

Pluggable Modules

The following subsections provide details on the different modules that can be plugged into the IR1100 Series Routers.

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Cisco Pluggable Modules

The Pluggable Module provides the flexibility of adding different interfaces to the IR1101 platform, for example, a cellular module.

Important The Pluggable Module is not hot swappable. The router must be reloaded after a new module is installed.

Cellular Pluggable Module

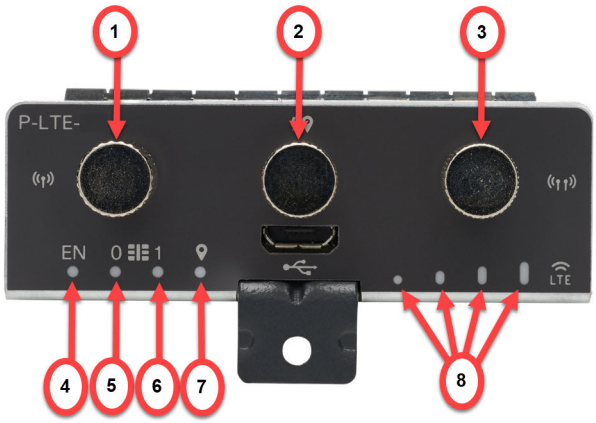
Highlights of the Cellular Pluggable Module are:

- All Cellular interfaces are supported through a Pluggable Module
- Micro-Sim, 3FF size. Cisco recommends Industrial Temp micro SIMs that are rated from -40C to +105C
- To ensure a reliable contact to the SIM socket, gold plated SIM cards must be used

Note Complete details on the Cellular Pluggable Module are found in the Cellular Pluggable Interface Module Configuration Guide.

The following figure shows an example of a Pluggable Module. In this case, the LTE Pluggable Module.

Figure 1: LTE Pluggable Module (front)



Item	Description
1	Cellular-Main SMA
2	GPS SMA
3	Cellular-Div SMA
4	Enable LED
5	SIM 0 LED
6	SIM 1 LED
7	GPS LED
8	RSSI LEDs

LTE Category 18 Pluggable Module

This module has a new smaller form factor SMA Diversity Antenna for usability and Micro-USB port access.

Note The P-LTEAP18-G pluggable module must be installed in the IR1101 Base. It cannot be used in the IRM-1100 Expansion Module.

Figure 2: P-LTEAP18-GL

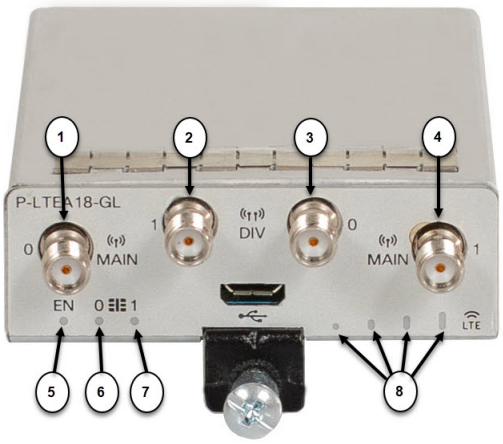


Table 1:

Item	Description
1	Main 0 Antenna
2	Diversity 1 Antenna
3	Diversity 0 Antenna
4	Main 1 Antenna
5	Enable LED
6	SIM 0 LED
7	SIM 1 LED
8	RSSI LEDs

P-LTEAP18-GL Frequency Bands

The following table provides the global frequency bands available.

Note Antennas must be attached to the RF connectors as listed below for proper bands service.

Item	Description
MAIN 0 and DIV 0	B1, B2(B25), B3, B4(B66), B5(B26,B18,B19), B8, B12(B17), B13, B14, B20, B28, B29, B39, B71, B41
MAIN 1 and DIV 1	B7, B30, B32, B38, B40, B41, B42, B46, B48, B2(B25)

5G Sub-6 GHz Support on IoT Routing

The 5G Sub-6 GHz Pluggable Interface Modules offer 5G capability to the IoT Industrial Router family. The product IDs for the pluggable modules are P-5GS6-GL and P-5GS6-R16SA-GL. The P-5GS6-GL uses the FN980 Telit modem, and P-5GS6-R16SA-GL uses the EM9293 modem.

Note

- IOS XE release 17.7.1 is the first software release to provide support for the P-5GS6-GL.
- IOS XE release 17.15.1a is the first software release to provide support for the P-5GS6-R16SA-GL.

Features and Limitations

The following features and limitations apply across all IoT routing platforms unless specifically mentioned:

- IoT routing platforms support a maximum of two pluggable modules, with a combination of 5G and 4G PIMs.
- The pluggable module can be started or stopped through the CLI under exec mode. Also, it can be configured to power off the module to reduce power consumption as needed.
- The capability to disable FDD Band 30 for vehicular applications is available.

The following are product specific:

- On the IR1101 with P-5GS6-GL module:
  - When plugged into the base, the module is accessible via Cellular 0/1/0, 0/1/1.
  - The module is not supported on the expansion module.
- On the IR1101 with the P-5GS6-R16SA-GL module:
  - The module is software and hardware supported on both, base and expansion module.
- On the IR1800
  - The cellular modems are accessible via Cellular 0/4/0, 0/4/1, 0/5/0, 0/5/1.

P-LTE-450 Interface LTE 450 MHz category 4 Pluggable Module

The P-LTE-450 is a 450MHz Category-4 LTE PIM, which addresses LTE use cases primarily targeting utility, public safety, and critical infrastructure maintained by public organizations in Europe and other world regions. The module supports only Band 31 and 72 for LTE 450MHz networks.

Note Throughout the user documentation, you will see the module referred to as P-LTE-450, which is the Cisco product name. The module is designed and manufactured by Intelliport, which refers to it as the IPS-701. Both names will be present in documentation.

Unlike regular LTE modules, there are some differences with regards to the P-LTE-450MHz on IOS-XE platform. Some of the key differences are:

- IP pass through will be on Gigabit Ethernet interfaces rather than cellular interface
- Troubleshooting commands are from web interface of third-party hardware

See the Cellular Pluggable Interface Module Configuration Guide for complete details.

For additional information, see the LTE 450MHz Alliance.

mSATA Module

Mini-SATA, or mSATA, is a low-profile interface connector that enables more effective Serial ATA (SATA) integration in small form-factor drives roughly the size of a business card, such as solid state disks (SSDs). The mSATA Pluggable Module plugs into the IR-1100-SPMI Expansion Module. The following figure shows the mSATA Pluggable Module.

Figure 3: mSATA Pluggable Module



Highlights of the mSATA Pluggable Module are:

- Provides an additional 100GB of additional flash memory storage
- Main purpose is to provide space to store application data for IOx

- Field Replaceable unit, but is not hot-swappable

Ethernet and Optical SFP Modules

The Ethernet and Optical SFP modules provide connections to other devices. These field-replaceable transceiver modules provide the uplink interfaces. The Ethernet and Optical modules can be either copper or optical. Details are in the two tables listed below.

The Local Connectors (LCs) provide the fiber-optic connection. RJ-45 connectors allow copper connections. You can use any combination of the supported SFP modules listed in the table that follows.



Note The IR1101 is designed to operate in the Industrial temperature range (-40C to +85C internal component temperature range) and therefore cannot support commercial rated SFPs.

Table 2: Supported Gigabit SFPs

GE SFP	Distance	Fiber	Commercial 0C to +70C	Extended -5C to +85C	Industrial -40C to +85C	DOM
GLC-SX-MM-RGD	220-550 m	MMF			YES	
GLC-LX-SM-RGD	550m/10 km	MMF/SMF			YES	
GLC-ZX-SM-RGD	70 km	SMF			YES	YES
GLC-BX40-DA-I	40 km	SMF			YES	YES
GLC-BX40-U-I	40 km	SMF			YES	YES
GLC-BX80-D-I	80 km	SMF			YES	YES
GLC-BX80-U-I	80 km	SMF			YES	YES
SFP-GE-S	220-550 m	MMF		YES		YES
SFP-GE-L	550 m/10 km	MMF/SMF		YES		YES
SFP-GE-Z	70 km	SMF		YES		YES

Table 3: Supported FE SFPs

FE SFP	Distance	Fiber	Commercial 0C ~ +70C	Extended -5C ~ +85C	Industrial -40C ~ +85C	DOM
GLC-FE-100FX-RGD	2 km	MMF			YES	

FE SFP	Distance	Fiber	Commercial 0C ~ +70C	Extended -5C ~ +85C	Industrial -40C ~ +85C	DOM
GLC-FE-100LX-RGD	10 km	SMF			YES	

Table 4: Supported SFPs added in IOS XE 17.7.1

SFP	Distance	Fiber	Commercial 0C ~ +70C	Extended -5C ~ +85C	Industrial -40C ~ +85C	DOM
GLC-T-RGD	100 M	Copper			YES	
CWDM-SFP-1470	100 km	SMF	YES			YES
CWDM-SFP-1610	100 km	SMF	YES			YES
CWDM-SFP-1530	100 km	SMF	YES			YES
DWDM-SFP-3033	80 km	SMF	YES			YES
DWDM-SFP-3112	80 km	SMF	YES			YES
GLC-BX-D-I	10 km	SMF			YES	YES
GLC-BX-U-I	10 km	SMF			YES	YES
GLC-TE	100 km	Copper			YES	NO

For the most up-to-date list of supported SFP models for Cisco Industrial Devices, see the Cisco Optics-to-Device Compatibility Matrix.

DSL SFP Module

This section provides an example of installing and removing the DSL SFP module.

Attention Prior to installing the DSL SFP Module, please note the following statements:

1. Follow all of warning notices and instructions marked on the product or in the user manual.
2. Do not install telephone wiring during a lightning storm.
3. The device should be installed by a service/skilled person on stationary pluggable equipment and connected to a socked-outlet with a protective earthing conductor to building earth.
4. External paired conductor cable should be minimum wire diameter of 0.4 mm, shall have the current limited to 1.3 A.

5. Please disconnect RJ45/RJ11 line before disconnect the power supply.

The following photo shows the DSL SFP Module:



Note SFP-VADSL2+-I was evaluated to country specific regulatory requirements only. The product was not evaluated to IEC 61850-3 and IEEE1613 substation / utility standards.

Prerequisite for Installing the DSL SFP

The DSL SFP will only function on IOS-XE release 17.4.1 and above.

Due to a change in the IR1101 Faceplate, older routers are not able to use the DSL SFP. There is no viewable version on the IR1101 Faceplate, but you can determine if your router is new enough to use the DSL SFP through the **show inventory** command:

```
IR1101#show inventory
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
INFO: Please use "show license UDI" to get serial number for licensing.
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
NAME: "Chassis", DESCR: "IR1101 Base Chassis"
PID: IR1101-K9          , VID: V05  , SN: FCW23500H5X
NAME: "Module 0 - Mother Board", DESCR: "Cisco IR1101 motherboard"
PID: IR1101-K9          , VID: V05  , SN: FOC23473SRK
NAME: "module subslot 0/0", DESCR: "IR1101-ES-5"
PID: IR1101-ES-5        , VID: V01  , SN:
NAME: "subslot 0/0 transceiver 0", DESCR: "GE T"
PID: SFP-VADSL2+-I        , VID: V01  , SN: MET2023000A
```

The IR1101 K9 VID version must be equal to, or greater than V05 as shown above.

DSL SFP Overview

The DSL SFP interface is an 8 pin modular jack. The following table shows the pin-out assignments:

Pin Number	Pin Assignment
1	Not Used
2	Not Used
3	Not Used
4	Analog Input
5	Analog Input

Pin Number	Pin Assignment
6	Not Used
7	Not Used
8	Not Used

The modular jack pin-outs are shown in the following graphics:

Figure 4: Front View

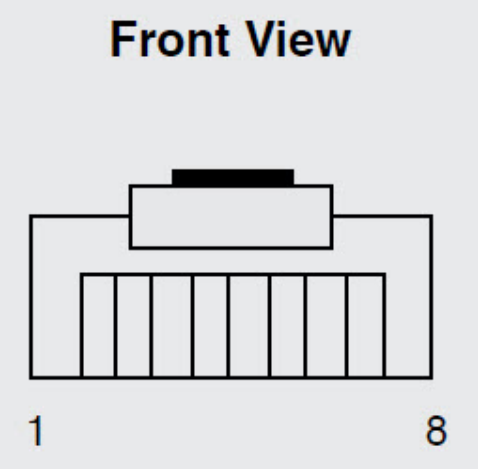
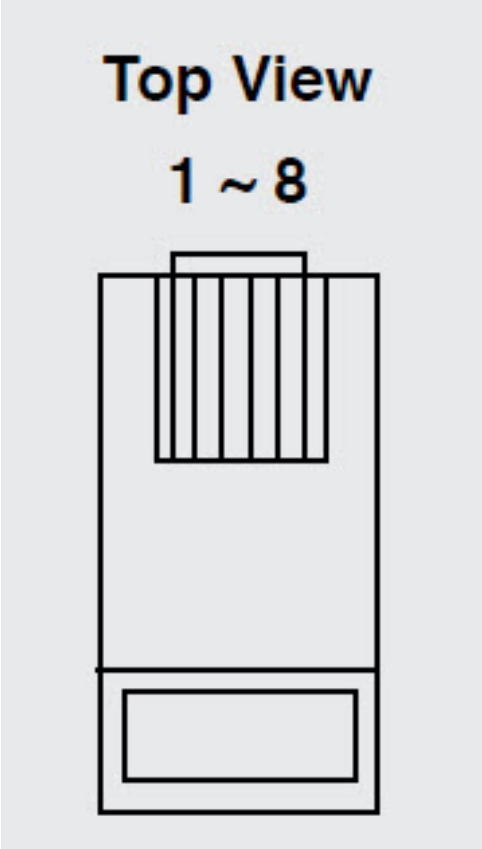
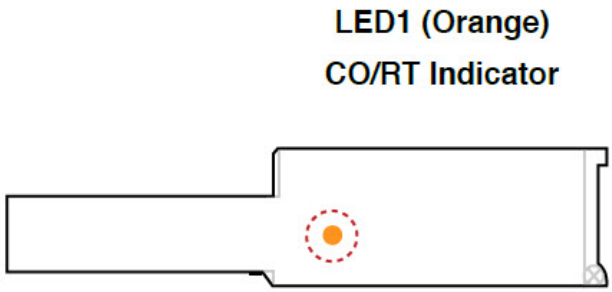


Figure 5: Top View



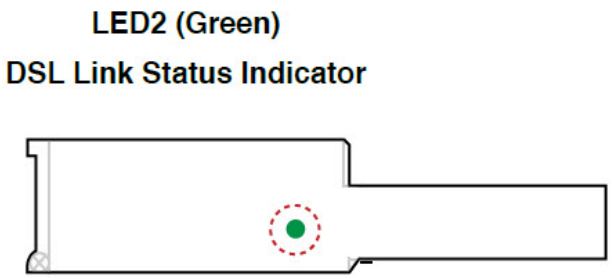
The DSL SFP has two LEDs built in. The LED positions and definitions are shown in the following:

Figure 6: LED 1



Indicator LED	State	Description
LED 1 (Orange)	On	CPE side (expected to be ON when used on an IR router)
LED 1 (Orange)	Off	Central office side (not supported)

Figure 7: LED 2



Indicator LED	State	Description
LED 2 (Green) xDSL Status LED	Off	No DSL Connection Possibly a bad cable, link, etc...
LED 2 (Green) xDSL Status LED	Slow Flash	Idle
LED 2 (Green) xDSL Status LED	Fast Flash	Training
LED 2 (Green) xDSL Status LED	Steady	Showtime
LED 2 (Green) xDSL Status LED	Extremely Rapid Flash	Packet Transmit

Installing the DSL SFP Module

Perform the following to install the module:

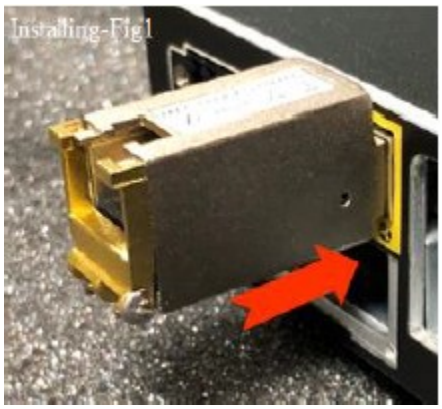
Important This section uses photos of a generic SFP and product as an illustration of proper installation and handling methods. Your completed installation will appear different.

Procedure

Step 1 Close the SFP-Pull before inserting the SFP module.

Step 2 Line up the SFP module and slide it into the cage.

Figure 8: Align SFP Module



LED 1 will turn orange as an indicator of RT. Check for physical connection. You should see LED 2 flashing green slowly as soon as you insert the device.

Step 3 Plug in the xDSL connection cable. This is only available for an RJ-45 connector.

Figure 9: xDSL Connection



Check for physical connection. You should see LED 2 flashing green slowly as soon as you insert the cable.

Link time takes about 60 seconds. Fast flashing green LED 2 indicates DSL training. LED 2 on both VDSL2 SFP Modules (CO & RT) turns solid green when the devices link up.

Removing the DSL SFP Module

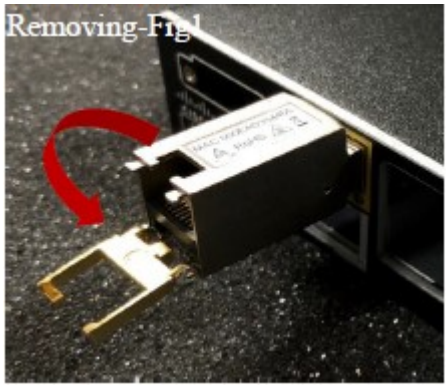
Perform the following to remove the module:

Procedure

Step 1 Remove the xDSL connection cable from the ports.

Step 2 Open the SFP-Pull with your finger and press it to the end.

Figure 10: SFP-Pull



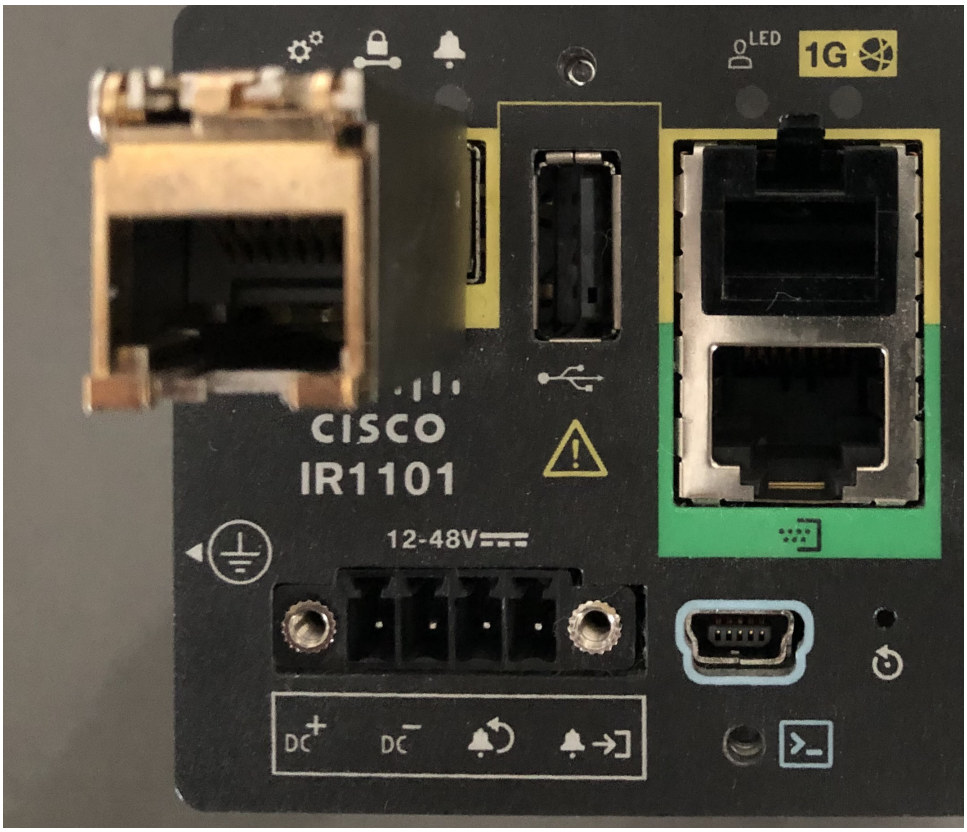
Step 3 Grasp the SFP module between your thumb and index finger, and carefully remove it from the cage. Do NOT pull on the SFP-Pull.

Figure 11: Grasp SFP Module



Completed Installation

The previous installation instructions illustrated handling techniques using a generic SFP. The following illustrations show a DSL SFP plugged into an IR1101.


LED
1G
CISCO
IR1101
12-48V
DC+
DC-


CISCO
IR1101
12-48V
DC+
DC-
1G
EN