem#
The following two examples show a Verizon profile followed by an AT&T profile.

**Verizon Profile**

```bash
DUAL-Modem# show cellular 0/0 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
```

**AT&T Profile**

```bash
DUAL-Modem# show cellular 1/0 profile
Profile 1 = ACTIVE* **
Profile 1 is used for AT&T
--------
PDP Type = IPv4
PDP address = 10.61.25.231
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
DUAL-Modem# show cellular 0/0 hardware
Modem Firmware Version = SWI9X30C_02.20.03.00
Modem Firmware built = 2016/06/30 10:54:05
Hardware Version = 1.0
Device Model ID: MC7455MOBILE
International Mobile Subcriber Identity (IMSI) = 311480166946902
```
International Mobile Equipment Identity (IMEI) = 352009080050110
Integrated Circuit Card ID (ICCID) = 891480000165326375
Mobile Subscriber Integrated Services Digital Network-Number (MSISDN) = 6692200807
Modem Status = Online
Current Modem Temperature = 34 deg C
PRI SKU ID = 1103084, PRI version = 002.024, Carrier = Verizon
Carrier identified as Verizon
OEM PRI version = 000.001

Creating a Cellular Profile for Verizon.

DUAL-Modem# 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
DUAL-Modem#

Creating a Cellular Profile for AT&T

DUAL-Modem# 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
DUAL-Modem#
DUAL-Modem# conf t
Enter configuration commands, one per line. End with CNTRL/Z.
DUAL-Modem(config)# controller cellular 1
DUAL-Modem(config-controller)#
DUAL-Modem(config-controller)# lte sim data-profile 1 attach-profile 1
Note: Please issue a modem reset for the modified attach-profile to take effect.
DUAL-Modem(config-controller)# end
DUAL-Modem#

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

Procedure

Step 1 Show the controller cellular 0

Example:
IR800# 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
!

Step 2 If the cellular interface obtains an IPv4 private address, NAT should be configured.

Example:
IR800# conf term
Enter configuration commands, one per line. End with CNTRL/Z.
IR800(config)# inter cellular 0
IR800(config-if)# ip nat outside
IR800(config)# inter vlan 4
IR800(config-if)# ip nat inside
IR800(config)# access-list 10 permit 10.20.20.0 0.0.0.255
!
IPv4 subnet to be NATed
IR800(config)# ip nat inside source list 10 interface Cellular0 overload
!
NAT interface association

Step 3 Once the Cellular configuration is done, ping a well-known IP address to test the connectivity.

Example:
IR800# 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:
**Step 4** Attached Cellular 0 profile must become "active" and "connection" shows IP address and traffic.

**Example:**

```
IR800#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.
```

```
IR800#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.

```
IR800#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
Queuing 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
IR800#
```

If the negotiated IP address is not operational:

```
IR800#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
```
Other Useful Commands

IR800# shows cell 0 hardware
Modem Firmware Version = SWI9X15C_05.05.58.00
Modem Firmware built = 2015/03/04 21:30:23
Hardware Version = 1.0
Device Model ID: MC7304
Package Identifier ID: 1102029_9903299_MC7304_05.05.58.00_00_Cisco_005.010_000
International Mobile Subscriber Identity (IMSI) = 208150103324395
International Mobile Equipment Identity (IMEI) = 352761060206340
Integrated Circuit Card ID (ICCID) = 8933150112100222053
Mobile Subscriber Integrated Services Digital Network-Number (MSISDN) = 33695764790
Current Modem Temperature = 47 deg C
PRI SKU ID = 9903299, PRI version = 05.10, Carrier = 1

IR800# shows cell 0 security
Active SIM = 0
SIM slot #0 active
SIM switchover attempts = 0
Card Holder Verification (CHV1) = Disabled
SIM Status = OK
SIM User Operation Required = None
Number of CHV1 Retries remaining = 3

IR800# cellular 0 lte sim unlock XXXX
! XXXX = PIN code

IR800# shows 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)

IR800# shows cell 0 network
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

IR800# shows cell 0 all

The output to the show cell 0 all command is extensive, and omitted from this guide for brevity.
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:

IR800#show line
Tty Line Typ Tx/Rx A Modem Roty AccO AccI Uses Noise Overruns In
I 3 3 TTY - - - - - 1 0 4/0 Ce0

Use one of the IR800 IP address along with 2000 + line number (2003)

IR800#10.15.15.1 2003
Trying 10.15.15.1, 2003 ... Open

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

AT!GSTATUS?
!GSTATUS:
Current Time: 2133353 Temperature: 38
Bootup Time: 0 Mode: ONLINE
System mode: WCDMA PS state: Attached
WCDMA band: WCDMA 900
WCDMA channel: 3037
GMM (PS) state:REGISTERED NORMAL SERVICE
MM (CS) state: IDLE NORMAL SERVICE
WCDMA L1 state:L1M_PCH_SLEEP LAC: 0F46 (3910)
RRC state: DISCONNECTED Cell ID: 0D3CE428 (222094376)
RxM RSSI C0: -90 RxD RSSI C0: -106
RxM RSSI C1: -106 RxD RSSI C1: -106
Disconnect using "SHIFT+CONTROL+6+x", then confirm:

IR800#disc
Closing connection to 10.2.2.2 [confirm]enter
IR800#

Checking 4G Modem Firmware through AT Commands

To check the IR800 4G modem firmware, execute the 4G modem AT commands after connecting to the modem. The following example is for an IR809G-LTE-GA-K9 loaded with FW-MC7304-LTE-GB Global firmware.

Note

On the IR809, the PRI SKU ID= 9903299 is not representative of the GB firmware

at!priid?
PRI Part Number: 9903299
Revision: 05.10
Carrier PRI: 9999999_9902674_SWI9X15C_05.05.58.00_00_GENEU-4G_005.026_000
OK

at!package?
1102029_9903299_MC7304_05.05.58.00_00_Cisco_005.010_000

at!gobiimpref?
!GOCIIMPREF:
preferred fw version: 05.05.58.00
preferred carrier name: GENEU-4G
preferred config name: GENEU-4G_005.026_000
current fw version: 05.05.58.00
IR800 Cellular Technology Selection

The cellular interface supports a seamless handoff between LTE and 3G networks when the LTE cell becomes weak in certain spots and vice versa. But it may also be disable to lock the cellular interface in a given technology, for example, LTE.

The cellular interface supports 3G and 2.5G technologies. 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:

```
IR829# cellular 0 lte technology ?
Blue
values available on Global SKU
auto Automatic LTE Technology Selection
cdma-1xrtt CDMA 1xRTT
cdma-evdo CDMA EVDO Rev A
cdma-hybrid HYBRID CDMA
gsm GSM
lte LTE
umts UMTS
```

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

**Note**

Show the completed configuration: (output edited for brevity)

```
IR800# show run
Building configuration...
Current configuration : 4365 bytes
!
! Last configuration change at 09:53:09 UTC Sat Oct 10 2015 by cisco
!
version 15.5
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname IR800
!
boot-start-marker
boot system flash:/ir800-universalk9-mz.SPA.155-3.M0a
boot-end-marker
!
enable password cisco
!
aaa new-model
!
aaa session-id common
ethernet lmi ce
!
ip dhcp pool GuestOS
  network 10.16.16.0 255.255.255.0
  default-router 10.16.16.1
dns-server 8.8.8.8
!
```
ip domain name local.cisco.com
ip cef
ipv6 unicast-routing
ipv6 cef
!
multilink bundle-name authenticated
!
chat-script LTE """"AT!CALL"""" TIMEOUT 20 """"OK"
!
license udi pid IR809G-LTE-GA-K9 sn JMX1915X00Q
license accept end user agreement
license boot module ir800 technology-package securityk9
license boot module ir800 technology-package datak9
!
username cisco password 0 cisco
!
redundancy
!
controller Cellular 0
lte sim data-profile 1 attach-profile 1 slot 0
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
!
interface GigabitEthernet0
description backhaul
ip address dhcp
duplex auto
speed auto
ipv6 address autoconfig default
!
interface GigabitEthernet1
no ip address
shutdown
duplex auto
speed auto
!
interface GigabitEthernet2
ip address 10.16.16.1 255.255.255.0
duplex auto
speed auto
ipv6 address autoconfig
!
interface Cellular0
ip address negotiated
encapsulation slip
dialer in-band
dialer idle-timeout 0
dialer string LTE
dialer-group 1
async mode interactive
!
interface Cellular1
no ip address
capsulation slip
!
interface Async0
no ip address
capsulation scada
!
interface Async1
no ip address
capsulation scada
!
ip forward-protocol nd
!
no ip http server
no ip http secure-server
!
ip route 0.0.0.0 0.0.0.0 Cellular0
The IR800 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 can be assigned to Cellular AUX antenna.
- GPS data can be seen locally, or data stream can be forwarded to applications, i.e. RUBAN.

**Note**

When installing dual modems, you can only configure GPS on modem 1, not modem 2.

For information about the GPS LED indications and locations of the GPS connectors, see [IR829 Product Overview](#) and [IR809 Product Overview](#).

To configure GPS on the IR800 series, refer to the following examples.

```
IR829# conf term
IR829(config)#controller cellular 0
IR829(config-controller)#lte gps ?
   enable   enable GPS feature
```
mode select GPS mode
nmea enable NMEA data
IR829(config-controller)#lte gps mode standalone

IR829(config-controller)#lte gps nmea ip
IR829#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
IR829#

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

For example:

IR829#conf t
Enter configuration commands, one per line. End with CNTL/Z.
IR829(config)#controller cellular 0
IR829(config-controller)#lte gps nmea ?
ip NMEA over IP interface
serial NMEA over serial interface
IR829(config-controller)#lte gps nmea ip ?
udp UDP Transport
<cr>
IR829(config-controller)#lte gps nmea ip udp ?
A.B.C.D Source address
IR829(config-controller)#lte gps nmea ip udp 10.3.4.5 ?
A.B.C.D Destination address
IR829(config-controller)#lte gps nmea ip udp 10.1.1.1 10.3.4.5 ?
<0-65535> Destination port
IR829(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
IR829(config-controller)#

Troubleshooting the Cellular Interface

These procedures are to capture information to share with support in order to assist them in helping to troubleshoot an issue with the cellular interface.

The following are steps to capture Linux logs for the cellular interface.
Procedure

Step 1  Set up the fetch command.

Example:

```
# conf t
# service internal
# exit
# vds fetch-log
```

These steps will generate a directory on flash:vds-log.

Step 2  Capture the logs.

Example:

```
IR800# vds fetch-log
fetch: 4gmodem.log  Sending file modes: C0644 510 4gmodem.log
fetch: auth.log  Sending file modes: C0640 162330 auth.log
fetch: auth.log.1  Sending file modes: C0640 262215 auth.log.1
fetch: auth.log.2.gz  Sending file modes: C0640 11297 auth.log.2.gz
fetch: auth.log.3.gz  Sending file modes: C0640 11296 auth.log.3.gz
fetch: cwan_modem0.log  Sending file modes: C0644 3875716 cwan_modem0.log
fetch: cwan_modem1.log  Sending file modes: C0644 791629 cwan_modem1.log
fetch: daemon.log  Sending file modes: C0640 1404 daemon.log
fetch: dmesg  Sending file modes: C0644 13740 dmesg
fetch: dmesg.0  Sending file modes: C0644 0 dmesg.0
fetch: ios_cs_verify.log  Sending file modes: C0644 1091 ios_cs_verify.log
fetch: ios_vds_com.log  Sending file modes: C0644 219169 ios_vds_com.log
fetch: ios_vds_com.log.1  Sending file modes: C0644 262207 ios_vds_com.log.1
fetch: ios_vds_com.log.2.gz  Sending file modes: C0644 7859 ios_vds_com.log.2.gz
fetch: ios_vds_com.log.3.gz  Sending file modes: C0644 7894 ios_vds_com.log.3.gz
fetch: kern.log  Sending file modes: C0640 38608 kern.log
fetch: messages  Sending file modes: C0640 174064 messages
fetch: messages.1  Sending file modes: C0640 262364 messages.1
fetch: messages.2.gz  Sending file modes: C0640 18434 messages.2.gz
fetch: messages.3.gz  Sending file modes: C0640 25027 messages.3.gz
fetch: udev  Sending file modes: C0644 124266 udev
fetch: vdscli-acpid.log  Send
```

Step 3  Stop the logging after 10 minutes.

Step 4  View the flash directory, and you will see the vds-log directory.
Step 5  The flash:/vds-log directory contains the log files captured.

Example:

   4 -rw-  510 Nov 16 2016 19:06:44 +00:00 4gmodem.log  
   25 -rw- 162330 Nov 16 2016 19:06:54 +00:00 auth.log  
   26 -rw- 262215 Nov 16 2016 19:07:04 +00:00 auth.log.1 
   27 -rw- 11297 Nov 16 2016 19:07:16 +00:00 auth.log.2.gz 
   28 -rw- 11296 Nov 16 2016 19:07:24 +00:00 auth.log.3.gz 
   29 -rw- 3875716 Nov 16 2016 19:07:42 +00:00 cwan_modem0.log 
   30 -rw- 791629 Nov 16 2016 19:07:54 +00:00 cwan_modem1.log 
   31 -rw- 1404 Nov 16 2016 19:08:04 +00:00 daemon.log  
   32 -rw- 13740 Nov 16 2016 19:08:14 +00:00 dmesg 
   33 -rw-  20 Nov 16 2016 19:08:24 +00:00 dmesg.0  
   34 -rw- 1091 Nov 16 2016 19:08:32 +00:00 ios_cs_verify.log 
   35 -rw- 219169 Nov 16 2016 19:08:42 +00:00 ios_vds_com.log 
   36 -rw- 262207 Nov 16 2016 19:08:54 +00:00 ios_vds_com.log.1 
   37 -rw- 7859 Nov 16 2016 19:09:04 +00:00 ios_vds_com.log.2.gz 
   38 -rw- 7894 Nov 16 2016 19:09:14 +00:00 ios_vds_com.log.3.gz 
   39 -rw- 38608 Nov 16 2016 19:09:24 +00:00 kern.log  
   40 -rw- 174064 Nov 16 2016 19:09:34 +00:00 messages 
   41 -rw- 262364 Nov 16 2016 19:09:44 +00:00 messages.1 
   42 -rw- 18438 Nov 16 2016 19:09:54 +00:00 messages.2.gz 
   43 -rw- 25027 Nov 16 2016 19:10:04 +00:00 messages.3.gz 
   44 -rw- 124266 Nov 16 2016 19:10:14 +00:00 udev 
   45 -rw-  29 Nov 16 2016 19:10:24 +00:00 vdscll-acpid.log 
   46 -rw-  909 Nov 16 2016 19:10:34 +00:00 vdscll-eventd.log 
   47 -rw-  467 Nov 16 2016 19:10:44 +00:00 vdscll-vdscll-bde-gos.log 
   48 -rw-  479 Nov 16 2016 19:10:54 +00:00 vdscll-vdscll-bde-ir800.log 
   49 -rw-  81 Nov 16 2016 19:11:04 +00:00 vdscll-wiredrd.log 
   50 -rw- 140382 Nov 16 2016 19:11:14 +00:00 vdscll-wirelessd.log 
   51 -rw- 1192 Nov 16 2016 19:11:24 +00:00 vdscll.log 

994918400 bytes total (34735718)

What to Do Next

The following commands describe how to login to VDS.

IR800(config)# service internal
IR800# vds telnet enable
IR800# vds attach
Ubuntu 10.10
vds0 login: root
Password: <your password>
root@vds0:~#
IR800# vds attach
Ubuntu 10.10
vds0 login: root
Password:<your password>
root@vds0:~# df -k
Filesystem  1K-blocks  Used  Available  Use% Mounted on
none       153168    140   153028    1% /dev
none        153324     0     153324    0% /dev/shm
none        153324     52    153272    1% /var/run
none        153324     0     153324    0% /var/lock
/dev/sda1    242078    2070    227508    1% /vds_system
root@vds0:~#

Other command output that will be helpful to collect for your business unit contact:

# Show platform hypervisor
# Show platform led
# Show tech
# Show cellular 0/0 all
# Show controller 0/0
# Show interface cellular 0/0
# Show ip interface brief
# Show running-config