Cisco Router Overview

The Cisco 8011-4G24Y4H-I Large Density Router is temperature-hardened, fixed port, one rack unit form-factor router. The router enables as a CSG (Cell Site Gateway) or pre-aggregation router.

This router is intended for indoor and outdoor applications. While installing in outdoor environment, we recommend you to have an IP65 sealed cabinet with heat exchanger complying with Telcordia GR487. For more information on cabinet selection, see Cabinet Selection Guidelines.

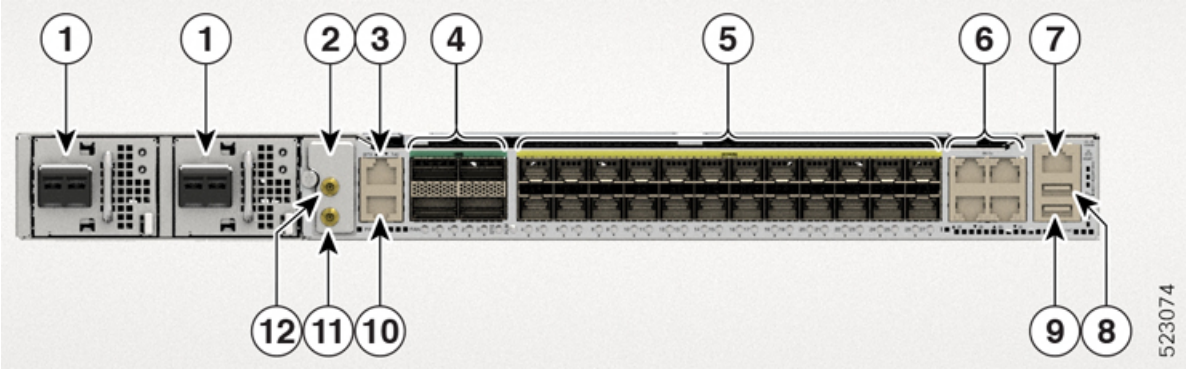
For more information about the router features and benefits, see the *Cisco 8010 Series Large Density Fixed Routers Datassheet*.

Temperature and Physical Specification

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

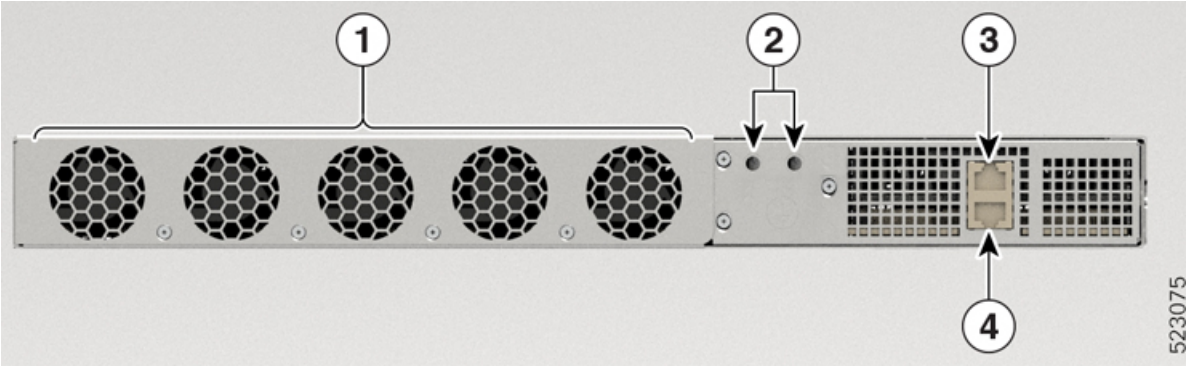
Cisco 8010 Series Routers

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-Timing Interfaces Card (by default) or 8000-Timing Interfaces Card-GNSS (optional)
3	BITS port	4	100G QSFP28 ports
5	1/10/25G SFP28 ports	6	Copper ports
7	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



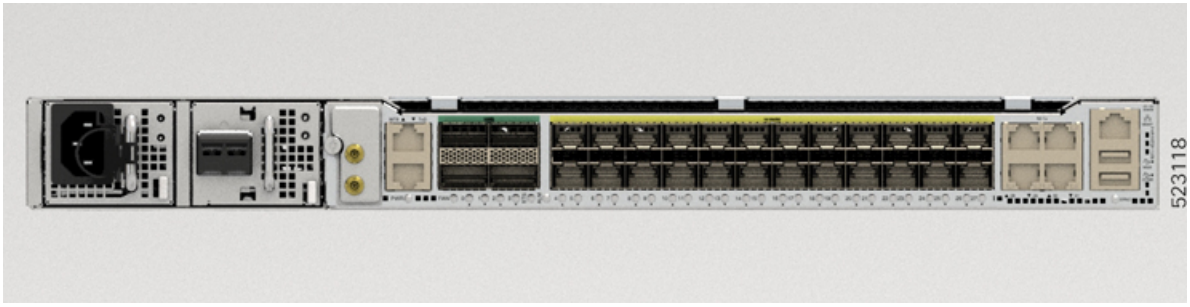
1	Fixed Fan Modules	2	Grounding Lug Holes
3	Alarm port	4	RS232 Console port

Network Interfaces

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

- 4 x 1G Copper ports
- 24 x 1/10/25G SFP28 ports
- 4 x 100G QSFP28 ports

Figure 3: Cisco 8011-4G24Y4H-I Router



Note The ports are color coded in the chassis for ease of identification; for example, the 100G QSFP28 ports are in green, and the 1/10/25G SFP28 ports are in yellow.

Interface Naming

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

Table 1: Port Numbering

100G QSFP28 ports	**1/10/25G SFP28 ports**	**1G Copper ports** **10/100/1000**
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 Copper**— 0/0/0/28 to 0/0/0/31

Port Speed on 100G Ports

The 100G ports (0-3) support:

- 4 x 10G QSFP28 Ports
- 4 x 25G QSFP28 Ports
- 40G QSFP Ports

Network Timing Interfaces with GNSS

Note The router supports the following 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 8000-TIC. As an option, you can choose the 8000-TIC-GNSS, while ordering the router.

Note

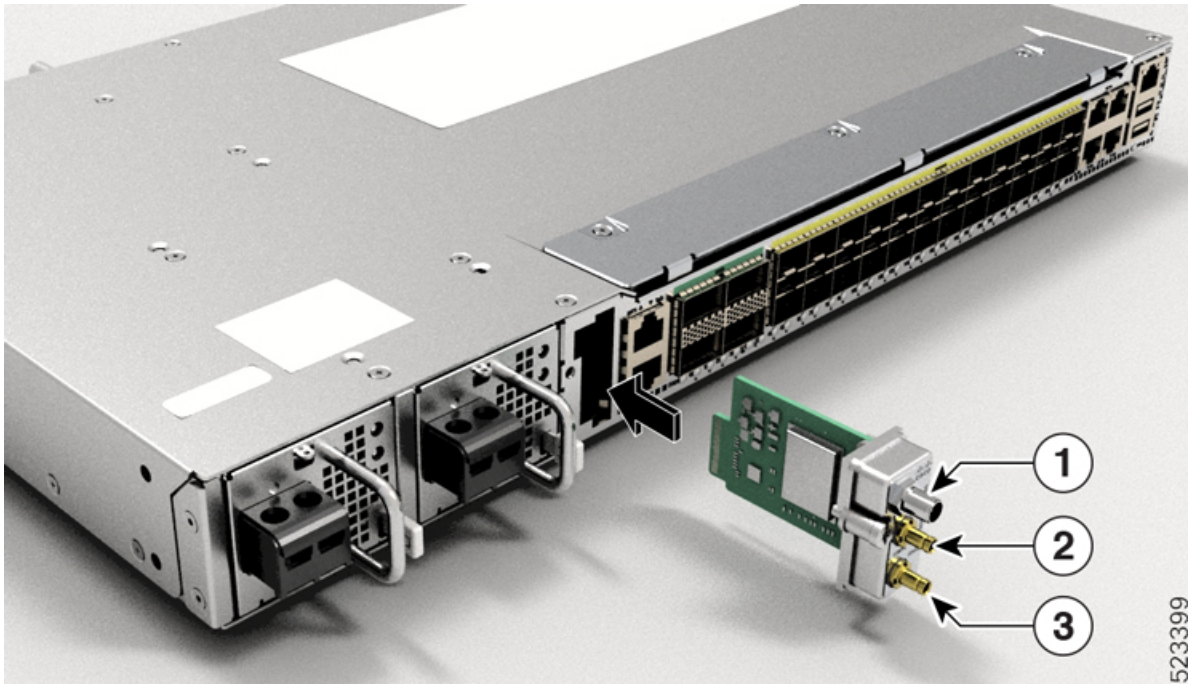
- The TIC is modular, but you must insert a TIC module for the router to work.
- Online Insertion and Removal (OIR) of a TIC module isn't supported when the router is operational.

- 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 can be 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.

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

Timing Interfaces Card with GNSS module has an in-built ESD protection on all pins, including the RF-input pin. However, extra surge protection is required if an outdoor antenna is to be connected.

Figure 4: Ports on Timing Interfaces Card with GNSS (8000-TIC-GNSS) Module



1	GNSS port
2	10Mhz port
3	1PPS port

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 arrestor must support DC-pass and suitable for the GNSS frequency range (1.575GHz) with low attenuation.

Timing Interfaces Card with GNSS Module RF Input Requirements

Table 2: Timing Interfaces Card with GNSS Connectors

Category	GNSS RF Input
Connector Type	RF SMA Jack
Impedance	50 ohms
Band	Multi band - L1/L2

Category	GNSS RF Input
Accuracy	PRTC-B

- For optimal performance, the Timing Interfaces Card with GNSS module 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.

- Timing Interfaces Card with GNSS module provides 5V to the active antenna through the same RF input.
- Surge requirement:
  - Timing Interfaces Card with GNSS modules have built-in ESD protections on all pins, including the RF-input pin. However, 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.
  - 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 (1.575GHz) with low attenuation.

- Antenna Sky visibility:
  - Timing Interfaces Card with 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.

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 3: 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's no standardized requirement for holdover, it's up to the 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.

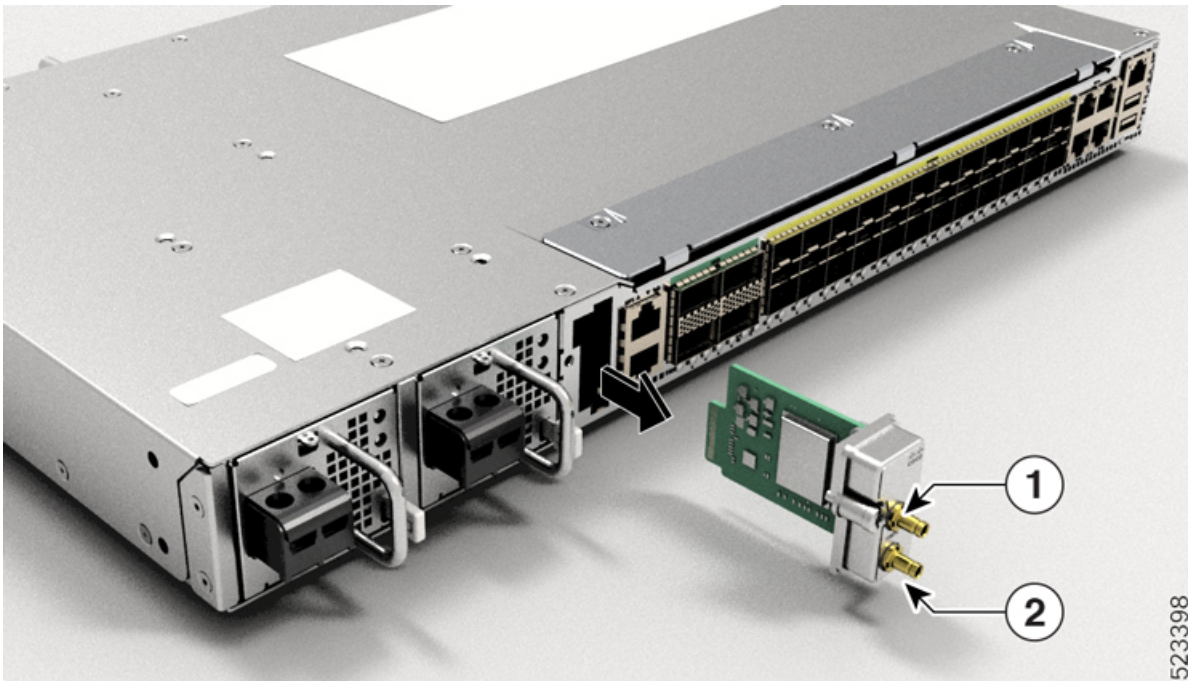
Table 4: Bands on PRTC-A versus PRTC-B

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)
Ionospheric delay model	Basic	Advanced
Antenna	Single band (L1/E1)	Dual band (L1/E1, L2)
Constellation	GPS, Galileo, other	GPS, Galileo, other

Timing Interfaces Card (8000-TIC)

The timing ports with 1PPS and 10Mhz ports are provided as a pluggable module and is DIN 1.0/2.3 jack connector compliant to DIN 41626 specifications.

Figure 5: Ports on Timing Interfaces Card (8000-TIC) Module



1	10Mhz port
2	1PPS port

Timing Interfaces Card Ports Specification

Table 5: 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 (>) 2.4 volts TTL compatible Output—Greater than (>) 2.4 volts TTL compatible
Impedance	50 ohms	50 ohms
Pulse Width	50% duty cycle	100 microseconds

Category	10MHz (Input)	1PPS (Input and Output)
Rise Time	Input—AC coupled Output—5 nanoseconds	Output—5 nanoseconds

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

A single USB 2.0 Type-A receptacle on the front panel of the router provides console access to Uboot flash for Cisco software and diagnostics. While it uses the Type-A connector, it operates as a USB peripheral only for connection to an external host computer. This interface requires the use of a Type-A to Type-A connector instead of a standard USB cable.

Note

- Use of the USB console is mutually exclusive of the RS232 console port.
- This interface requires the use of a Type-A to Type-A USB cable.
- If you insert the USB cable and connect to the host computer, then you can only enter the commands using the USB.

RS232 Console

The RS232 console port in RJ45 form factor on the rear panel of the router provides, transmission (Tx), reception (Rx), and ground (Gnd) information.

Online Insertion and Removal

The router supports the following Online Insertion and Removal (OIR) operations:

- When an SFP is removed, there’s no effect on traffic flowing on other ports.
- When an SFP is installed, there’s no effect on 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 doesn’t become operational until the configuration is updated.

- When both power supplies are installed and active, the load may be shared between them, or a single PSU supports the whole load. When a power supply isn't working or the input cable is removed, the remaining power supply takes the entire load without disruption.
- Both the PSUs are field replaceable units and when one PSU is removed or installed there's 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**.