Configure Day-Zero P-5GS6-GL and P-5GS6-R16SA-GL Deployment

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Introduction

This document describes the initial configuration and installation process for the Cisco Pluggable Interface Modules P-5GS6-GL and P-5GS6-R16SA-GL.

Prerequisites

Requirements

Cisco recommends that you have basic knowledge of these topics:

- 5G Cellular Network Basics
- Cisco IOS® XE

Compatible Routers

For both modules, the series of routers are supported:

- C8200
- C8300
- ISR 1K

Components Used

- ISR 1821 (v. 17.9.4)
- P-5GS6-GL (v. M0H.020202)
- P-5GS6-R16SA-GL (v. M0H.020202)

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

Background Information

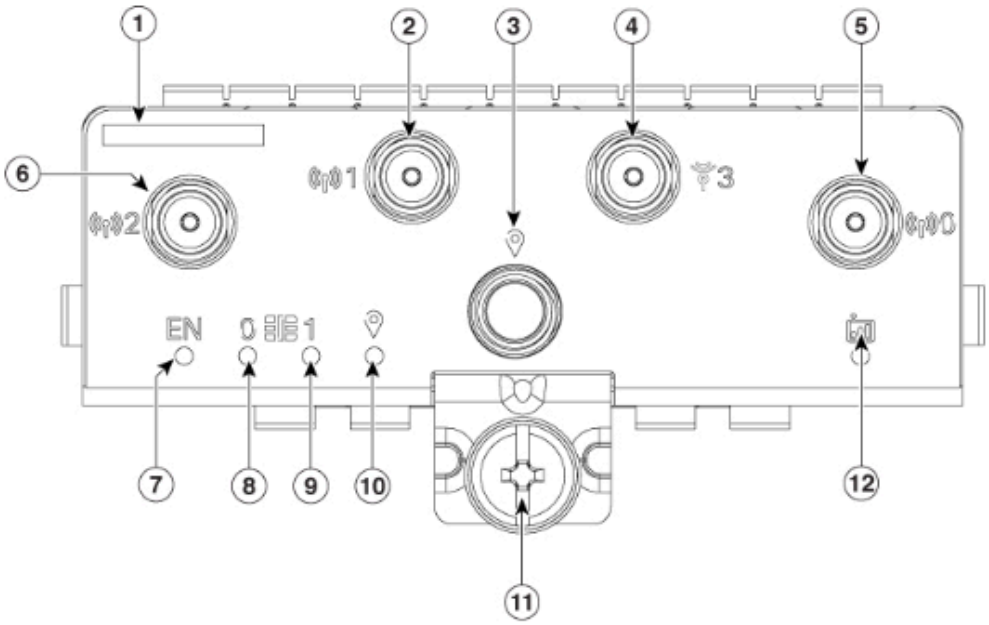
Any complex configuration procedure is beyond the scope of this publication as this document provide installation, configuration compatibility and checks. The modules are Plug and Play devices, but the information provided allows ease of use. Here is a hyperlink for all published P-5GS6-GL and P-5GS6-R16SA-GL documentation.

Hardware Installation

Front Panel of the P-5GS6-GL Module

This figure shows the I/0 panel of the P-5GS6-GL module:





1	The printed PID
2	Antenna 1 (SMA)
3	GPS (SMA)
4	Antenna 3 (SMA)
5	Antenna 0 (SMA)
6	Antenna 2 (SMA)
7	Enable LED
8	SIM 0 LED
9	SIM 1 LED
10	GPS LED
11	M3.5 thumb-screw
12	Service LED

Front Panel of the P-5GS6-R16SA-GL Module

This figure shows the I/0 panel of the P-5GS6-R16SA-GL module:



General Information of the P-5GS6-GL Module

This module:

- Supports a dual MICROS SIM slot with an active GPS Antenna supported on firmware version 030202.
- Is an SMA Antenna Support.
- Works as an NSA (Non-standalone) device. This means the 5G band is on the data plane and LTE on the control plane. As a result, traffic needs to be pushed in and out of the P-5GS6-GL for the NSA device to aggregate from 4G bands to 5G bands.
- Supports LTE with 4G LTE Advanced Pro system.
- Has the modem Telit FN980.

General Information of the P-5GS6-R16SA-GL Module

This module:

- Supports a dual MICROS SIM slot with an active GPS Antenna supported on firmware version 030202.
- Works as a SA (Standalone); which essentially allows the 5G band onto the data plane and on the control plane. This aggregates a 5G connection immediately during use.
- Is an SMA Antenna Support.
- Supports LTE with 4G LTE Advanced Pro system.
- Has the modem a Sierra Wireless EM9293.

Indication of LED Status on Modules

LED	Color	Function
EN	Green, Yellow	Green : Module is on Yellow : Module power is not functioning correctly
SIM0	Green, Yellow	Yellow : SIM0 is installed but not active Green : SIM0 is installed and

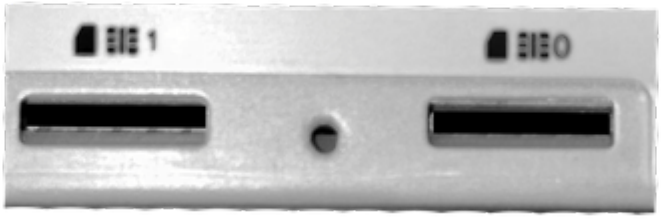
		active Green flash : LTE Data activity
SIM1	Green, Yellow	Yellow : SIM1 is installed but not active Green : SIM1 is installed and active Green flash : LTE Data activity
GPS	Green, Yellow	Yellow : Software defined Green : GPS configured Green flash : GPS acquiring
Service	Green, Yellow, Blue	Yellow : 3G Green : 4G Blue : 5G

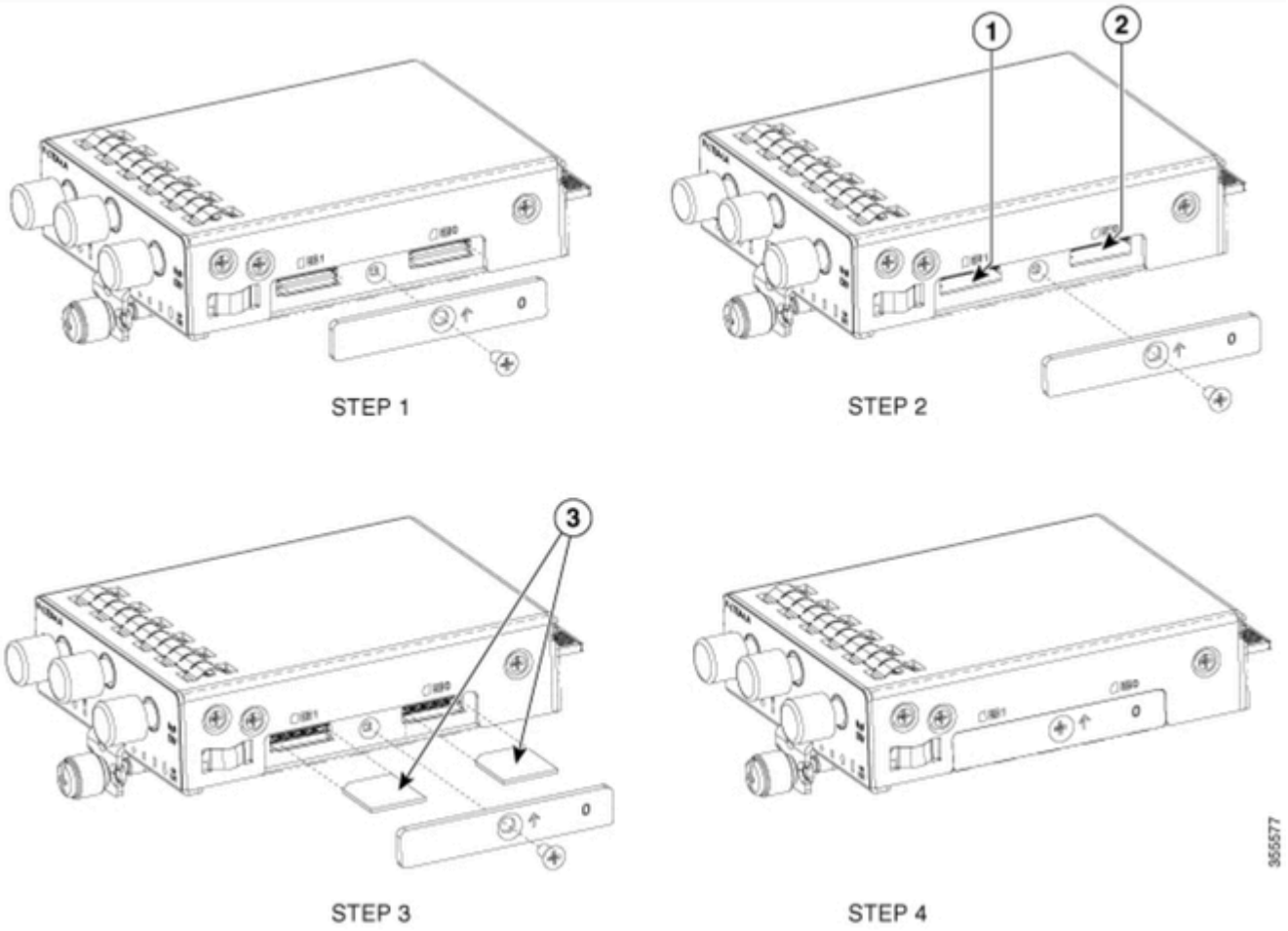
Installation of the SIM Card(s)

The PIM has a capsule cover on the SIM slots. It has a cover that is held together by a Phillips screw. The SIM size is only compatible with MICRO SIM (Height: 15 mm, Width: 12 mm, Thickness: 0.76mm).

Carefully remove the screw to reveal the SIM slots shown here:







Installation of the 5G Antenna

A 5G Antenna must be installed onto the PIM. The only supported indoor 5G Antenna is the 5G-ANTM-SMA-D (Multi-Band Swivel Mount Dipole antenna).

To insert the antenna:

1. Ensure there is no power to the module.
2. Take the SMA male connector end of the antenna.
3. Twist the connector into the female connector on the module until moderately tight.



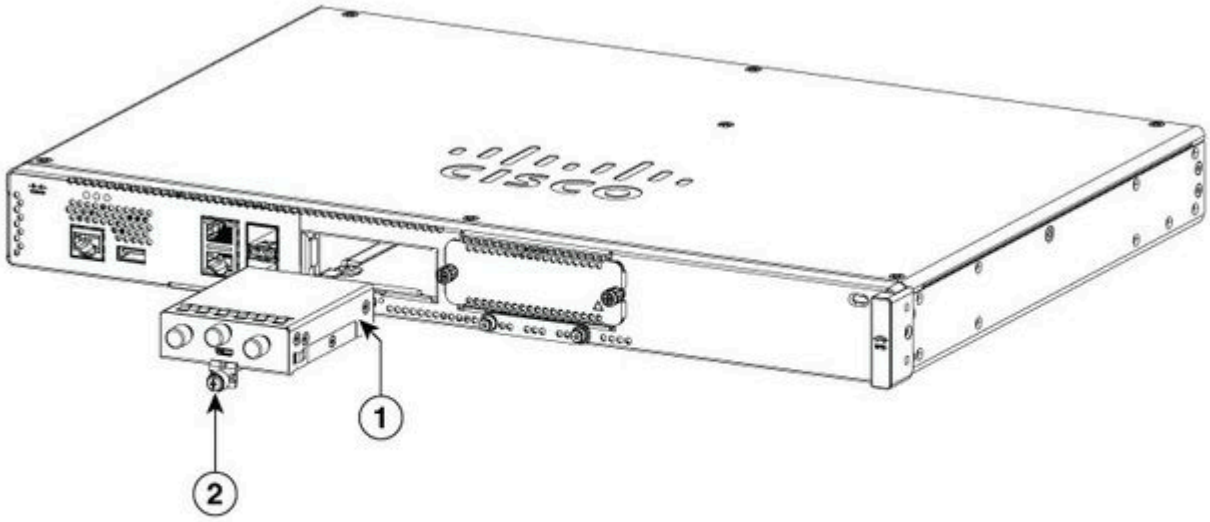
Note: The 5G-ANTM-SMA-D is intended for indoor use. The antenna is designed to connect to a dedicated antenna port on the device. No special tools are required to install the antenna.

Warning: Please utilize the 5G-ANTM-SMA-D installation guide to ensure safety precautions and protocols to operate with lightning activity.

Powering Up the P-5GS6-GL Module

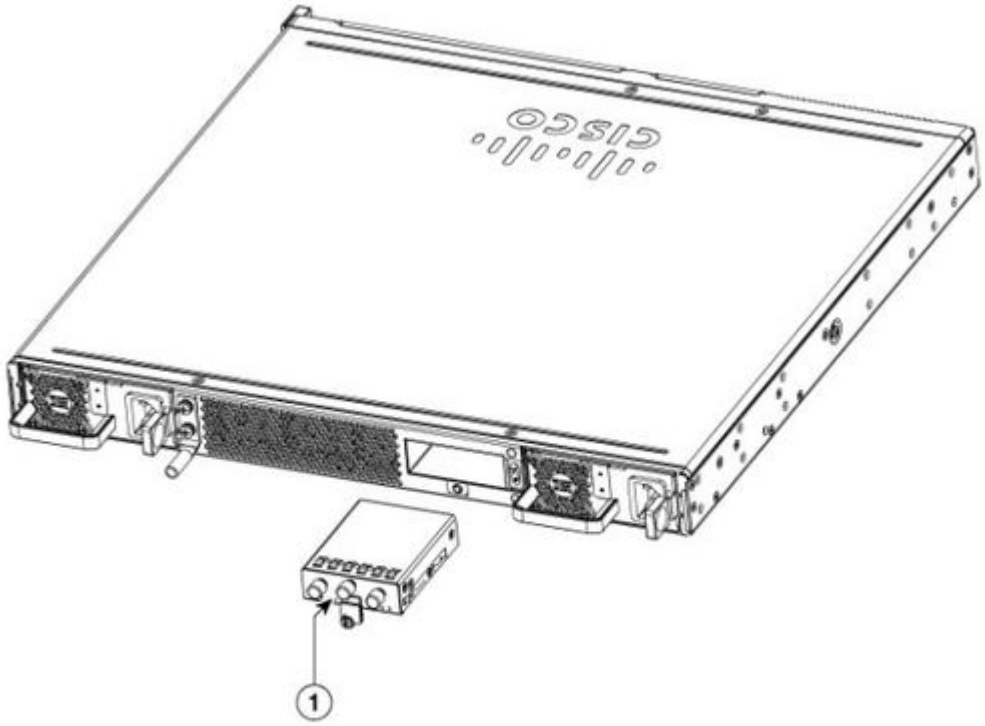
Insert the module into the router. It fits into a PCIE slot within the router, which powers up the module. Be sure to tighten the thumb screw after confirming insertion.

C8200:

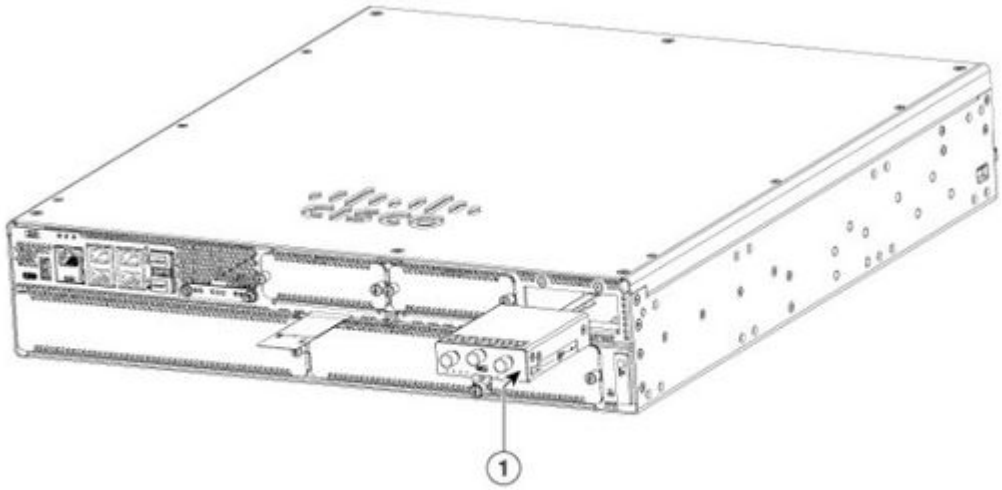


1	Pluggable interface module (PIM)
2	Screw

C8300-1N1S and C8300-2N2S:



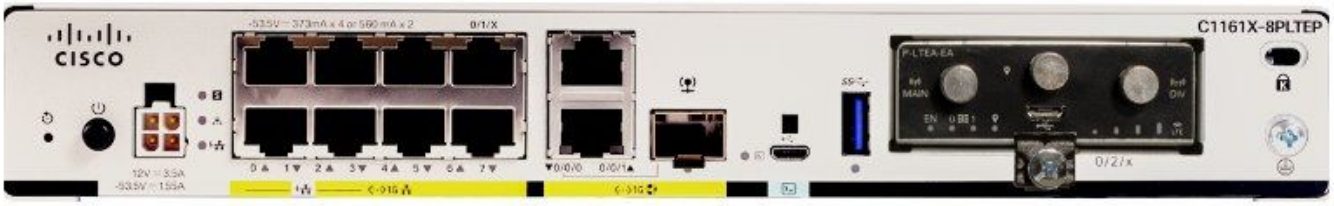
1	Pluggable interface module



1	Pluggable interface module

ISR1101 and ISR1121/1161:





Software Installation

Access the P-5GS6-GL via Console and SSH

This step requires a router accessible through console or SSH session from your terminal emulator software (PUTTY/SecureCRT).

Check Hardware Information

```
ISR1821# show cellular 0/X/0 hardware
```

```
Hardware Information
====================
Modem Firmware Version = M0H.020202
Host Firmware Version = A0H.000292
Device Model ID = FN980
International Mobile Subscriber Identity (IMSI) = XXXXXXXXXXXXXXX
International Mobile Equipment Identity (IMEI) = XXXXXXXXXXXXXXX
Integrated Circuit Card ID (ICCID) = XXXXXXXXXXXXXXXXXXX
Mobile Subscriber Integrated Services
Digital Network-Number (MSISDN) = XXXXXXXXXX
```

Check Session Connection

```
ISR1821# show cellular 0/x/0 network
```

Check Radio Information

```
ISR1821# show cellular 0/x/0 radio band
```

Band Selection

This feature is utilized to lock the modem to only use specified bands.

This command locks no bands for 3G, band 20 for 4G, and band 78 for 5G:

```
ISR1821(config)# controller cell 0/x/0
ISR1821(config-controller)# lte modem band indices umts3g none lte4g 20 nr5g 78 slot 0
```

Check and Configure Cellular Interface

```
!
interface Cellular0/x/0
 ip address negotiated
 ip nat outside
 dialer in-band
 dialer idle-timeout 0
 dialer watch-group 1
 dialer-group 1
 pulse-time 1
!
ip route 0.0.0.0 0.0.0.0 cellular0/x/0
!
dialer watch-list 1 ip x.x.x.x 0.0.0.0
```

```
dialer watch-list 1 delay route-check initial 60
dialer watch-list 1 delay connect 1
dialer-list 1 protocol ip permit
!
controller cellular 0/x/0
 lte sim data-profile 3 attach-profile 1 slot 0
 lte sim data-profile 4 attach-profile 4 slot 1
!
```

Check and Configure Cellular Access Point Name (APN)

```
ISR1821# show cellular 0/X/0 profile
Profile password Encryption level =  7
Profile 1 = INACTIVE **
--------
PDP Type = IPv4v6
Access Point Name (APN) = ims
Authentication = None

Profile 2 = INACTIVE
--------
PDP Type = IPv4v6
Access Point Name (APN) = vzwadmin
Authentication = None

Profile 3 = ACTIVE*
--------
PDP Type = IPv4v6
PDP address = XXX.XXX.XXX.XXX
IPv4 PDP Connection is successful
Access Point Name (APN) = VZWINTERNET
Authentication = None
    Primary DNS address = XXX.XXX.XXX.XXX
    Secondary DNS address = XXX.XXX.XXX.XXX

Profile 4 = INACTIVE
--------
PDP Type = IPv4v6
Access Point Name (APN) = vzwapp
Authentication = None

Profile 5 = INACTIVE
--------
PDP Type = IPv4v6
Access Point Name (APN) =
Authentication = None

Profile 6 = INACTIVE
--------
PDP Type = IPv4v6
Access Point Name (APN) = vzwclass6
Authentication = None

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

How to confirm configuration and then configure the APN on the APN cellular interface:

```
ISR1821# show cellular 0/x/0 profile
ISR1821# show running | sec controller
ISR1821# cellular 0/1/0 lte profile create 1 <APN_NAME> none ipv4v6
ISR1821# cellular 0/1/0 lte profile create 1 <APN_NAME> pap user pwd ipv4v6
```

Check and Configure your P-5GS6-GL5GS6SGLGL

This command is how to view your current and saved firmware. This contains a comprehensive guide to complete this step.

```
ISR1821# show cellular 0/x/0 firmware
 Idx Carrier              FwVersion        PriVersion   Status
 3   AT&T                 M0H.020002       0730         Active

Firmware Activation mode  =  AUTO

Modem image running: Main
Mobile Network Operator: AT&T
Number of MNO's = 11
 Index MNO ID  MNO NAME
 1     0       Generic GCF
 2     1       Generic PTCRB
 3     10      AT&T
 4     11      T-Mobile
 5     12      Verizon Wireless
 6     20      SK Telecom
 7     21      SK Telecom Dongle
 8     30      NTT Docomo
 9     31      KDDI
 10    40      Telstra
 11    50      Anatel
```

Use this procedure to upload and upgrade the firmware version of your modem:

- Have a reachable TFTP copy the software image onto the server, and ensure permissions on the file are such that anonymous TFTP users are able to access the file.
- Create a subdirectory firmware.
- Confirm you are utilizing the correct firmware based off your carrier and modem (viewable in the software page).
- Copy the firmware file (.bin) onto that directory.
- Upgrade trough the CLI with the commands listed:

```
ISR1821# copy tftp: flash:
Address or name of remote host []?
Source filename []?
Destination filename [filename]? <firmware file name>
Accessing tftp://<ip>/<file name>...
ISR1821# mkdir <firmware file name>
```

```
ISR1821# microcode reload cellular 0 1 modem-provision flash:/<firmware file name>/
```



Note: The only upgradable component on the PIM is PIM firmware. Other upgrades are committed within the router software.

Configure Primary SIM and Failovers

1. View the current active SIM:

```
ISR1821# show controller cellular 0/x/0 sim
Cellular Dual SIM details:
--------------------------
SIM 0 is present
SIM 1 is not present
SIM 0 is active SIM
```

2. Configure the controller cellular interface:

```
ISR1821# conf t
ISR1821# controller cellular 0/x/0
ISR1821# lte sim primary slot 0
ISR1821# lte sim max-retry 6
ISR1821# lte failovertimer 5
ISR1821# lte sim data-profile 3 attach-profile 1 slot 0
ISR1821# lte sim data-profile 4 attach-profile 4 slot 1
```

Configure AUTO-SIM

```
ISR1821# configure terminal
ISR1821(config)# controller cellular 0/x/0
ISR1821(config-controller)# lte firmware auto-sim
```