

Cisco 8010 Large and Medium Density Routers Overview

The Cisco 8010 Series Large and Medium Density Fixed Routers, featuring the Cisco Silicon One A100 ASIC, deliver comprehensive Class C timing support and end-to-end encryption. Designed for seamless network expansion and scalability, these routers are built on the robust Cisco IOS XR operating system.

The Cisco 8010 Series Large and Medium Density Fixed Routers are temperature-hardened, fixed port, one rack unit form-factor routers. The primary use cases of the router are:

- CSG (Cell Site Gateway),
- L3 Pre-aggregation,
- L2 Pre-aggregation,
- L3 WAN, and
- OLT Aggregation

For more information about the router features and benefits, see the Cisco 8010 Large Density Routers Data Sheet.

Router Variants

This table provides the variants for the Cisco 8010 Series Large and Medium Density Fixed Routers.

Table 1: Router variants and applications

Variant name	Classification	Deployment Mode
Cisco 8011-4G24Y4H-I	Large Density	Central office, outdoor
Cisco 8011-32Y8L2H2FH	Large Density	Central office
Cisco 8011-12G12X4Y-A	Medium Density	Central office, outdoor
Cisco 8011-12G12X4Y-D	Medium Density	Central office, outdoor

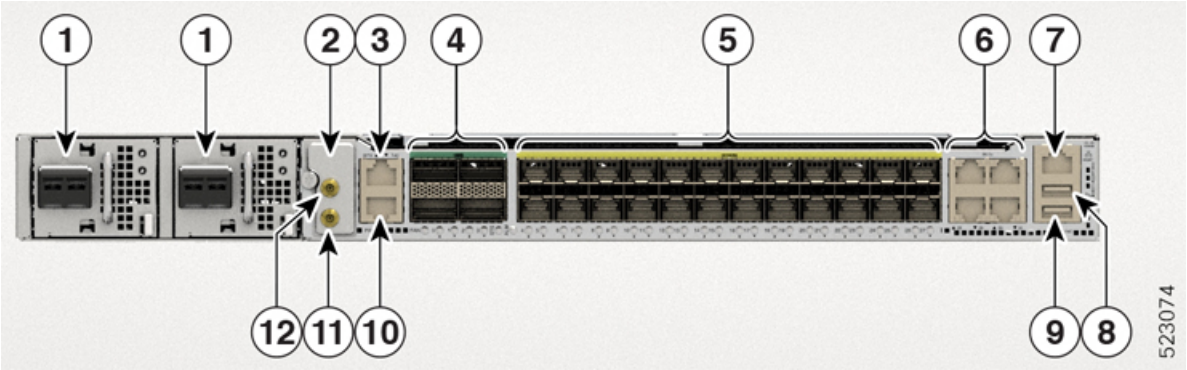
Note While installing in outdoor environment, we recommend you to have an IP65/IP66 sealed cabinet with heat exchanger complying with Telcordia GR487.

- Hardware Features of Cisco 8000 Series Large and Medium Density Routers, on page 2
- Network Interfaces, on page 5
- Interface Naming, on page 7
- Network Timing Interfaces, on page 9
- External Alarm Inputs, on page 17
- USB console, on page 17
- RS232 Console, on page 17
- Online Insertion and Removal, on page 18
- Supported Transceiver Modules, on page 18

Hardware Features of Cisco 8000 Series Large and Medium Density Routers

Cisco 8011-4G24Y4H-I Router

Figure 1: Cisco 8011-4G24Y4H-I Router Port and LED details on Front View

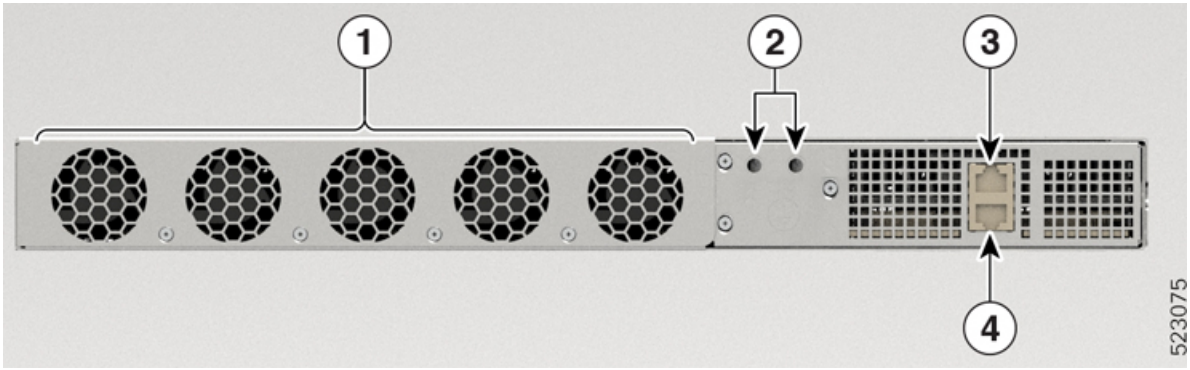


1	DC or AC PSU Power Module (PM0 and PM1)	2	• 8000-TIC (shown):
			  • Timing Interfaces Card: 10MHz, 1PPS ports
			• 8000-TIC-GNSS (optional):
			  • PRTC-B GNSS Receiver Card: 10MHz, 1PPS, Antenna ports

3	BITS port	4	100G QSFP ports

5	1/10/25G SFP ports	6	Copper ports
7	1G Ethernet Management port	8	USB memory port
9	USB Console port	10	1PPS/Time of Day (ToD) port
11	1PPS port	12	10MHz port

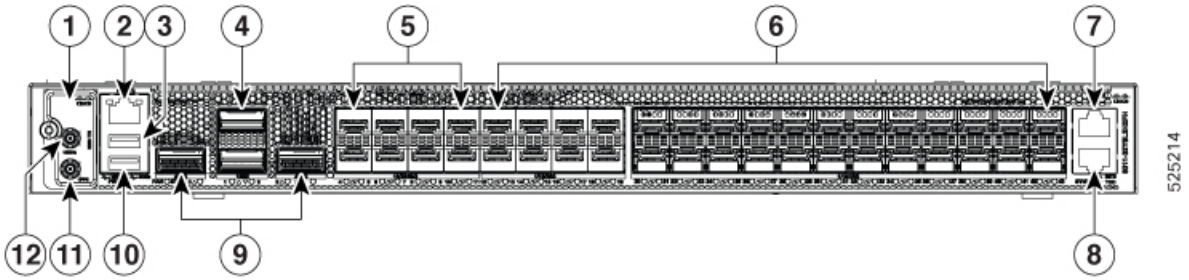
Figure 2: Cisco 8011-4G24Y4H-I Router Fan and Alarm Port details on Rear View



1	Fixed Fan Modules	2	Grounding Lug Holes
3	Alarm port	4	RS232 Console port

Cisco 8011-32Y8L2H2FH Router

Figure 3: Cisco 8011-32Y8L2H2FH Router Port and LED details on front view

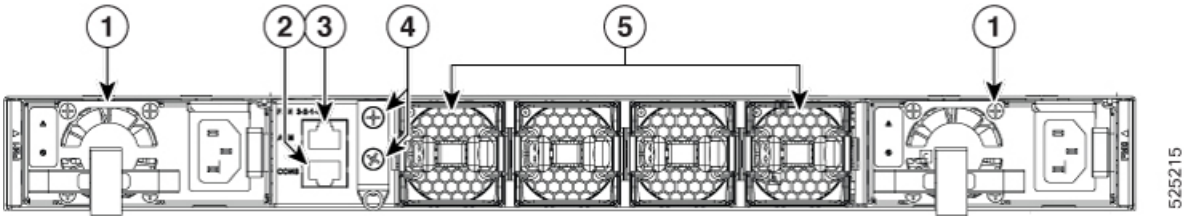


1	• 8000-TIC (shown):
	  • Timing Interfaces Card: 10MHz, 1PPS ports
	• 8000-TIC-GNSS (optional):
	  • PRTC-B GNSS Receiver Card: 10MHz, 1PPS, Antenna ports
		2	10/100/1000M Ethernet Management port

3	USB memory port	4	100G QSFP ports

5	10/25/50G SFP ports	6	1/10/25G SFP ports
7	BITS port	8	1PPS/Time of Day (ToD) port
9	400G QSFP ports	10	USB console port
11	1PPS port	12	10MHz port

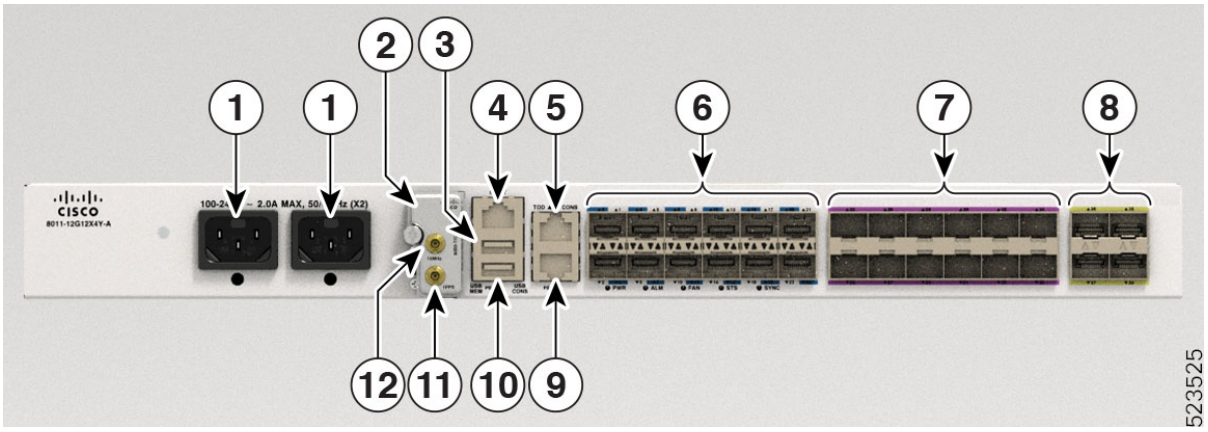
Figure 4: Cisco 8011-32Y8L2H2FH router fan and alarm port details on rear view



1	DC or AC PSU power module (PM0 and PM1)	2	RS232 console port
3	Alarm port	4	Grounding lug holes
5	Fan modules (0 to 3)		

Cisco 8011-12G12X4Y-A/D Router

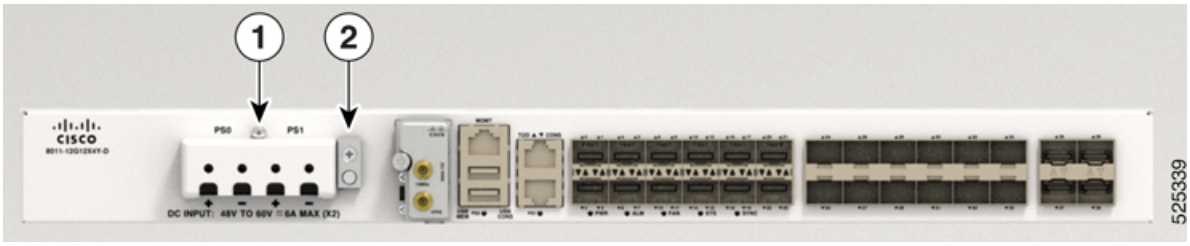
Figure 5: Cisco 8011-12G12X4Y-A Router Components on Front View



1	AC PSU PS0/PS1 PM	2	8000-TIC (by default) or 8000-TIC-GNSS (optional)
3	USB Memory port	4	Management port
5	1PPS/Time of Day (ToD) port	6	1G CSFP SFP ports
7	1/10G SFP+ ports	8	1/10/25G SFP28 ports
9	RS232 Console port	10	USB Console port

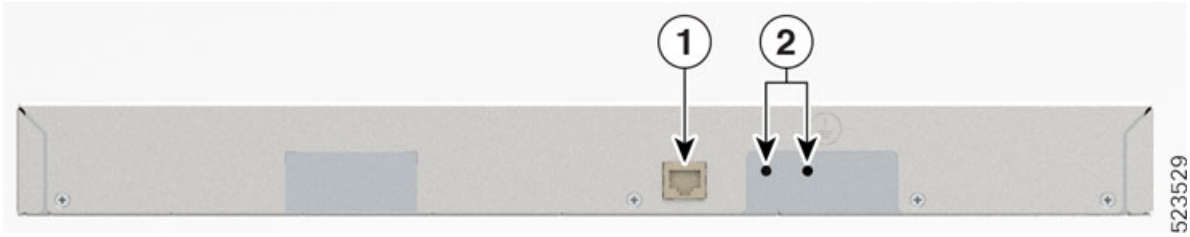
11	1PPS	12	10MHz

Figure 6: Cisco 8011-12G12X4Y-D Router Components on Front View



1	DC PSU PS0/PS1 PM	2	Surge pin

Figure 7: Cisco 8011-12G12X4Y-A/D Router Components on Rear View



1	Alarm port	2	Lug Holes

For temperature and physical specifications, see the Cisco 8010 Series Routers Data Sheet.

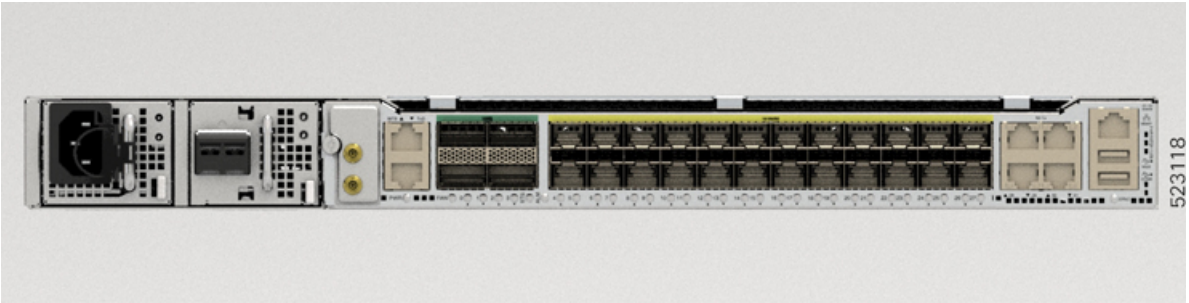
Network Interfaces

Cisco 8011-4G24Y4H-I Router

The Cisco 8011-4G24Y4H-I router supports the following network interfaces:

- 4x1G Copper ports
- 24x1/10/25G SFP ports
- 4x100G QSFP ports

Figure 8: Cisco 8011-4G24Y4H-I Router



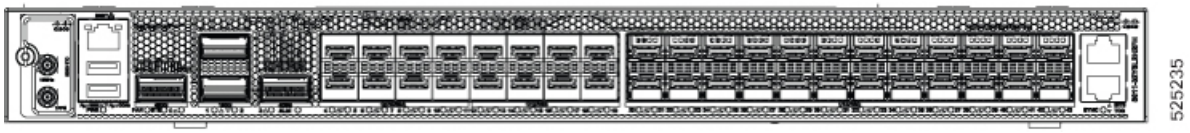
Note The ports are color coded in the chassis for ease of identification; for example, the 100G ports are in green, and the 1/10/25G ports are in yellow.

Cisco 8011-32Y8L2H2FH Router

The Cisco 8011-32Y8L2H2FH router supports these network interfaces:

- 2x400G QSFP56-DD ports
- 2x100G QSFP28 ports
- 8x10/25/50G SFP ports
- 32x1/10/25G SFP ports

Figure 9: Cisco 8011-32Y8L2H2FH Router



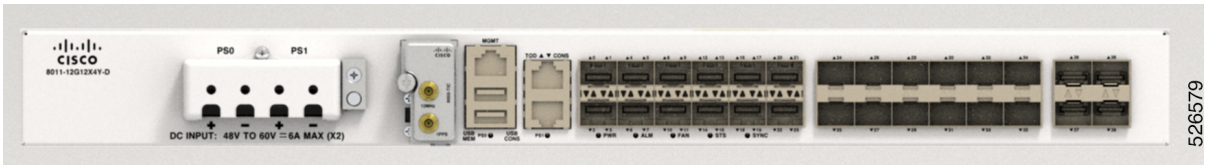
Note The ports are color coded in the chassis for ease of identification; for example, the 400G ports are in blue, the 100G ports are in green, the 10/25/50G ports are in orange, and the 1/10/25G ports are in yellow.

Cisco 8011-12G12X4Y Router

The Cisco 8011-12G12X4Y-A router and Cisco 8011-12G12X4Y-D router support the following network interfaces:

- 12x1G CSFP ports
- 12x1G SFP ports
- 12 x1/10G SFP+ ports
- 4x1/10/25G SFP28 ports

Figure 10: Cisco 8011-12G12X4Y Router



Note The ports are color coded in the chassis for ease of identification; for example, the 1G CSFP ports are in blue, the 1/10G SFP+ ports are in pink, and the 1/10/25G SFP28 ports are in yellow.

Interface Naming

Cisco 8011-4G24Y4H-I Router

This table shows the interface naming of the Cisco 8011-4G24Y4H-I router:

Table 2: Port numbers

100G QSFP ports	1/10/25G SFP ports	1G Copper ports (10/100/1000M)
0 to 3	4 to 27	28 to 31

The *interface-path-id* is *rack/slot/module/port*. The slash between values is required as part of the notation.

- **HundredGigE**—0/0/0/0 to 0/0/0/3
- **TwentyFiveGigE**—0/0/0/4 to 0/0/0/27
- **TenGigE**—0/0/0/4 to 0/0/0/27
- **GigE**—0/0/0/4 to 0/0/0/27
- **GigE**—0/0/0/28 to 0/0/0/31

Port Speed on 100G Ports:

The 100G ports (0-3) support:

- 4x25G QSFP
- 40G QSFP
- 4x10G QSFP

Cisco 8011-32Y8L2H2FH Router

This table shows the interface naming of the Cisco 8011-32Y8L2H2FH router.

Table 3: Port numbers

400G QSFP ports	100G QSFP ports	10/25/50G SFP ports	1/10/25G SFP ports
0, 3	1 to 2	4 to 11	12 to 43

The *interface-path-id* is *rack/slot/module*. The slash between values is required as part of the notation.

- **FourHundred GigE**—0/0/0/0 & 0/0/0/3
- **HundredGigE**—0/0/0/1 to 0/0/0/2
- **FiftyGigE**—0/0/0/4 to 0/0/0/11
- **TwentyFiveGigE**—0/0/0/4 to 0/0/0/43
- **TenGigE**—0/0/0/4 to 0/0/0/43
- **GigE**—0/0/0/12 to 0/0/0/43

This table shows the port speed options for the 400G, 100G, 10/25/50G, and 1/10/25G ports.

Table 4: Port speed

Port speed for 400G ports	Port speed for 100G ports	Port speed for 10/25/50G ports	Port speed for 1/10/25G ports
400G	100G	50G	25G
4x100G	4x25G	25G	10G
8x50G	40G	10G	1G
3x100G	4x10G	—	—
200G	—	—	—
2x100G	—	—	—
100G	—	—	—
4x25G	—	—	—
40G	—	—	—
4x10G	—	—	—

Note Not all 400G, 100G, and 50G ports can be enabled simultaneously at the maximum port speed.

Cisco 8011-12G12X4Y Router

The following table shows the interface naming of the Cisco 8011-12G12X4Y-A and Cisco 8011-12G12X4Y-D routers:

Table 5: Port Numbering

1G CSFP ports	1G SFP ports	1/10G SFP+ ports	1/10/25G SFP28 ports
0/0 to 0/23	0/0, 0/3, 0/4, 0/7, 0/8, 0/11, 0/12, 0/15, 0/16, 0/19, 0/20, and 0/23	0/24 to 0/35	0/36 to 0/39

The *interface-path-id* is *rack/slot/module/port*. The slash between values is required as part of the notation.

- **TwentyFiveGigE**— 0/0/0/36 to 0/0/0/39
- **TenGigE**— 0/0/0/24 to 0/0/0/39
- **GigE**— 0/0/0/0 to 0/0/0/23

Network Timing Interfaces

The router supports these timing interfaces card (TIC):

- Cisco 8010 timing interfaces card (8000-TIC)
- Cisco 8010 timing interfaces card with GNSS (8000-TIC-GNSS)

By default, the router comes with Cisco 8000-TIC. Cisco 8000-TIC-GNSS can also be selected when ordering the router.

Usage guidelines

Some of the guidelines to use network timing interfaces:

- 1PPS input or output and ToD input or output—The interface is used for input or output of Time-of-Day (ToD) and 1PPS pulses. ToD format includes both NTP and IEEE 1588-2008 time formats.
- The same RS422 pins for 1PPS and ToD are shared between the input and output directions. The direction for each are independently configurable through software.
- BITS input or output—The BITS interfaces support clock recovery from either a T1 at 1.544MHz or an E1 at 2.048MHz, configurable by software.

Restrictions

Online insertion and removal (OIR) of a TIC module is not supported when the router is operational.

Cisco 8010 Timing Interfaces Card (8000-TIC)

Cisco 8010 Timing Interfaces Card (8000-TIC) is a pluggable module containing these timing ports:

- 1PPS port
- 10MHz port

8000-TIC is DIN 1.0/2.3 jack connector compliant to DIN 41626 specifications.

Figure 11: Cisco 8011-4G24Y4H-I Router: Ports on Timing Interfaces Card (8000-TIC) Module

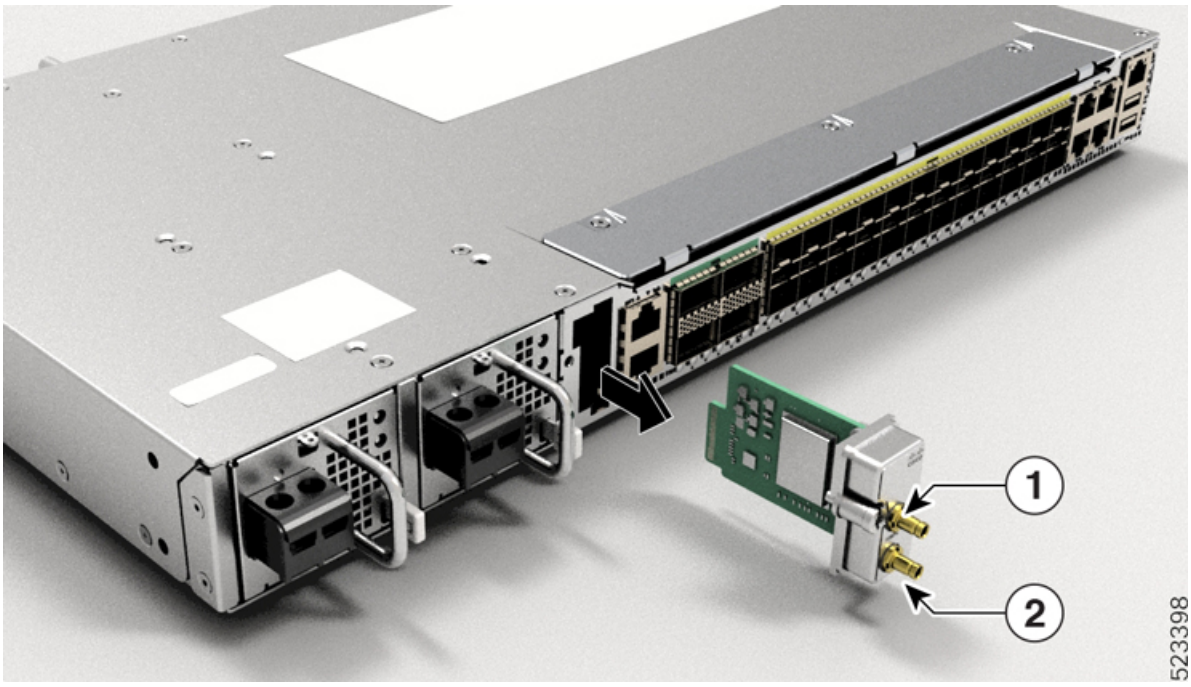


Figure 12: Cisco 8011-32Y8L2H2FH: Ports on Cisco 8010 Timing Interfaces Card (8000-TIC) Module

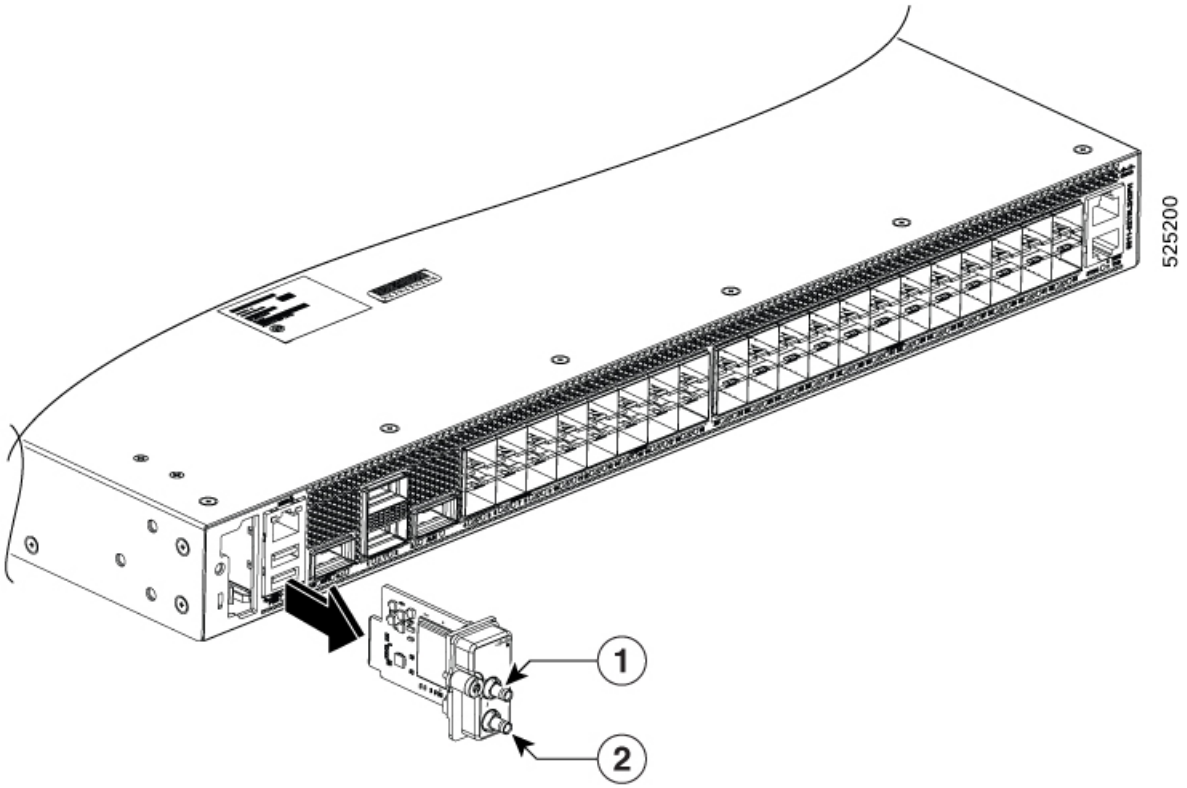
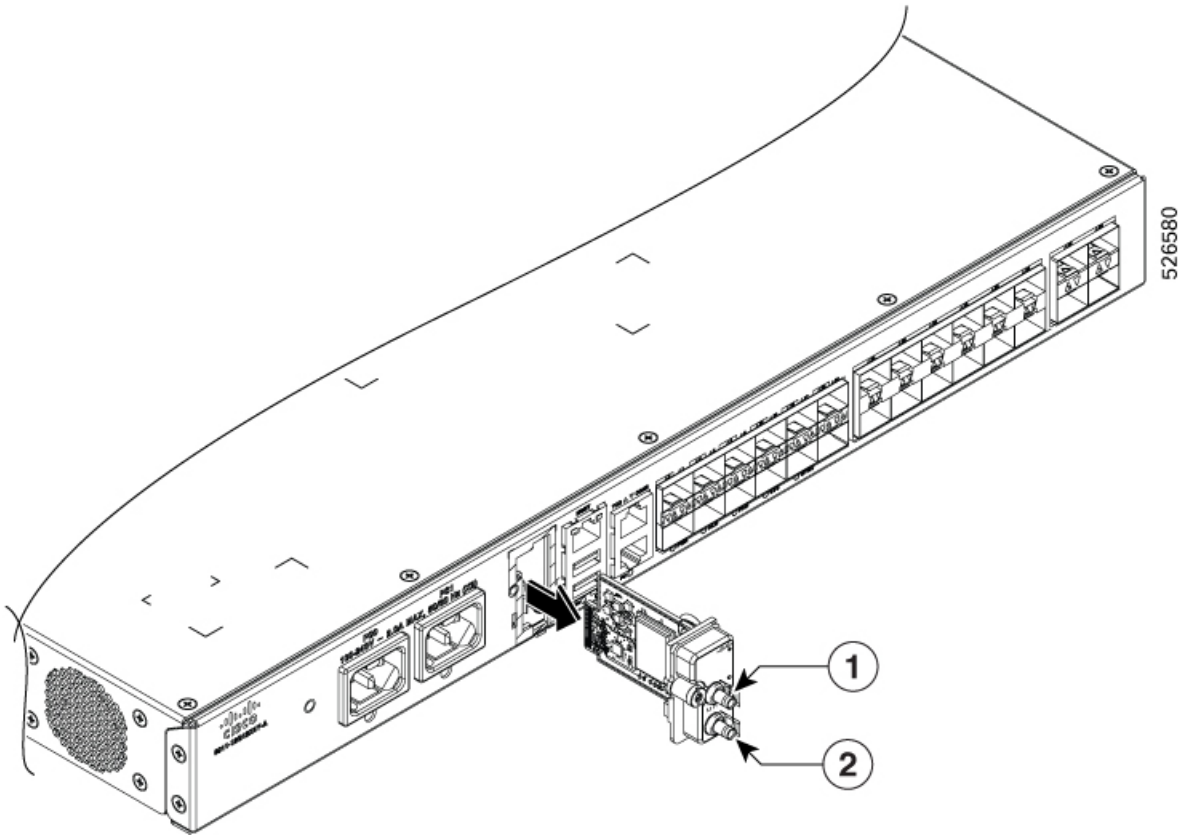


Figure 13: Cisco 8011-12G12X4Y Router: Ports on Timing Interfaces Card (8000-TIC) Module



1	10MHz port
2	1PPS port

Timing Interfaces Card Ports Specification

Table 6: Timing Interfaces Card Ports

Category	10MHz (Input)	1PPS (Input and Output)
Waveform	Input—Sine wave Output—Sine wave	Input—Rectangular pulse Output—Rectangular pulse
Amplitude	Input—Greater than (>) 1.7 volt p-p(+8 to +10 dBm) Output—Greater than (>) 2.4 volts TTL compatible	Input—Greater than (>) 1.2 volts TTL compatible Output—Greater than (>) 2.4 volts TTL compatible
Impedance	50 Ohms	50 Ohms
Pulse Width	50% duty cycle	100 Nanoseconds when configured as Output

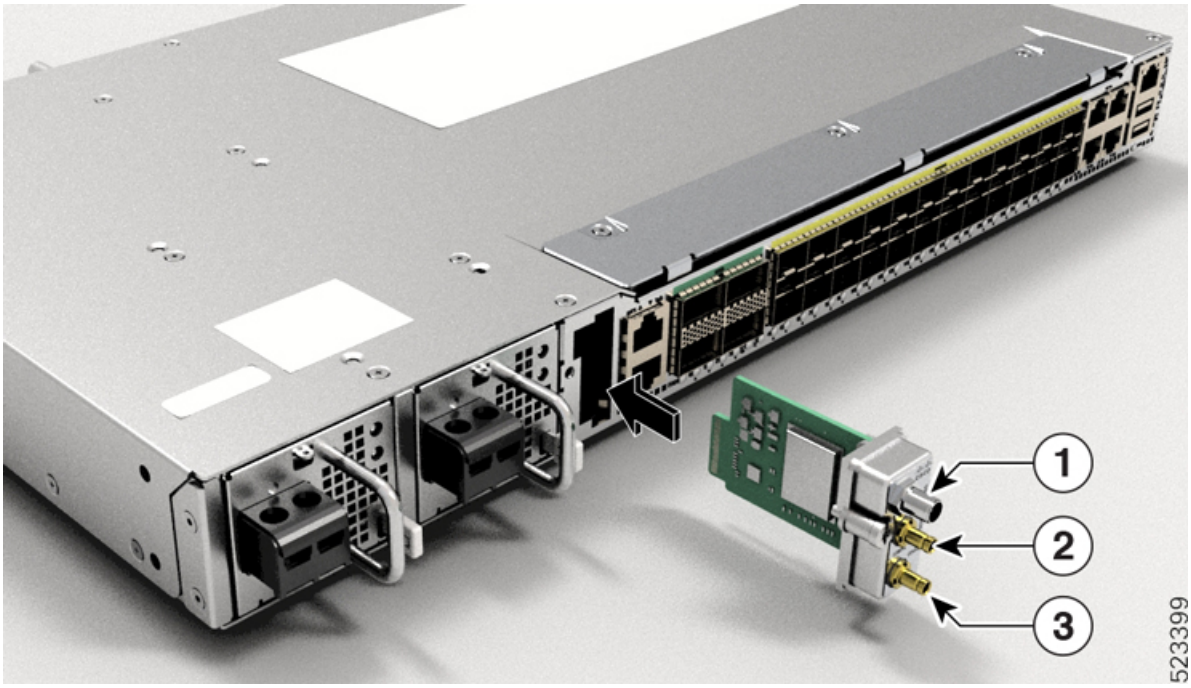
Category	10MHz (Input)	1PPS (Input and Output)
Rise Time	Output—5 Nanoseconds	<5 Nanoseconds

Cisco 8010 Timing Interfaces Card with GNSS (8000-TIC-GNSS)

8000-TIC-GNSS is a Cisco 8010 Timing Interfaces Card with a GNSS module. 8000-TIC-GNSS has:

- an in-built ESD protection on all pins
- these timing ports:
  - GNSS Antenna port
  - 10MHz port
  - 1PPS port

Figure 14: Cisco 8011-4G24Y4H-I Router: Ports on Timing Interfaces Card with GNSS (8000-TIC-GNSS) Module



For the Cisco 8011-4G24Y4H-I Router, an extra surge protection is required if an outdoor antenna is to be connected.

Figure 15: Cisco 8011-32Y8L2H2FH: Ports on Cisco 8010 Timing Interfaces Card with GNSS (8000-TIC-GNSS) Module

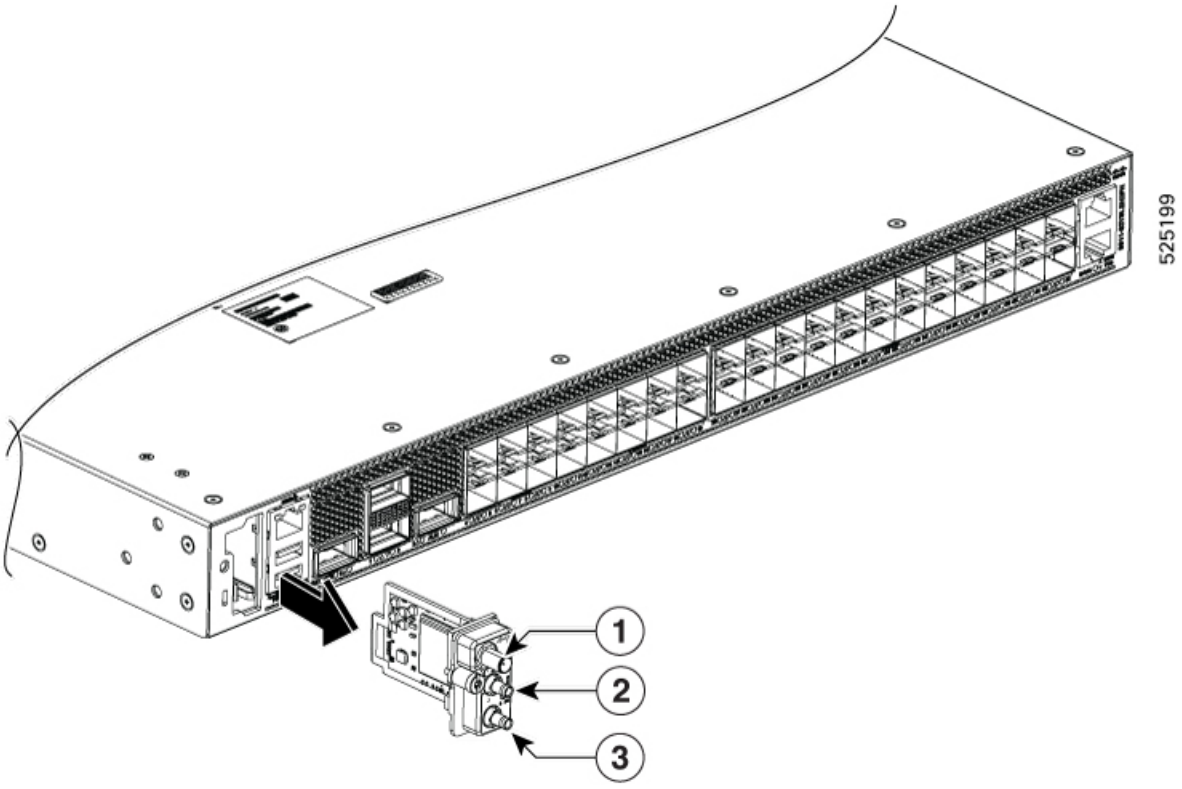
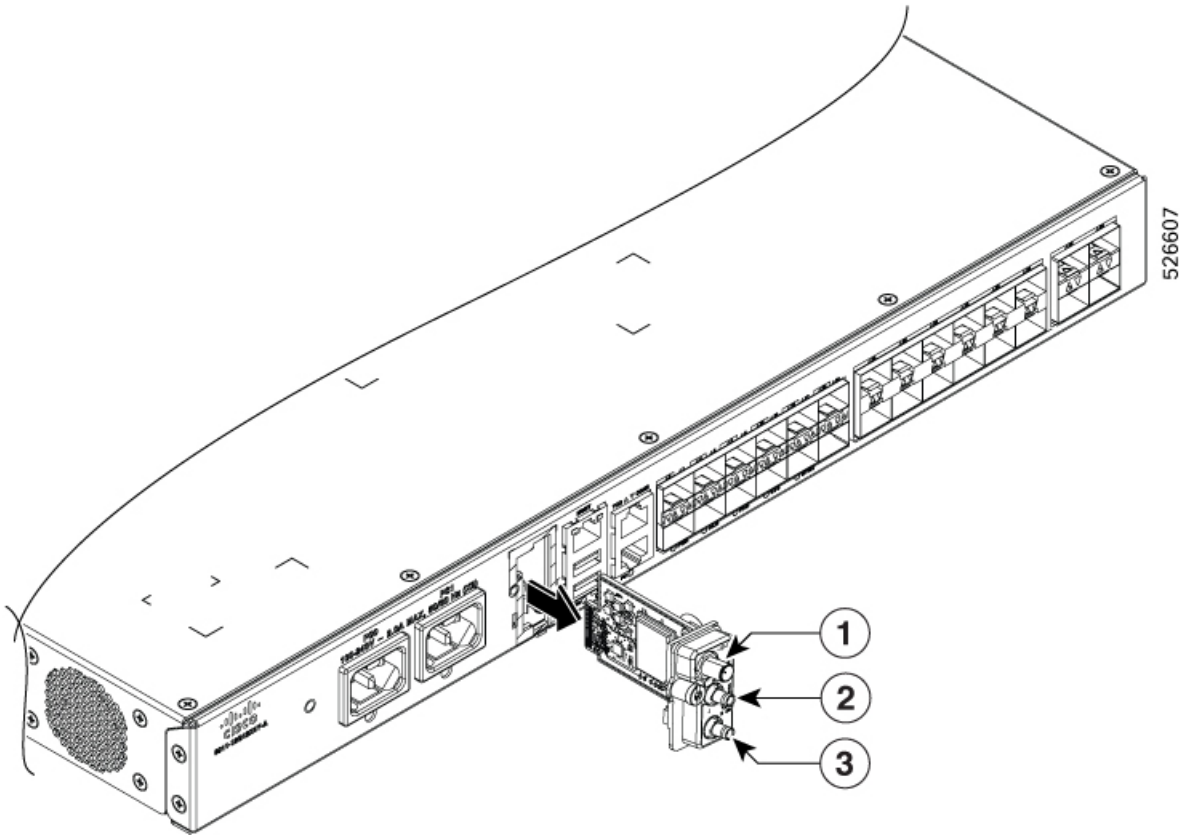


Figure 16: Cisco 8011-12G12X4Y: Ports on Cisco 8010 Timing Interfaces Card with GNSS (8000-TIC-GNSS) Module



For the Cisco 8011-12G12X4Y Router, an extra surge protection is required if an outdoor antenna is to be connected.

1	GNSS Antenna port
2	10MHz port
3	1PPS port

For information on how to insert and secure the Cisco 8000 Timing Interfaces Card with GNSS module, see Inserting and Securing Timing Interfaces Card with GNSS Module.

Timing Interfaces Card with GNSS Module RF Input Specifications

This table provides specifications of the GNSS RF input and connector.

Table 7: Timing Interfaces Card with GNSS Module

Connector Type	SMA Jack
Impedance	50 Ohms

Band	Multi band - L1/L2
Accuracy	PRTC-B

Primary Reference Time Clock

As packet timing requirements emerged, the ITU-T developed the Primary Reference Time Clock (PRTC) standard for time and phase for transport over a packet network and this standard is known as G.8272.

Note The performance specified in the following table also applies to the output of the combined PRTC and T-GM function when integrated into a single piece of equipment. Therefore, for both the PRTC-A and PRTC-B, there's no additional (performance) allowance for the inclusion of the T-GM function.

Table 8: PRTC-A versus PRTC-B

Category	PRTC-A	PRTC-B
Standard	G.8272	G.8272
Time output accuracy (max)	100 ns	40 ns
Phase Error at Output		
Wander in locked mode (MTIE)	100 ns	40 ns
Wander in locked mode (TDEV)	30 ns	5 ns
Holdover	Optional	Optional

There is no standard packet timing requirement and it is based on implementation. Some standalone PRTC devices have very-high quality quartz oscillators or even a Rubidium oscillator as an option to allow an option for extended holdover. Redundancy is provided through network design instead of relying on holdover performance from expensive oscillators.

According to the standards, there are only a few differences between the two classes of clock. Meeting those requirements may result in different implementations, which may influence the cost of the device.

To achieve improved performance, PRTC-B is typically implemented with a two-band GNSS receiver instead of a single-band receiver. The "traditional" band for GPS signals in the L1 band, while the newer devices receive signals in the L2 band.

Table 9: Bands on PRTC-A versus PRTC-B

Category	PRTC-A	PRTC-B
Bands (GPS)	L1 (1575.42 MHz)	L1 + L2 (1227.60 MHz)
Bands (Galileo)	E1 (1575.42 MHz)	E1 (1227.60 MHz)
Bands (BeiDou)	1561.098MHz	1207.140MHz

Category	PRTC-A	PRTC-B
Bands (GLONASS)	1575.42MHz	1207.140MHz
Ionospheric delay model	Basic	Advanced
Antenna	Single band (L1/E1)	Dual band (L1/E1, L2)
Constellation	GPS, Galileo, other	GPS, Galileo, other

Usage Guidelines

These are some guidelines to follow when using the Cisco 8000-TIC-GNSS:

Surge Protection

- The Cisco 8000-TIC-GNSS modules have built-in ESD protections on all pins, including the RF-input pin.
- An extra surge protection may be required if rooftop antennas are to be connected to meet the regulations and standards for lightning protection of countries where the end product is installed.
- The lightning protector must support a low clamping voltage (less than 600V).
- A lightning protection must be mounted at the place where the antenna cable enters the building. The primary lightning protection must be capable of conducting all potentially dangerous electrical energy to protective earth (PE).
- Surge arrestors should support DC-pass and suitable for the Timing Interfaces Card with GNSS frequency range (1227.60MHz and 1.575GHz) with low attenuation.
- Surge arrestors must support DC-pass and suitable for the GNSS frequency range as per the constellation used with low attenuation.
- For optimal performance, the Cisco 8000-TIC-GNSS requires a GNSS antenna with built-in Low-Noise Amplifier (LNA). The antenna LNA amplifies the received satellite signals for the following two purposes:
  - Compensation of losses on the cable.
  - Lifting the signal amplitude to the suitable range for the receiver frontend.

  The amplification required is 22dB gain + cable/connector loss + Splitter signal loss.

  The recommended range of LNA gain (- cable/connector loss) is 22–30dB with a minimum of 20dB and a maximum of 35dB, at the connector of the receiver module.

Antenna Sky Visibility

- The Cisco 8000-TIC-GNSS provides 5V to the active antenna through the same RF input.
- The Cisco 8000-TIC-GNSS signals can only be received on a direct line of sight between antenna and satellite. The antenna must have a clear view of the sky. For proper timing, minimum of four satellites should be locked.

Note The antenna terminal should be earthed at the building entrance in accordance with the ANSI/NFPA 70, the National Electrical Code (NEC), in particular Section 820.93, Grounding of Outer Conductive Shield of a Coaxial Cable.

- Use a passive splitter if more than one Timing Interfaces Card with GNSS module is fed from a single antenna.

Note The splitter should have at least one RF port capable of DC-pass, and an antenna should be connected to that port, if the antenna needs to feed power from 8000-TIC-GNSS.

External Alarm Inputs

The router supports four dry contact alarm inputs through an RJ45 jack at the back panel.

The alarm condition is normally open, which indicates that no current flows through the alarm circuit, and the alarm is generated when the current is flowing. Each alarm input can be provisioned as being critical, major, or minor.

USB console

USB console is a single USB 2.0 Type-A receptacle on the front panel of the router that:

- provides console access to Uboot flash for Cisco software and diagnostics
- uses the Type-A connector
- operates as a USB peripheral only to connect to an external host computer, and
- uses a Type-A to Type-A connector instead of a standard USB cable.

Restrictions

- The USB console port and RS232 console port are mutually exclusive to each other.

RS232 Console

The RS232 console is a port in RJ45 form factor on the rear panel of the router. This console provides:

- transmission (Tx),
- reception (Rx), and

- ground (Gnd) information.

Online Insertion and Removal

The router supports these online insertion and removal (OIR) operations:

- When an SFP is removed from a port, there is no effect on the traffic flowing on other ports.
- When an SFP is installed on a port:
  - there is no effect on the traffic flowing on other ports.
  - the system initializes that port for operation based on the current configuration.
  - if the inserted SFP is incompatible with the current configuration of that port, the port becomes operational only after the configuration is updated.
- When both the AC and DC power supplies are installed and active:
  - the load may be shared between both the PSUs or a single PSU takes the entire load.
  - when one power supply is not working or the input cable is removed, the other power supply takes the entire load without disruption.
- Both the PSUs are field replaceable units. When one PSU is removed or installed, there is no functional impact to the router.

Supported Transceiver Modules

For more information on the supported transceiver modules, see Transceiver Module Group (TMG) Compatibility Matrix. In the **Begin your Search** search box, enter the keyword and click **Enter**.