



Overview

This chapter provides an overview of the Cisco ASR 9000 Series Routers Ethernet line cards and includes these sections:

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Ethernet Line Cards and MPAs

The following tables list the Cisco ASR 9000 Series Ethernet line cards and MPAs (Modular Port Adapters) and their corresponding Cisco product identification numbers (PIDs), organized by generation.



Note RS-FEC are a group of error-correcting codes that are used in mass storage systems to correct the burst errors associated with media defects. All line cards and MPAs that support OTN mode support RS-FEC. In the LAN mode, by default, SR4, CWDM4, and PSM4 optics are enabled with RS-FEC (in accordance to the IEEE Standard).

Table 1: Cisco ASR 9000 Series Ethernet Line Cards: 1st Generation

Ethernet Line Card	Cisco Product Number
2-Port 10GE + 20-Port GE Combination Line Card	A9K-2T20GE-B
2-Port 10GE + 20-Port GE Extended Combination Line Card	A9K-2T20GE-E
2-Port 10GE + 20-Port GE Low Queue Combination Line Card with XFP and SFP	A9K-2T20GE-L
4-Port 10GE Line Card with XFP	A9K-4T-B

Ethernet Line Card	Cisco Product Number
4-Port 10GE Extended Line Card with XFP	A9K-4T-E
4-Port 10GE Low Queue Line Card with XFP	A9K-4T-L
8-Port 10GE DX Low Queue Line Card with XFP	A9K-8T/4-L
8-Port 10GE DX Line Card with XFP	A9K-8T/4-B
8-Port 10GE DX Extended Line Card with XFP	A9K-8T/4-E
8-Port 10GE Line Rate Card with XFP	A9K-8T-B
8-Port 10GE Extended Line Rate Card with XFP	A9K-8T-E
8-port 10GE 80G Low Queue Line Rate Card with XFP	A9K-8T-L
40-Port GE Line Card with SFP	A9K-40GE-B
40-Port GE Extended Line Card with SFP	A9K-40GE-E
40-Port GE Low Queue Line Card with SFP	A9K-40GE-L

Table 2: Cisco ASR 9000 Series Ethernet Line Cards: 2nd Generation

Ethernet Line Card	Cisco Product Number
1-Port 100GE DX Line Card, Service Edge Optimized with CFP	A9K-1X100GE-SE
1-Port 100GE DX Line Card, Packet Transport Optimized with CFP	A9K-1X100GE-TR
4-Port 10GE + 16-Port GE Combination Line Card, Packet Transport Optimized, with SFP and SFP+	A9K-4T16GE-TR
4-Port 10GE + 16-Port GE Extended Combination Line Card, Service Edge Optimized, with SFP and SFP+	A9K-4T16GE-SE
24-Port 10GE DX Line Card, Packet Transport Optimized with SFP+	A9K-24X10GE-TR
24-Port 10GE Line Card, Service Edge Optimized with SFP+	A9K-24X10GE-SE
36-Port 10GE Line Card, Packet Transport Optimized with SFP+	A9K-36X10GE-TR
36-Port 10GE Line Card, Service Edge Optimized with SFP+	A9K-36X10GE-SE
40-Port GE Line Card, Packet Transport Optimized with SFP	A9K-40GE-TR
40-Port GE Line Card, Service Edge Optimized with SFP	A9K-40GE-SE
2-Port 100GE DX Line Card, Packet Transport Optimized with CFP	A9K-2X100GE-TR
2-Port 100GE DX Line Card, Service Edge Optimized with CFP	A9K-2X100GE-SE

Ethernet Line Card	Cisco Product Number
1-Port 40GE Modular Port Adapter (MPA), with QSFP+	A9K-MPA-1X40GE
2-port 40GE Modular Port Adapter (MPA), with QSFP+	A9K-MPA-2X40GE
2-port 10GE Modular Port Adapter (MPA) with XFP	A9K-MPA-2X10GE
4-Port 10GE Modular Port Adapter (MPA) with XFP	A9K-MPA-4X10GE
8-port 10GE Modular Port Adapter (MPA) with SFP+	A9K-MPA-8X10GE
20-Port GE Modular Port Adapter (MPA) with SFP	A9K-MPA-20X1GE
80 Gigabyte Modular Line Card, Packet Transport Optimized	A9K-MOD80-TR
80 Gigabyte Modular Line Card, Service Edge Optimized	A9K-MOD80-SE
160 Gigabyte Modular Line Card, Packet Transport Optimized	A9K-MOD160-TR
160 Gigabyte Modular Line Card, Service Edge Optimized	A9K-MOD160-SE

Table 3: Cisco ASR 9000 Series Ethernet Line Cards: 3rd Generation

Ethernet Line Card	Cisco Product Number
24-Port 10GE/1GE Line Card, Packet Transport Optimized with SFP+ or SFP	A9K-24X10GE-1G-TR
24-Port 10GE/1GE Line Card, Service Edge Optimized with SFP+ or SFP	A9K-24X10GE-1G-SE
24-Port 10GE/1GE Line Card, Consumption Model with SFP+ or SFP	A9K-24X10GE-1G-CM
48-Port 10GE/1GE Line Card, Packet Transport Optimized with SFP+ or SFP	A9K-48X10GE-1G-TR
48-Port 10GE/1GE Line Card, Service Edge Optimized with SFP+ or SFP	A9K-48X10GE-1G-SE
48-Port 10GE/1GE Line Card, Consumption Model with SFP+ or SFP	A9K-48X10GE-1G-CM
4-Port 100GE Ethernet Line Card, Packet Transport Optimized with CPAK	A9K-4X100GE-TR
4-Port 100GE Ethernet Line Card, Service Edge Optimized with CPAK	A9K-4X100GE-SE
8-Port 100GE Line Card, Packet Transport Optimized with CPAK	A9K-8X100GE-TR
8-Port 100GE Line Card, Service Edge Optimized with CPAK	A9K-8X100GE-SE
8-Port 100GE Line Card, Consumption Model Optimized with CPAK	A9K-8X100GE-CM
8-Port 100GE Line Card, Service Edge Optimized, with CPAK (LAN version)	A9K-8X100G-LB-SE
8-Port 100GE Line Card, Transport Optimized, with CPAK (LAN version)	A9K-8X100G-LB-TR
4-Port 100GE Line Card, with QSFP28	A9K-4X100GE

Ethernet Line Card	Cisco Product Number
2-Port 100G + 20-Port 10 GE Combination IPoDWDM Line Card with CFP2 and SFP+, Packet Transport Optimized	A9K-400GE-DWDM-TR
20-Port 10-Gigabit Ethernet Modular Port Adapter (MPA) with SFP+	A9K-MPA-20x10GE
20-Port 10-Gigabit Ethernet Modular Port Adapter (MPA) - Consumption Model	A9K-MPA-20x10GE-CM
1-Port 100GE Modular Port Adapter (MPA)	A9K-MPA-1x100GE
1-Port 200GE Modular Port Adapter (MPA)	A9K-MPA-1X200GE
2-Port 100GE Modular Port Adapter (MPA)	A9K-MPA-2x100GE
2-Port 100GE Modular Port Adapter (MPA) - Consumption Model	A9K-MPA-2x100GE-CM
32-port GE Modular Port Adapter (MPA) with MACsec	A9K-MPA-32X1GE
200 Gigabyte Modular Line Card, Packet Transport Optimized	A9K-MOD200-TR
200 Gigabyte Modular Line Card, Service Edge Optimized	A9K-MOD200-SE
400 Gigabyte Modular Line Card, Packet Transport Optimized	A9K-MOD400-TR
400 Gigabyte Modular Line Card, Service Edge Optimized	A9K-MOD400-SE
400 Gigabyte Modular Line Card, Consumption Model Optimized	A9K-MOD400-CM

Table 4: Cisco ASR 9900 Series Ethernet Line Cards: 3rd Generation

Ethernet Line Card	Cisco Product Number
8-Port 100GE Line Card, Transport Optimized with CPAK	A99-8X100GE-TR
8-Port 100GE Line Card, Service Edge Optimized with CPAK	A99-8X100GE-SE
8-Port 100GE Line Card, Consumption Model with CPAK	A99-8X100GE-CM
12-Port 100GE Line Card, with QSFP28	A99-12X100GE
12-Port 100GE Line Card, Consumption Model with QSFP28	A99-12X100GE-CM
7 Fabric 48-Port Dual-Rate 10GE/1GE Line Card, Service Edge Optimized	A99-48X10GE-1G-SE
7 Fabric 48-Port Dual-Rate 10GE/1GE Line Card, Transport Optimized	A99-48X10GE-1G-TR

Table 5: Cisco ASR 9000 Series Ethernet Line Cards: 4th Generation

Ethernet Line Card	Cisco Product Number
16-port 100GE Line Card, Transport Optimized with QSFP28/QSFP+	A9K-16X100GE-TR
16-port 100GE Line Card, Consumption Model with QSFP28/QSFP+	A9K-16X100GE-CM
16-port 100GE Line Card, Service Edge Optimized with QSFP28/QSFP+	A99-16X100GE-X-SE

Table 6: Cisco ASR 9900 Series Ethernet Line Cards: 4th Generation

Ethernet Line Card	Cisco Product Number
32-port 100GE Line Card, Transport Optimized with QSFP28/QSFP+	A99-32X100GE-TR
32-port 100GE Line Card, Consumption Model with QSFP28	A99-32X100GE-CM

Table 7: Cisco ASR 9000 Series Ethernet Line Cards: 5th Generation

Ethernet Line Card	Cisco Product Number
2T Combo Line Card, Service Edge Optimized	A9K-20HG-FLEX-SE
2T Combo Line Card, Transport Optimized	A9K-20HG-FLEX-TR
800G Combo Line Card, Service Edge Optimized	A9K-8HG-FLEX-SE
800G Combo Line Card, Transport Optimized	A9K-8HG-FLEX-TR
400G Combo Line Card, Service Edge Optimized	A9K-4HG-FLEX-SE
400G Combo Line Card, Transport Optimized	A9K-4HG-FLEX-TR

Table 8: Cisco ASR 9900 Series Ethernet Line Cards: 5th Generation

Ethernet Line Card	Cisco Product Number
32-port 100GE Line Card with QSFP28/QSFP+, Service Edge Optimized	A99-32X100GE-X-SE
32-port 100GE Line Card with QSFP28/QSFP+, Transport Optimized	A99-32X100GE-X-TR
10-port 400GE Line Card with QSFP-DD, Service Edge Optimized	A99-10X400GE-X-SE
10-port 400GE Line Card with QSFP-DD, Transport Optimized	A99-10X400GE-X-TR

Ethernet Line Card	Cisco Product Number
400G Combo Line Card, Service Edge Optimized	A99-4HG-FLEX-SE
400G Combo Line Card, Transport Optimized	A99-4HG-FLEX-TR

The following table lists the Cisco ASR 9000 chassis and the supported Ethernet line cards and MPAs .

Table 9: Cisco ASR 9000 Chassis and Ethernet Line Card Compatibility

Chassis	Ethernet Line Card
Cisco ASR 9006, Cisco ASR 9010 Note Support for 3rd generation and later line cards requires v2 fan trays (ASR-9006-FAN-V2 or ASR-9010-FAN-V2)	<ul style="list-style-type: none"> • Table 1: Cisco ASR 9000 Series Ethernet Line Cards: 1st Generation • Table 2: Cisco ASR 9000 Series Ethernet Line Cards: 2nd Generation • Table 3: Cisco ASR 9000 Series Ethernet Line Cards: 3rd Generation • Table 5: Cisco ASR 9000 Series Ethernet Line Cards: 4th Generation, on page 5 • Table 7: Cisco ASR 9000 Series Ethernet Line Cards: 5th Generation, on page 5
Cisco ASR 9904, Cisco ASR 9910, Cisco ASR 9912, and Cisco ASR 9922	<ul style="list-style-type: none"> • Table 2: Cisco ASR 9000 Series Ethernet Line Cards: 2nd Generation • Table 3: Cisco ASR 9000 Series Ethernet Line Cards: 3rd Generation • Table 4: Cisco ASR 9900 Series Ethernet Line Cards: 3rd Generation • Table 5: Cisco ASR 9000 Series Ethernet Line Cards: 4th Generation, on page 5 • Table 6: Cisco ASR 9900 Series Ethernet Line Cards: 4th Generation, on page 5 • Table 8: Cisco ASR 9900 Series Ethernet Line Cards: 5th Generation, on page 5

Chassis	Ethernet Line Card
Cisco ASR 9906	<ul style="list-style-type: none"> • Table 3: Cisco ASR 9000 Series Ethernet Line Cards: 3rd Generation • Table 4: Cisco ASR 9900 Series Ethernet Line Cards: 3rd Generation • Table 5: Cisco ASR 9000 Series Ethernet Line Cards: 4th Generation, on page 5 • Table 6: Cisco ASR 9900 Series Ethernet Line Cards: 4th Generation, on page 5 • Table 8: Cisco ASR 9900 Series Ethernet Line Cards: 5th Generation, on page 5

Cisco ASR 9000 Series Routers line cards do not support voltage monitoring. Hence, no alarm is raised when voltage thresholds are crossed.

Cisco IOS XR Software Release and Hardware Revision Requirements

The Cisco ASR 9000 Series Ethernet line cards and MPAs have specific Cisco IOS XR software requirements. To ensure compatibility with the software, each line card or MPA has a specific hardware revision number. The number is printed on a label affixed to the component side of the card or MPA and is displayed by the **show diag** command. The following table lists the hardware and software requirements for the line cards.

Table 10: Cisco ASR 9000 Series Ethernet Line Card and MPA

Ethernet Line Card	Product Number	Minimum IOS XR Software Release	Initial Support on IOS XR 64-bit Release	Required Hardware Version
40-Port GE Line Card	A9K-40GE-B	3.7.2	Unsupported	1.0
40-Port GE Extended Line Card	A9K-40GE-E	3.7.2	Unsupported	1.0
40-Port GE Low Queue Line Card	A9K-40GE-L	3.9.0	Unsupported	1.0
8-Port 10GE DX Line Card	A9K-8T/4-B	3.7.2	Unsupported	1.0
8-Port 10GE DX Extended Line Card	A9K-8T/4-E	3.7.2	Unsupported	1.0
8-Port 10GE DX Low Queue Line Card	A9K-8T/4-L	3.9.0	Unsupported	1.0
4-Port 10GE Line Card	A9K-4T-B	3.7.2	Unsupported	1.0
4-Port 10GE Extended Line Card	A9K-4T-E	3.7.2	Unsupported	1.0
4-Port 10GE Low Queue Line Card	A9K-4T-L	3.9.0	Unsupported	1.0

Ethernet Line Card	Product Number	Minimum IOS XR Software Release	Initial Support on IOS XR 64-bit Release	Required Hardware Version
8-Port 10GE Line Rate Card	A9K-8T-B	3.9.1	Unsupported	1.0
8-Port 10GE Extended Line Rate Card	A9K-8T-E	3.9.0	Unsupported	1.0
8-port 10GE 80G Low Queue Line Rate Card	A9K-8T-L	3.9.0	Unsupported	1.0
2-Port 10GE + 20-Port GE Combination Line Card	A9K-2T20GE-B	3.9.0	Unsupported	1.0
2-Port 10GE + 20-Port GE Extended Combination Line Card	A9K-2T20GE-E	3.9.0	Unsupported	1.0
2-Port 10GE + 20-Port GE Low Queue Combination Line Card	A9K-2T20GE-L	3.9.1	Unsupported	1.0
16-Port 10GE DX Medium Queue Line Card	A9K-16T/8-B	3.9.1	Unsupported	1.0
24-Port 10GE DX Line Card, Packet Transport Optimized	A9K-24X10GE-TR	4.2.0	Unsupported	1.0
24-Port 10GE DX Line Card, Service Edge Optimized	A9K-24X10GE-SE	4.2.0	Unsupported	1.0
2-Port 100GE DX Line Card, Packet Transport Optimized	A9K-2X100GE-TR	4.2.0	Unsupported	1.0
2-Port 100GE DX Line Card, Service Edge Optimized	A9K-2X100GE-SE	4.2.0	Unsupported	1.0
80 Gigabyte Modular Line Card, Packet Transport Optimized	A9K-MOD80G-TR	4.2.0	Unsupported	1.0
80 Gigabyte Modular Line Card, Service Edge Optimized	A9K-MOD80G-SE	4.2.0	Unsupported	1.0
160 Gigabyte Modular Line Card, Packet Transport Optimized	A9K-MOD160G-TR	4.2.0	Unsupported	1.0
160 Gigabyte Modular Line Card, Service Edge Optimized	A9K-MOD160G-SE	4.2.0	Unsupported	1.0
20-Port GE Modular Port Adapter (MPA)	A9K-MPA-20X1GE	4.2.0	6.2.1	1.0
2-port 10GE Modular Port Adapter (MPA)	A9K-MPA-2X10GE	4.2.0	6.3.2	1.0
4-Port 10GE Modular Port Adapter (MPA)	A9K-MPA-4X10GE	4.2.0	6.2.1	1.0
1-Port 100GE Modular Port Adapter (MPA)	A9K-MPA-1X100GE	6.0.1	6.3.1	1.0 3.0—required for CFP2-DCO digital optics

Ethernet Line Card	Product Number	Minimum IOS XR Software Release	Initial Support on IOS XR 64-bit Release	Required Hardware Version
2-Port 100GE Modular Port Adapter (MPA)	A9K-MPA-2X100GE	6.0.1	6.2.2	1.0 4.0—required for CFP2-DCO digital optics
2-Port 100GE Modular Port Adapter (MPA), Consumption Model	A9K-MPA-2X100GECM	6.1.2	Unsupported	1.0 2.0—required for CFP2-DCO digital optics
32-Port GE Modular Port Adapter (MPA)	A9K-MPA-32X1GE	6.6.1	6.6.1	1.0
160 Gigabyte Modular Line Card, Packet Transport Optimized	A9K-MOD160G-TR	4.2.1	Unsupported	1.0
160 Gigabyte Modular Line Card, Service Edge Optimized	A9K-MOD160G-SE	4.2.1	Unsupported	1.0
2-port 40GE Modular Port Adapter (MPA)	A9K-MPA-2X40GE	4.2.1	6.3.1	1.0
36-Port 10GE Line Card, Packet Transport Optimized	A9K-36X10GE-TR	4.2.2 4.2.2 is the hardware release. The CCO release is 4.2.3.	Unsupported	1.0
36-Port 10GE Line Card, Service Edge Optimized	A9K-36X10GE-SE	4.2.2	Unsupported	1.0
1-Port 100GE DX Line Card, Packet Transport Optimized	A9K-1X100GE-TR	4.2.2	Unsupported	1.0
1-Port 100GE DX Line Card, Service Edge Optimized	A9K-1X100GE-SE	4.2.2	Unsupported	1.0
2-Port 10GE Modular Port Adapter (MPA)	A9K-EP-2T	4.2.0	Unsupported	1.0
1-Port 40GE Modular Port Adapter (MPA)	A9K-MPA-1X40GE	4.2.3	6.3.1	1.0
8-port 10GE Modular Port Adapter (MPA)	A9K-MPA-8X10GE	4.3.1	6.3.2	1.0
40-Port GE Line Card, Packet Transport Optimized	A9K-40GE-TR	5.2.2	Unsupported	1.0
40-Port GE Line Card, Service Edge Optimized	A9K-40GE-SE	5.2.2	Unsupported	1.0
4-Port 10GE + 16-Port GE Combination Line Card, Packet Transport Optimized	A9K-4T16GE-TR	5.3.0	Unsupported	1.0
4-Port 10GE + 16-Port GE Extended Combination Line Card, Service Edge Optimized	A9K-4T16GE-SE	5.3.0	Unsupported	1.0

Ethernet Line Card	Product Number	Minimum IOS XR Software Release	Initial Support on IOS XR 64-bit Release	Required Hardware Version
8-Port 100GE Line Card, Service Edge Optimized	A9K-8X100GE-L-SE	5.3.0	6.1.2	1.0
8-Port 100GE Line Card, Consumption Model	A99-8X100GE-CM	6.1.1	6.1.2	1.0
8-Port 100GE Line Card, Packet Transport optimized	A99-8X100GE-TR	6.1.1	6.1.2	1.0
8-Port 100GE Line Card, Service Edge optimized	A99-8X100GE-SE	6.1.1	6.1.2	1.0
4-Port 100GE Line Card, Packet Transport Optimized	A9K-4X100GE-TR	5.3.1	6.1.2	1.0
4-Port 100GE Line Card, Service Edge Optimized	A9K-4X100GE-SE	5.3.1	6.1.2	1.0
8-Port 100GE Line Card, Packet Transport Optimized	A9K-8X100GE-TR	5.3.1	6.1.2	1.0
8-Port 100GE Line Card, Service Edge Optimized	A9K-8X100GE-SE	5.3.1	6.1.2	1.0
8-Port 100GE Line Card, Consumption Model Optimized	A9K-8X100GE-CM	5.3.2	6.1.2	1.0
4-Port 100GE Line Card	A9K-4X100GE	6.2.3 6.3.2	6.4.1	1.0
12-Port 100GE Line Card	A99-12X100GE	6.0.1	6.1.2	1.0
12-Port 100GE Line Card, Consumption Model	A99-12X100GE-CM	6.1.1	6.1.2	1.0
400 Gigabyte Modular Line Card, Packet Transport Optimized	A9K-MOD400-TR	5.3.2	6.2.1	1.0
400 Gigabyte Modular Line Card, Service Edge Optimized	A9K-MOD400-SE	5.3.2	6.2.1	1.0
400 Gigabyte Modular Line Card, Consumption Model Optimized	A9K-MOD400-CM	6.1.1	6.2.1	1.0
200 Gigabyte Modular Line Card, Packet Transport Optimized	A9K-MOD200-TR	6.0.1	6.2.1	1.0
200 Gigabyte Modular Line Card, Service Edge Optimized	A9K-MOD200-SE	6.0.1	6.2.1	1.0
2-Port 100G + 20-Port 10 GE Combination IPoDWDM Line Card with CFP2 and SFP+, Packet Transport Optimized	A9K-40GE10GE-IPoDWDM-TR	5.3.2	6.2.1	1.0
20-Port 10-Gigabit Ethernet Modular Port Adapter (MPA) with SFP+	A9K-MPA-20x10GE	5.3.2	6.2.1	1.0
24-Port 10GE/1GE Line Card, Packet Transport Optimized	A9K-24X10GE-1G-TR	6.2.1	6.3.2	1.0

Ethernet Line Card	Product Number	Minimum IOS XR Software Release	Initial Support on IOS XR 64-bit Release	Required Hardware Version
24-Port 10GE/1GE Line Card, Service Edge Optimized	A9K-24X10GE-1G-SE	6.2.1	6.3.2	1.0
24-Port 10GE/1GE Line Card, Service Edge Optimized	A9K-24X10GE-1G-CM	6.3.2	6.4.1	1.0
48-Port 10GE/1GE Line Card, Packet Transport Optimized	A9K-48X10GE-1G-TR	6.2.1	6.3.2	1.0
48-Port 10GE/1GE Line Card, Service Edge Optimized	A9K-48X10GE-1G-SE	6.2.1	6.3.2	1.0
48-Port 10GE/1GE Line Card, Service Edge Optimized	A9K-48X10GE-1G-CM	6.3.2	6.4.1	1.0
7 Fabric 48-Port Dual-Rate 10GE/1GE Line Card, Service Edge Optimized	A99-48X10GE-1G-SE	6.5.2	6.5.2	1.0
7 Fabric 48-Port Dual-Rate 10GE/1GE Line Card, Transport Optimized	A99-48X10GE-1G-TR	6.5.2	6.5.2	1.0
1-Port 200GE Modular Port Adapter (MPA) Note <ul style="list-style-type: none"> • This MPA supports only CFP2-DCO optics. • Only Version 2.0 of the MPA is NEBS compliant. 	A9K-MPA-1X200GE	6.6.2	Unsupported	1.0 and 2.0
400G Combo Line Card, Transport Optimized	A9K-4HG-FLEX-TR	7.4.1	7.4.1	1.0
400G Combo Line Card, Service Edge Optimized	A9K-4HG-FLEX-SE	7.4.1	7.4.1	1.0
400G Combo Line Card, Transport Optimized	A99-4HG-FLEX-TR	7.4.1	7.4.1	1.0
400G Combo Line Card, Service Edge Optimized	A99-4HG-FLEX-SE	7.4.1	7.4.1	1.0

The **show diag slot_number** and **show version** commands display the current hardware configuration of the router, including the system software version that is currently loaded and running. For complete descriptions of **show** commands, see the command reference or configuration guide for the installed Cisco IOS XR release.

If the command displays indicate that the Cisco IOS XR software is a version earlier than you need, check the contents of flash memory to determine if the required images are available on your system. The **dir devicename** command displays a list of all files stored in flash memory. If you do not have the correct software version, contact Cisco customer service.

For software configuration information, see the Cisco IOS software configuration and command reference publications for the installed Cisco IOS XR release. Also see the Cisco IOS XR software release notes for additional information.

The digitally signed images are supported from Cisco IOS XR release 6.0.1 on following line cards:

- A9K-4X100GE-SE/TR
- A99-8X100GE-SE/TR

- A9K-MOD400-SE/TR/CM
- A9K-MOD200-SE/TR/CM
- A9K-400G-DWDM-TR
- A99-12X100GE

For more information on digitally signed images, see *Cisco ASR 9000 Series Aggregation Services Router System Management Configuration Guide*.

Ethernet Line Card and MPA Comparison

The first generation Cisco ASR 9000 line cards are available in base, extended, and low-queue versions. All other generations of line cards are available in Transport and Service Edge versions. All versions are functionally equivalent, but vary in configuration scale and buffer capacity. The following table provides comparative information about the various line cards and MPAs. For detailed information about the various transceiver modules, see [Cisco Transceiver Modules](#) on Cisco.com.

For supported transceivers modules, refer to the Transceiver Module Group (TMG) Compatibility Matrix Tool:

<https://tmgmatrix.cisco.com/home>

Table 11: Cisco Ethernet Line Card or MPA Hardware Comparison

Cisco Series Ethernet Line Card or MPA	Product Number	Number of Ports	Module Type
2-Port 10GE + 20-Port GE Combination Line Card	A9K-2T20GE-B	2x10GE 20xGE	XFP (10GE ports) SFP (GE ports)
2-Port 10GE + 20-Port GE Extended Combination Line Card	A9K-2T20GE-E	2x10GE 20xGE	XFP (10GE ports) SFP (GE ports)
2-Port 10GE + 20-Port GE Low Queue Combination Line Card	A9K-2T20GE-L	2x10GE 20xGE	XFP (10GE ports) SFP (GE ports)
4-Port 10GE+16-Port GE Combination Line Card, Packet Transport Optimized	A9K-4T16GE-TR	4x10GE 16xGE	SFP+ (10GE ports) SFP (GE ports)
4-Port 10GE+ 16-Port GE Extended Combination Line Card, Service Edge Optimized	A9K-4T16GE-SE	4x10GE 16xGE	SFP+ (10GE ports) SFP (GE ports)
4-Port 10GE Line Card	A9K-4T-B	4	XFP
4-Port 10GE Extended Line Card	A9K-4T-E	4	XFP
4-Port 10GE Low Queue Line Card	A9K-4T-L	4	XFP
8-Port 10GE DX Line Card	A9K-8T/4-B	8	XFP
8-Port 10GE DX Extended Line Card	A9K-8T/4-E	8	XFP

Cisco Series Ethernet Line Card or MPA	Product Number	Number of Ports	Module Type
8-Port 10GE DX Low Queue Line Card	A9K-8T/4-L	8	XFP
8-Port 10GE Line Rate Card	A9K-8T-B	8	XFP
8-Port 10GE Extended Line Rate Card	A9K-8T-E	8	XFP
8-port 10GE 80G Low Queue Line Rate Card	A9K-8T-L	8	XFP
16-Port 10GE DX Medium Queue Line Card	A9K-16T/8-B	16	SFP+
24-Port 10GE DX Line Card, Packet Transport Optimized	A9K-24X10GE-TR	24	SFP+
24-Port 10GE DX Line Card, Service Edge Optimized	A9K-24X10GE-SE	24	SFP+
24-Port 10GE/1GE Line Card, Packet Transport Optimized Note The 24-Port 10GE/1GE Line Card accepts SFP and SFP+ modules.	A9K-24X10GE-1G-TR	24	SFP+ (10GE ports) SFP (GE ports)
24-Port 10GE/1GE Line Card, Service Edge Optimized Note The 24-Port 10GE/1GE Line Card accepts SFP and SFP+ modules.	A9K-24X10GE-1G-SE	24	SFP+ (10GE ports) SFP (GE ports)
24-Port 10GE/1GE Line Card, Consumption Model Note The 24-Port 10GE/1GE Line Card accepts SFP and SFP+ modules.	A9K-24X10GE-1G-CM	24	SFP+ (10GE ports) SFP (GE ports)
36-Port 10GE Line Card, Packet Transport Optimized	A9K-36X10GE-TR	36	SFP+
36-Port 10GE Line Card, Service Edge Optimized	A9K-36X10GE-SE	36	SFP+
40-Port GE Line Card	A9K-40GE-B	40	SFP
40-Port GE Extended Line Card	A9K-40GE-E	40	SFP
40-Port GE Low Queue Line Card	A9K-40GE-L	40	SFP
40-Port GE Line Card, Packet Transport Optimized	A9K-40GE-TR	40	SFP
40-Port GE Line Card, Service Edge Optimized	A9K-40GE-SE	40	SFP
48-Port 10GE/1GE Line Card, Packet Transport Optimized Note The 48-Port 10GE/1GE Line Card accepts SFP and SFP+ modules.	A9K-48X10GE-1G-TR	48	SFP+ (10GE ports) SFP (GE ports)

Cisco Series Ethernet Line Card or MPA	Product Number	Number of Ports	Module Type
48-Port 10GE/1GE Line Card, Service Edge Optimized Note The 48-Port 10GE/1GE Line Card accepts SFP and SFP+ modules.	A9K-48X10GE-1G-SE	48	SFP+ (10GE ports) SFP (GE ports)
48-Port 10GE/1GE Line Card, Consumption Model Note The 48-Port 10GE/1GE Line Card accepts SFP and SFP+ modules.	A9K-48X10GE-1G-CM	48	SFP+ (10GE ports) SFP (GE ports)
1-Port 100GE DX Line Card, Packet Transport Optimized	A9K-1X100GE-TR	2	CFP
1-Port 100GE DX Line Card, Service Edge Optimized	A9K-1X100GE-SE	1	CFP
2-Port 100GE DX Line Card, Packet Transport Optimized	A9K-2X100GE-TR	2	CFP
2-Port 100GE DX Line Card, Service Edge Optimized	A9K-2X100GE-SE	2	CFP
2-Port 100GE DX Line Card, Service Edge Optimized	A9K-2X100GE-SE	2	CFP
4-Port 100GE Line Card, Packet Transport Optimized	A9K-4X100GE-TR	4	CPAK
4-Port 100GE Line Card, Service Edge Optimized	A9K-4X100GE-SE	4	CPAK
8-Port 100GE Line Card, Packet Transport Optimized	A9K-8X100GE-TR	8	CPAK
8-Port 100GE Line Card, Service Edge Optimized	A9K-8X100GE-SE	8	CPAK
8-Port 100GE Line Card, Consumption Model Optimized	A9K-8X100GE-CM	8	CPAK
8-Port 100GE Line Card, Service Edge Optimized (LAN version)	A9K-8X100GE-L-SE	8	CPAK
2-Port 100G + 20-Port 10 GE Combination IPoDWDM Line Card with CFP2 and SFP+, Packet Transport Optimized	A9K-400GE-DWDM-TR	2x100GE 20x10GE	CFP2(100GE ports) SFP+(10GE ports)
4-port 100 GE Line Card	A9K-4X100GE	4	QSFP28
12-port 100 GE Line Card	A99-12X100GE	12	QSFP28
80 Gigabyte Modular Line Card, Packet Transport Optimized	A9K-MOD80G-TR	—	—

Cisco Series Ethernet Line Card or MPA	Product Number	Number of Ports	Module Type
80 Gigabyte Modular Line Card, Service Edge Optimized	A9K-MOD80G-SE	—	—
160 Gigabyte Modular Line Card, Packet Transport Optimized	A9K-MOD160-TR	—	—
160 Gigabyte Modular Line Card, Service Edge Optimized	A9K-MOD160G-SE	—	—
200 Gigabyte Modular Line Card, Packet Transport Optimized	A9K-MOD200-TR	—	—
200 Gigabyte Modular Line Card, Service Edge Optimized	A9K-MOD200-SE	—	—
400 Gigabyte Modular Line Card, Packet Transport Optimized	A9K-MOD400-TR	—	—
400 Gigabyte Modular Line Card, Service Edge Optimized	A9K-MOD400-SE	—	—
400 Gigabyte Modular Line Card, Consumption Model Optimized	A9K-MOD400-CM	—	—
20-Port GE Modular Port Adapter (MPA)	A9K-MPA-20X1GE	20	SFP
32-Port GE Modular Port Adapter (MPA)	A9K-MPA-32X1GE	32	SFP, CSFP
8-Port 10GE Modular Port Adapter (MPA)	A9K-MPA-8X10GE	8	SFP+
4-Port 10GE Modular Port Adapter (MPA)	A9K-MPA-4X10GE	4	XFP
2-port 10GE Modular Port Adapter (MPA)	A9K-MPA-2X10GE	2	XFP
2-port 40GE Modular Port Adapter (MPA)	A9K-MPA-2X40GE	2	QSFP+
2-Port 10GE Modular Port Adapter (MPA)	A9K-EP-2T	2	XFP
1-Port 40GE Modular Port Adapter (MPA)	A9K-MPA-1X40GE	1	QSFP+
1-Port 100GE Modular Port Adapter (MPA)	A9K-MPA-1x100GE	1	CFP2-DCO and CPAK
1-Port 200GE Modular Port Adapter (MPA)	A9K-MPA-1X200GE	1	CFP2-DCO
2-Port 100GE Modular Port Adapter (MPA)	A9K-MPA-2x100GE	2	CFP2-DCO and CPAK
20-Port 10-Gigabit Ethernet Modular Port Adapter (MPA) with SFP+	A9K-MPA-20x10GE	20	SFP+
7 Fabric 48-Port Dual-Rate 10GE/1GE Line Card, Service Edge Optimized	A99-48X10GE-1G-SE	48	SFP+ (10GE ports) SFP (GE ports)
Note The 48-Port 10GE/1GE Line Card accepts SFP and SFP+ modules.			

Cisco Series Ethernet Line Card or MPA	Product Number	Number of Ports	Module Type
7 Fabric 48-Port Dual-Rate 10GE/1GE Line Card, Transport Optimized Note The 48-Port 10GE/1GE Line Card accepts SFP and SFP+ modules.	A99-48X10GE-1G-TR	48	SFP+ (10GE ports) SFP (GE ports)
400G Combo Line Card, Transport Optimized	A9K-4HG-FLEX-TR	44	<ul style="list-style-type: none"> • 24 ports of SFP+ • 16 ports of SPF28 • 4 ports of QSFP28/QSFP+ Note The line card has an aggregate bandwidth of 400Gb.
400G Combo Line Card, Service Edge Optimized	A9K-4HG-FLEX-SE		
400G Combo Line Card, Transport Optimized	A99-4HG-FLEX-TR		
400G Combo Line Card, Service Edge Optimized	A99-4HG-FLEX-SE		

**Caution**

Use only optical modules (SFP, SFP+, XFP, QSFP, CFP, and CPAK) supplied by Cisco Systems, Inc. in the Cisco ASR 9000 Series line cards. Each module contains an internal serial number that is security programmed by the module manufacturer with information that provides a way for the Cisco IOS XR software to identify and validate the module as qualified to operate with Ethernet line cards. Unapproved modules (those not purchased directly from Cisco) will work, but generate an error message stating that the device is unsupported.

**Note**

It is strongly recommended to wait for 60 seconds before successive insertion or removal of optics. Failure in following this recommendation may affect the functionality of the optics. This applies to all the various optics form factors such as SFP, SFP+, XFP, QSFP, QSFP28, CFP, CFP2 and CPAK.

**Note**

While inserting the QSFP, configure the port to the corresponding mode. For example, configure 1xFortyGigE mode for 40G optics and 4xTenGigE mode for 4x10G optics

If the ports are not configured to the appropriate mode and the optics are inserted in the default 100G mode, then an alarm is raised.

Therefore, for optics to function it is important for the corresponding operational mode to be configured.

10-Gigabit Ethernet Line Cards

**Note**

All Ethernet line cards have port Status LEDs on their front panels. Each SFP or XFP port has an adjacent LED to indicate the status of the associated port. In addition, each line card has a single tristate Status LED to display card status (see Line Card LEDs, page 134).

2-Port 10-Gigabit + 20-Port Gigabit Ethernet Combination Line Card with XFP

The 2-Port 10-Gigabit + 20-Port Gigabit Ethernet (GE) combination line card provides two cages for XFP Ethernet optical interface modules that operate at a rate of 10 Gbps, and 10 double-stacked cages (20 total) for SFP Ethernet optical modules that operate at a rate of 1 Gbps.

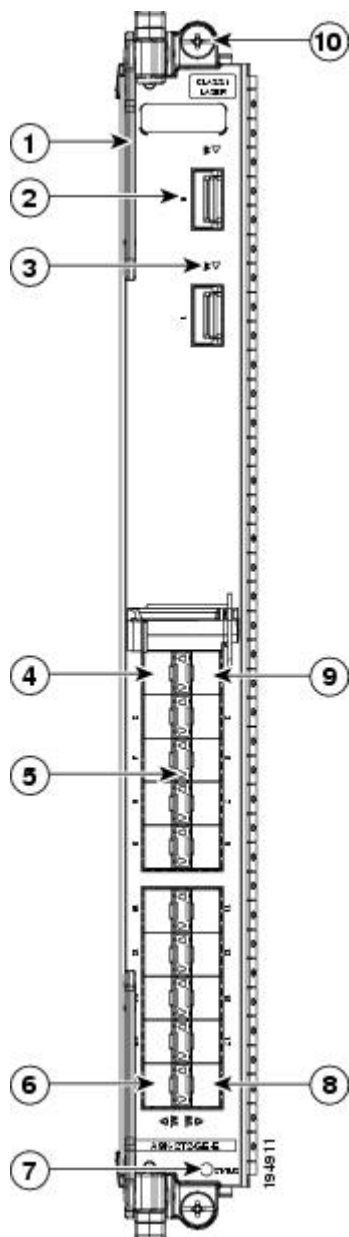
The two XFP modules can be 10GE multimode connections. The 20 SFP cages support either fiber-optic or copper Gigabit Ethernet transceivers.

The 2-Port 10GE + 20-Port GE combination line card is available in base, extended, and low-queue versions. All versions are functionally equivalent, but vary in configuration scale and buffer capacity.

Each XFP and SFP cage on the 2-Port 10GE + 20-Port GE combination line card has an adjacent Link LED visible on the front panel. The Link LED indicates the status of the associated XFP or SFP port, as described in [Line Card LEDs](#).

The following figure shows the 2-Port 10GE + 20-Port GE combination line card front panel and LEDs.

Figure 1: 2-Port 10-Gigabit + 20-Port GE Combination Line Card



1	Ejector lever (one of two)	6	1GE port 18 SFP cage
2	10GE port 0 XFP cage	7	Status LED
3	XFP port status LED (one per XFP port)	8	1GE port 19 SFP cage
4	1GE port 0 SFP cage	9	1GE port 1 SFP cage
5	SFP port status LED (one per SFP port)	10	Captive installation screw (one of two)



Note The interface numbering starts with zero for the GE and 10GE ports, so this line card has ports identified as Te0/x/0/0 and a Gig0/x/0/0.

For a list of the optics and connectors used by the two 10GE ports on the 2-Port 10GE + 20-Port GE combination line and for a list of all supported SFP modules, see <https://tmgmatrix.cisco.com/home>.

8-Port 10-Gigabit Ethernet 2:1 Oversubscribed Line Card with XFP

The 8-Port 10GE 2:1 oversubscribed line card provides eight cages for XFP Ethernet optical interface modules that operate at a rate of 10 Gbps. The eight XFP modules can be 10GE multimode connections. The 8-Port 10GE line card is a 40 Gbps line rate card with a maximum line rate of 8 ports at 50 percent (2:1 oversubscribed).

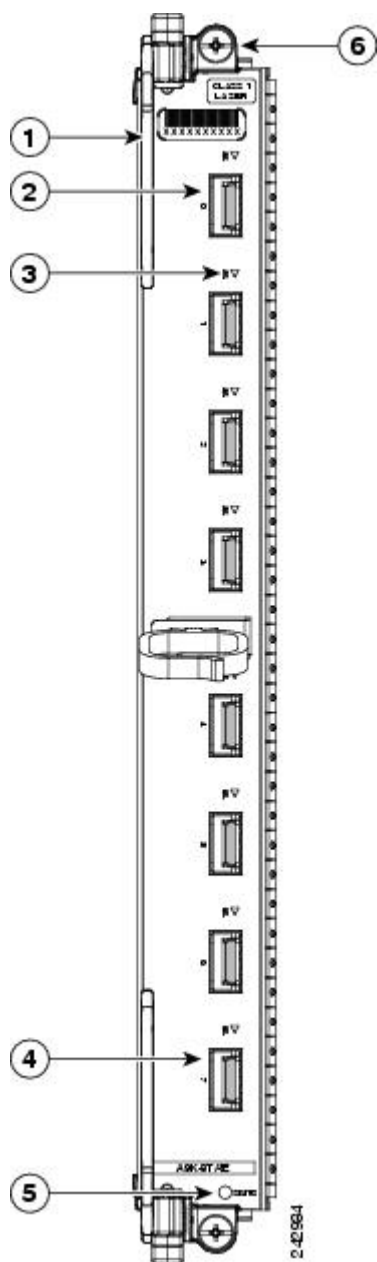
Oversubscription results from port pairs sharing the same Network Processor Unit (NPU). The oversubscribed port pairs are port 0:port 4, port 1:port 5, port 2:port 6 and port 3:port 7.

The 8-Port 10GE line card is available in base, extended, and low-queue versions. All versions are functionally equivalent, but vary in configuration scale and buffer capacity.

Each XFP cage on the 8-Port 10GE line card has an adjacent Link LED visible on the front panel. The Link LED indicates the status of the associated XFP port, as described in [Line Card LEDs](#).

The following figure shows the 8-Port 10GE line card front panel and LEDs.

Figure 2: 8-Port 10-Gigabit Ethernet 2:1 Oversubscribed Line Card



1	Ejector lever (one of two)	4	Port 7 XFP cage
2	Port 0 XFP cage	5	Status LED
3	Port status LED (one per port)	6	Captive installation screw (one of two)

4-Port 10-Gigabit Ethernet Line Card with XFP

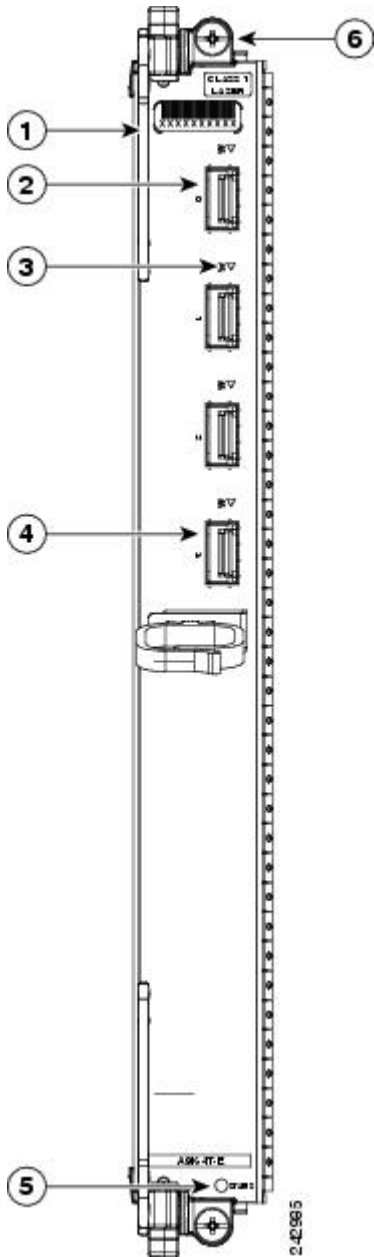
The 4-Port 10-Gigabit Ethernet (GE) line card provides four cages for XFP Ethernet optical interface modules that operate at a rate of 10 Gbps. The four XFP modules can be 10GE Ethernet multimode connections. For supported transceiver modules, see

The 4-Port 10GE line card is available in base, extended, and low-queue versions. All versions are functionally equivalent, but vary in configuration scale and buffer capacity.

Each XFP cage on the 4-Port 10GE line card has an adjacent Link LED visible on the front panel. The Link LED indicates the status of the associated XFP port, as described in [Line Card LEDs](#).

The following figure shows the 4-Port 10GE line card front panel and LEDs.

Figure 3: 4-Port 10-Gigabit Ethernet Line Card



1	Ejector lever (one of two)	4	Port 3 XFP cage
2	Port 0 XFP cage	5	Status LED
3	Port status LED (one per port)	6	Captive installation screw (one of two)

8-Port 10-Gigabit Ethernet 80 Gbps Line Rate Card with XFP

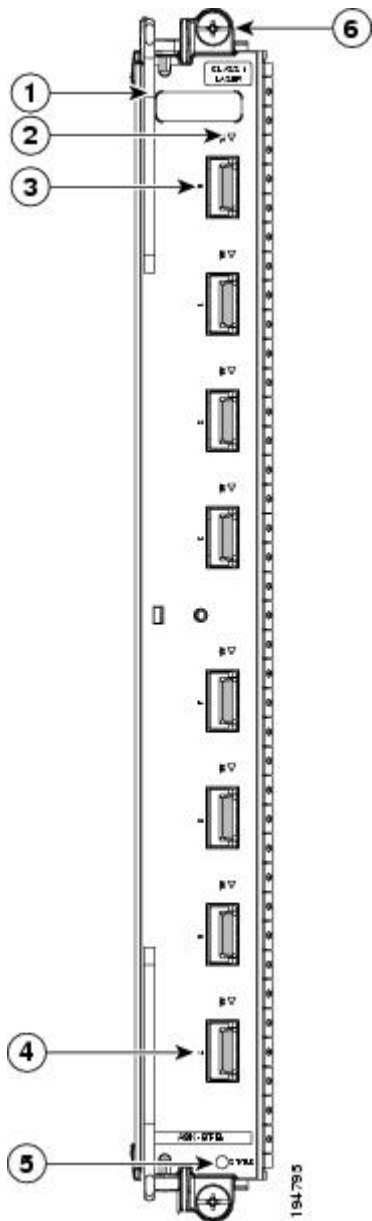
The 8-Port 10-Gigabit Ethernet (GE) 80 Gbps line rate card provides eight cages for XFP Ethernet optical interface modules that operate at a rate of 10 Gbps. The eight XFP modules can be 10GE multimode connections. The 8-Port 10GE line card is a full 80 Gbps line rate card.

The 8-Port 10GE 80 Gbps line rate card is available in base, extended, and low-queue versions. All versions are functionally equivalent, but vary in configuration scale and buffer capacity.

Each XFP cage on the 8-Port 10GE 80 Gbps line rate card has an adjacent Link LED visible on the front panel. The Link LED indicates the status of the associated XFP port, as described in [Line Card LEDs](#). See [Technical Specifications](#) for a list of all XFPs supported on the 8-Port 10GE 80 Gbps line rate card.

The following figure shows the 8-Port 10GE 80 Gbps line rate card front panel and connectors.

Figure 4: 8-Port 10-Gigabit Ethernet 80 Gbps Line Rate Card



1 Ejector lever (one of two)	4 Port 7 XFP cage
2 Port status LED (one per port)	5 Line card status LED
3 Port 0 XFP cage	6 Captive installation screw (one of two)

4-Port 10-Gigabit + 16-Port GE Combination Ethernet Line Card with SFP and SFP+

The 4-Port 10GE + 16-Port GE combination line card provides four cages for SFP+ Ethernet optical interface modules that operate at a rate of 10 Gbps, and 8 double-stacked (16 total) cages for SFP Ethernet optical modules that operate at a rate of 1 Gbps. This line card is available in either an -SE (Service Edge Optimized) or -TR (Packet Transport Optimized) version. All versions are functionally equivalent, but vary in configuration scale and buffer capacity.

Each SFP and SFP+ cage on the 4-Port 10GE + 16-Port GE combination line card has an adjacent Link LED visible on the front panel. The Link LED indicates the status of the associated SFP or SFP+ port, as described in [Line Card LEDs](#).

The following figure shows the 4-Port 10GE + 16-Port GE combination line card front panel and connectors.

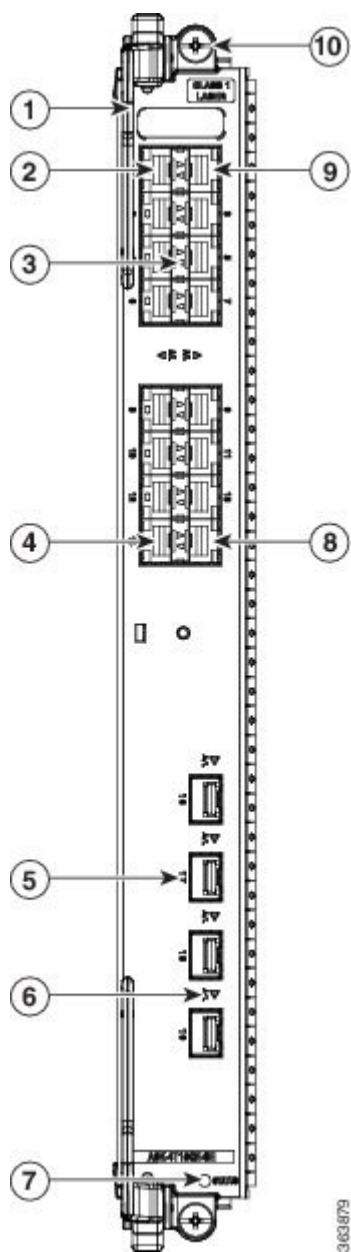


Note

The 4-Port 10GE + 16-Port GE combination line card comes with 16x1GE + 2x10GE ports enabled. The two 10GE ports that are enabled by default are Port16 and Port17. To enable the additional two 10GE ports, the license must be enabled. Upon acquiring the license, Port18 and Port19 are enabled.

For information on enabling the license, see the Software Entitlement chapter in the Cisco ASR 9000 Series Aggregation Services Router System Management Configuration Guide, Release 5.3.x. The license product number for the A9K-4T16GE-TR card is A9K-2T-TR-LIC. The license product number for the A9K-4T16GE-SE card is A9K-2T-SE-LIC.

Figure 5: 4-Port 10-Gigabit + 16-Port GE Combination Line Card



1	Ejector lever (one of two)	6	Port status LED (one per SFP+ port)
2	1GE port 0 SFP cage	7	Line card status LED
3	Port status LED (one per SFP port)	8	1GE port 15 SFP cage
4	1GE port 14 SFP cage	9	1GE port 1 SFP cage

5	10 GE port 17 SFP+ cage SFP+	10	Captive installation screw (one of two)
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**Note**

The interface numbering for the GE ports on the line card is Gig0/x/0/0 through Gig0/x/0/15. The interface numbering for the 10GE ports on the line card is tenGigE0/x/0/16 through tenGigE0/x/0/19.

16-Port 10-Gigabit Ethernet Oversubscribed Line Card with SFP+

The 16-Port 10-Gigabit Ethernet (GE) oversubscribed line card provides two stacked 2x4 cage assemblies for SFP+ Ethernet optical interface modules. The 16 SFP+ modules operate at a rate of 10 Gbps.

Oversubscription results from port pairs sharing the same NPU. The oversubscribed port pairs are port 0:port 8, port 1:port 9, port 2:port 10, port 3:port 11, port 4:port 12, port 5:port 13, port 6:port 14, and port 7:port 15. The maximum bandwidth per port pair sharing a single NPU is 14.62 Gbps (7.31 Gbps per port).

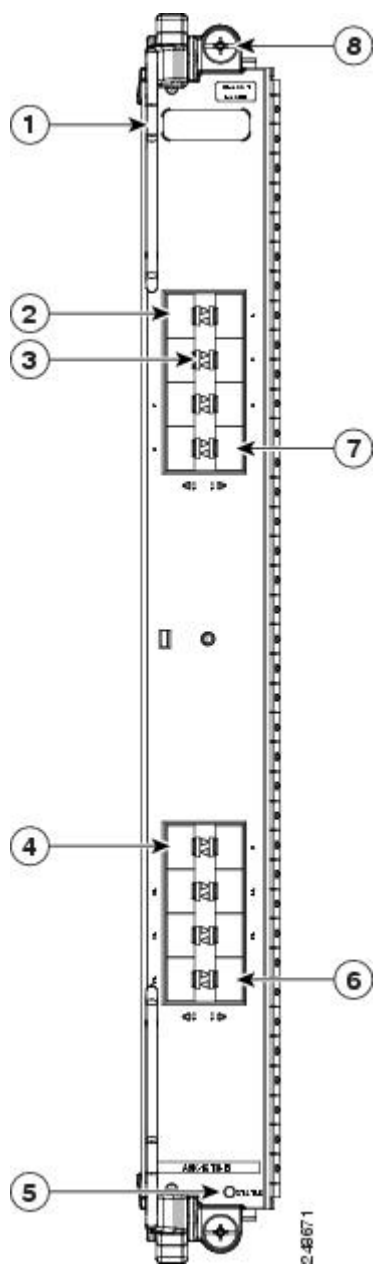
- With two RSP cards installed in the router, the 16-Port 10GE line card can achieve greater than a 2:1 oversubscription rate. Each port pair sharing an NPU can reach 7.31 Gbps per port, so the maximum bandwidth with two RSPs in the system is 117 Gbps.
- With a single RSP card installed in the router, the 16-Port 10GE line card is an 80 Gbps line rate card with a maximum line rate of 16 ports at 50 percent (2-1 oversubscribed).

The 16-Port 10GE line card is available in a base version.

Each SFP+ cage on the 16-Port 10GE line card has an adjacent Link LED visible on the front panel. The Link LED indicates the status of the associated SFP+ port, as described in [Line Card LEDs](#).

The following figure shows the 16-Port 10GE oversubscribed line card front panel and connectors.

Figure 6: 16-Port 10-Gigabit Ethernet Oversubscribed Line Card



1	Ejector lever (one of two)	5	Line card status LED
2	Port 0 SFP+ cage	6	Port 15 SFP+ cage
3	Port status LED (one per port)	7	Port 7 SFP+ cage
4	Port 8 SFP+ cage	8	Captive installation screw (one of two)

24-Port 10-Gigabit Ethernet Line Card with SFP+

The 24-Port 10-Gigabit Ethernet (GE) line card provides two stacked 2x6 cage assemblies for SFP+ Ethernet optical interface modules.

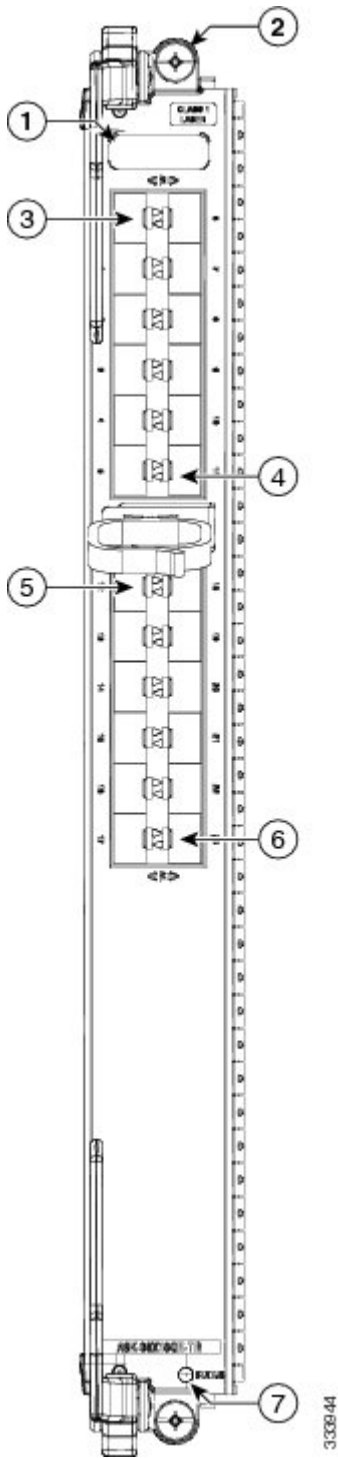
- With two RSP cards installed in the router, the 24-Port 10GE line card runs at line rate.
- With a single RSP card installed in the router, the 24-Port 10GE line card is a 220 Gbps line rate card.

The 24-Port 10GE line card is available in either an -SE (Service Edge Optimized) or -TR (Packet Transport Optimized) version.

Each SFP+ cage on the 24-Port 10GE line card has an adjacent Link LED visible on the front panel. The Link LED indicates the status of the associated SFP+ port, as described in [Line Card LEDs](#).

The following figure shows the 24-Port 10GE line card front panel and connectors.

Figure 7: 24-Port 10-Gigabit Ethernet Line Card



1 Ejector lever (one of two)	5 Port 12 SFP+ cage
2 Captive installation screw (one of two)	6 Port 23 SFP+ cage

3	Port 0 SFP+ cage	7	Line card status LED
4	Port 11 SFP+ cage		

24-Port 10-Gigabit Ethernet/Gigabit Ethernet Line Card with SFP+ or SFP



Note Oversubscription will be supported on this line card in a future release of IOS XR 6.2.x train.

The 24-Port 10-Gigabit Ethernet (10GE)/Gigabit Ethernet (GE) line card has twenty-four dual-rate ports that accept 10GE SFP+ or 1GE SFP modules.



Note The 24-port line card has a single Network Processor Unit (NPU). Configuring more than 20x10GE ports per NPU could result in line drops across all ports, depending on the packet size and traffic type. See [Configuring the Dual-Rate Line Cards](#) for information on specifying the port speed.

The 24-Port 10GE/1GE line card is available in these variants:

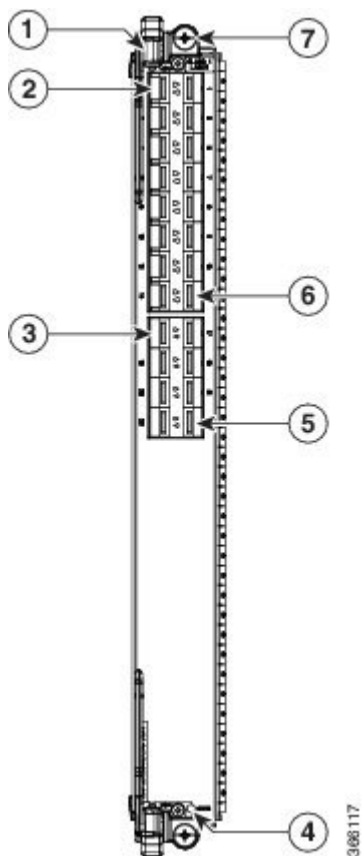
- -SE (Service Edge Optimized)
- -TR (Packet Transport Optimized)
- -CM (Consumption Model)

The -SE and -TR variants are functionally equivalent, but vary in configuration scale and buffer capacity. The -CM variant is same as the -SE variant except that the -CM variant functions on Consumption Based Pricing Model supported with Smart Licensing. For details related to the Consumption Based Pricing Model, see the chapter *Software Entitlement* in the *Cisco ASR 9000 Series Aggregation Services Router System Management Configuration Guide*.

Each SFP+ cage on the 24-Port 10GE/1GE line card has an adjacent Link LED visible on the front panel. The Link LED indicates the status of the associated SFP+ port, as described in [Line Card LEDs](#).

The following figure shows the 24-Port 10GE/1GE line card front panel connectors and indicators.

Figure 8: 24-Port 10-Gigabit Ethernet/Gigabit Ethernet Line Card

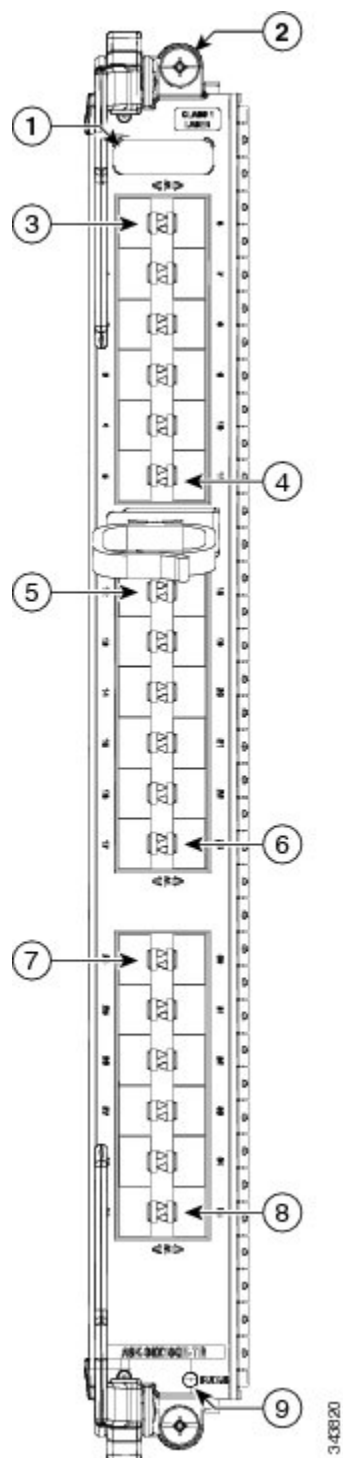


1	Ejector lever (one of two)	5	Port 23 SFP+ cage
2	Port 0 SFP+ cage	6	Port 15 SFP+ cage
3	Port 16 SFP+ cage	7	Captive installation screw (one of two)
4	Line card status LED		

36-Port 10-Gigabit Ethernet Line Card with SFP+

The 36-Port 10-Gigabit Ethernet (GE) line card has thirty-six 10-Gigabit SFP+ (10GE SFP) module ports. The following figure shows the 36-Port 10GE line card front panel connectors and indicators.

Figure 9: 36-Port 10-Gigabit Ethernet Line Card Front Panel



1 Ejector lever (one of two)	6 Port 23 SFP+ cage
2 Captive installation screw (one of two)	7 Port 24 SFP+ cage

3	Port 0 SFP+ cage	8	Port 35 SFP+ cage
4	Port 11 SFP+ cage	9	Line card status LED
5	Port 12 SFP+ cage		

48-Port 10-Gigabit Ethernet/Gigabit Ethernet Line Card with SFP+ or SFP



Note Oversubscription will be supported on this line card in a future release of IOS XR 6.2.x train.

The 48-Port 10-Gigabit Ethernet (10GE)/Gigabit Ethernet (GE) line card has forty-eight dual-rate ports that accept 10GE SFP+ or 1GE SFP modules.



Note The 48-port line card has two NPUs (one for each group of 24 ports). Configuring more than 20x10GE ports per NPU could result in line drops across all ports, depending on the packet size and traffic type. See [Configuring the Dual-Rate Line Cards](#) for information on specifying the port speed.

The 48-Port 10GE/1GE line card is available in these variants:

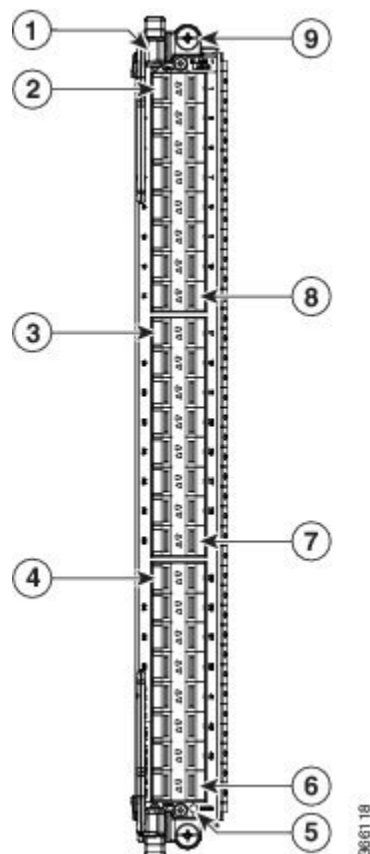
- -SE (Service Edge Optimized)
- -TR (Packet Transport Optimized)
- -CM (Consumption Model)

The -SE and -TR variants are functionally equivalent, but vary in configuration scale and buffer capacity. The -CM variant is same as the -SE variant except that the -CM variant functions on Consumption Based Pricing Model supported with Smart Licensing. For details related to the Consumption Based Pricing Model, see the *Software Entitlement* chapter in the *Cisco ASR 9000 Series Aggregation Services Router System Management Configuration Guide*.

Each SFP+ cage on the 48-Port 10GE/1GE line card has an adjacent Link LED visible on the front panel. The Link LED indicates the status of the associated SFP+ port, as described in [Line Card LEDs](#).

The following figure shows the 48-Port 10GE/1GE line card front panel connectors and indicators.

Figure 10: 40-Port 10-Gigabit Ethernet/Gigabit Ethernet Line Card



1	Ejector lever (one of two)	6	Port 47 SFP+ cage
2	Port 0 SFP+ cage	7	Port 31 SFP+ cage
3	Port 16 SFP+ cage	8	Port 15 SFP+ cage
4	Port 32 SFP+ cage	9	Captive installation screw (one of two)
5	Line card status LED		

40-Port Gigabit Ethernet Line Card with SFP

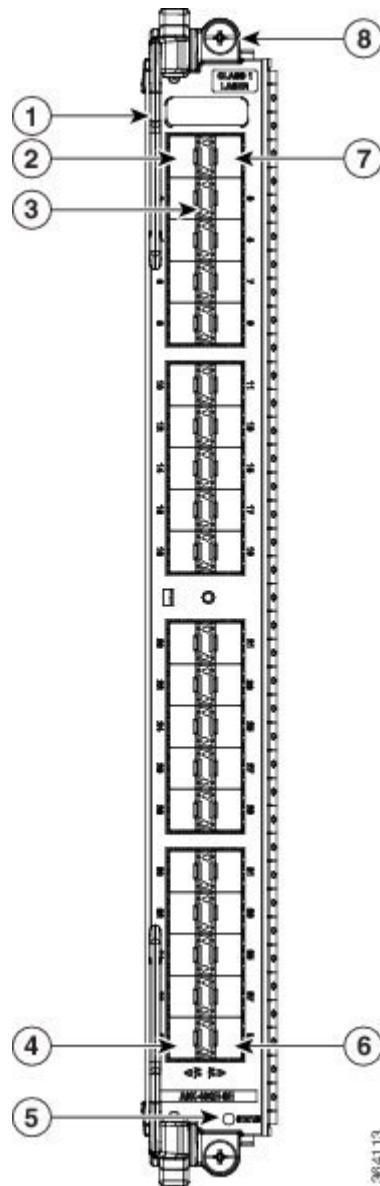
The 40-Port Gigabit Ethernet (GE) line card provides 20 double-stacked SFP (40 total) cages that support either fiber-optic or copper transceivers.

The 40-Port GE line card is available in base, extended, low-queue, and next-generation -SE (Service Edge Optimized), or -TR (Packet Transport Optimized) versions. All versions are functionally equivalent, but vary in configuration scale and buffer capacity.

Each SFP cage on the 40-Port GE line card has an adjacent Link LED visible on the front panel. The Link LED indicates the status of the associated SFP port, as described in [Line Card LEDs](#).

The following figure shows 40-Port GE line card front panel and connectors.

Figure 11: 40-Port Gigabit Ethernet Line Card (A9K-40GE-SE Card Shown)



1 Ejector lever (one of two)	5 Line card status LED
2 Port 0 SFP cage	6 Port 39 SFP cage
3 Port status LED (one per port)	7 Port 1 SFP cage
4 Port 38 SFP cage	8 Captive installation screw (one of two)

100-Gigabit Ethernet Line Cards

**Caution**

It is strongly recommended to wait for 60 seconds before successive insertion or removal of optics. Failure in following this recommendation may affect the functionality of the optics. This applies to all the various optics form factors such as SFP, SFP+, XFP, QSFP, QSFP28, CFP, CFP2 and CPAK.

1-Port 100-Gigabit Ethernet Line Card with CFP

The 1-Port 100-Gigabit Ethernet (GE) line card provides one CFP cage for an CFP Ethernet optical interface module that operates at a rate of 100 Gbps. The CFP module can be a 100GE multimode connection.

The 1-port 100GE line card is available in either an -SE (Service Edge Optimized) or -TR (Packet Transport Optimized) version. Both versions are functionally equivalent, but vary in configuration scale and buffer capacity. The CFP cage has an adjacent Link LED visible on the front panel as described in [Line Card LEDs](#).

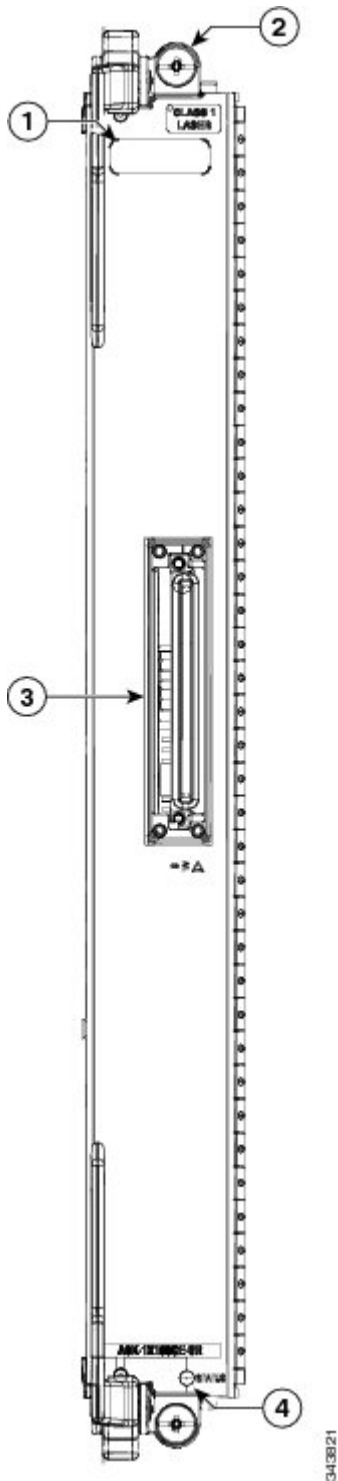
The following table lists the supported optics and connectors for 1-port 100GE line card.

Table 12: Supported CFP Optics for Cisco 1-Port 100GE Line Card

Part Number	100-Gigabit Ethernet CFP Modules	Maximum Distance
CFP-100G-LR4	100 GE long-reach over 4 WDM lanes (LR4) optics (single-mode fiber)	10 km
CFP-100G-SR10	100 GE over 10 short-reach optical lanes (SR10) optics (multimode fiber)	100 m

The following figure shows the 1-port 100GE line card front panel and connector.

Figure 12: 1-Port 100-Gigabit Ethernet Line Card Front Panel



1 Ejector lever (one of two)	3 100 Gigabit Ethernet CFP
2 Captive installation screw (one of two)	4 Line card status LED

2-Port 100-Gigabit Ethernet Line Card with CFP

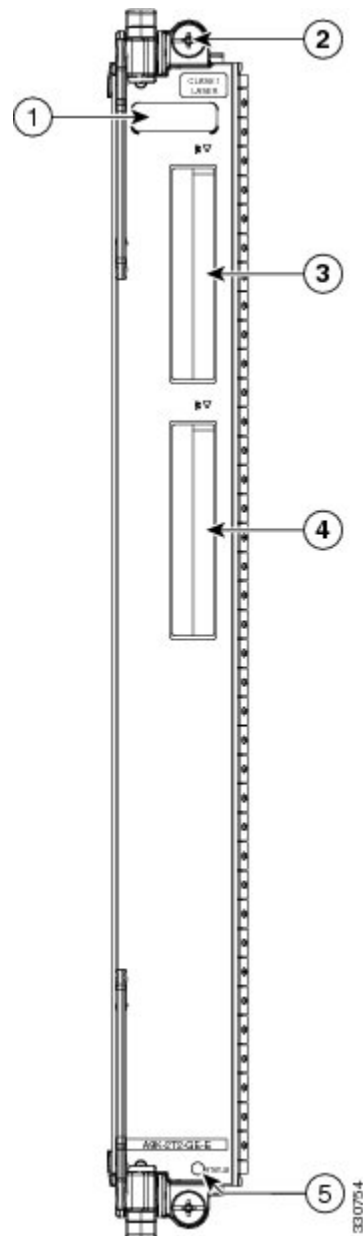
The 2-Port 100-Gigabit Ethernet (GE) line card provides two CFP cages for CFP Ethernet optical interface modules that operate at a rate of 100 Gbps. The two CFP modules can be 100GE multimode connections.

The line card is available in either an -SE (Service Edge Optimized) or -TR (Packet Transport Optimized) version. All versions are functionally equivalent, but vary in configuration scale and buffer capacity.

Each CFP cage on the 2-Port 100GE line card has an adjacent Link LED visible on the front panel. The Link LED indicates the status of the associated CFP port, as described in [Line Card LEDs](#).

The following figure shows the 2-Port 100GE line card front panel and LEDs.

Figure 13: 2-Port 100-Gigabit Ethernet Line Card



1	Ejector lever (one of two)	4	100GE CFP connector (two of two)
2	Captive installation screw (one of two)	5	Line card status LED
3	100GE CFP connector (one of two)		

4-Port 100-Gigabit Ethernet Line Card with CPAK

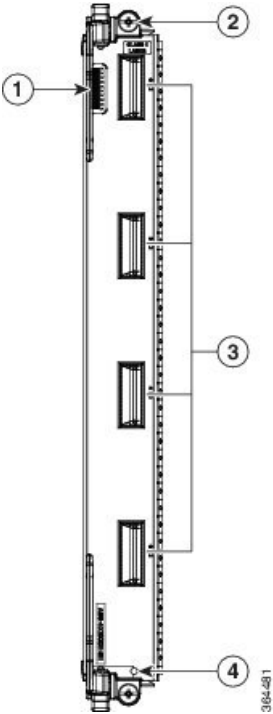
The 4-Port 100GE line card provides four CPAK cages for CPAK modules that operate at a rate of 100 Gbps.

The line card is available in -SE (Service Edge Optimized) and -TR (Packet Transport Optimized) variants. The two variants are functionally equivalent, but vary in configuration scale and buffer capacity.

Each CPAK cage on the 4-port 100GE line card has an adjacent Link LED visible on the front panel. The Link LED indicates the status of the associated CPAK port, as described in [Line Card LEDs](#).

The following figure shows the 4-Port 100GE line card front panel and connectors.

Figure 14: 4-Port 100-Gigabit Ethernet Line Card



1	Ejector lever (one of two)	4	Four 100GE CPAK connectors
2	Captive installation screw (one of two)	5	Status LED

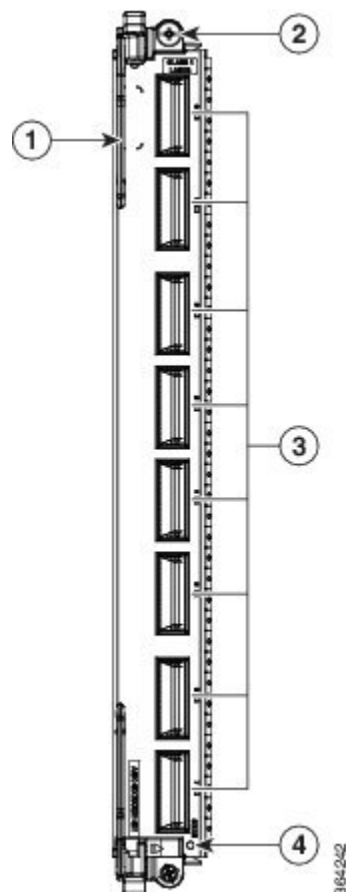
8-Port 100-Gigabit Ethernet Line Card with CPAK

The 8-Port 100-Gigabit Ethernet (GE) line card provides eight CPAK cages for CPAK modules that operate at a rate of 100 Gbps.

Each CPAK cage on the 8-Port 100GE line card has an adjacent Link LED visible on the front panel. The Link LED indicates the status of the associated CPAK port as described in [Line Card LEDs](#).

The following figure shows the 8-Port 100GE line card front panel and connectors.

Figure 15: 8-Port 100-Gigabit Ethernet Line Card



1 Ejector lever (one of two)	3 Eight 100GE CPAK connectors
2 Captive installation screw (one of two)	4 Status LED

This line card is available in two versions. The LAN version line card is available as an Service Edge Optimized (-SE) variant only. The OTN version line card is available in three variants:

- Service Edge Optimized (-SE)
- Packet Transport Optimized (-TR)
- Consumption Model Optimized (-CM)

The -SE and -TR variants are functionally equivalent, but vary in configuration scale and buffer capacity. The -CM variant is same as the -SE variant except that the -CM variant functions on Consumption Based Pricing Model supported with Smart Licensing. For details related to the Consumption Based Pricing Model, see the chapter *Software Entitlement on the Cisco ASR 9000 Series Router* in *Cisco ASR 9000 Series Aggregation Services Router System Management Configuration Guide*. For the -CM variant, you need to purchase a

minimum of 20 of foundational software licenses each of which licenses 10G worth of bandwidth. The foundational software licenses are available in four types based on the software features:

- IP/MPLS - For ports that use only IP/MPLS software feature.
- IP/MPLS + L2VPN - For ports that uses IP/MPLS with layer 2 Ethernet Flow Point (EFP) software feature.
- IP/MPLS + L3VPN - For ports that uses IP/MPLS with layer 3 Virtual Routing and Forwarding (VRF) software feature.
- IP/MPLS + L2VPN + L3VPN - For ports that uses IP/MPLS with layer 2 EFP as well as layer 3 VRF software features.

Additionally, each foundational software license is available in two tiers called as basic and advanced that provide lower and higher scale support respectively for the supported software feature. You can also optionally purchase additional licenses for specific software features that are not included in the foundational licenses. These additional licenses are available metered on a per 10G bandwidth basis or for the entire router.

**Note**

If you are installing the 8-port 100-Gigabit Ethernet Line Cards (TR and SE variants) in the chassis, ensure that V2 fan trays are installed in all the fan tray slots.

16-Port 100-Gigabit Ethernet Line Card with QSFP28/QSFP+

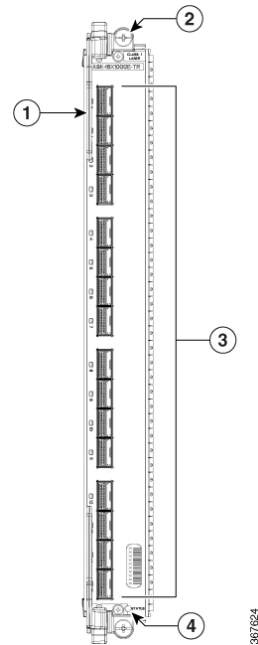
The 16-Port 100-Gigabit Ethernet (GE) line card provides sixteen ports for QSFP28/QSFP+ modules that operate at a rate of 100 Gbps.

Each line card has a single tristate Status LED to display card status. Each QSFP28/QSFP+ port on the line card has a port status LED visible on the front panel. The LEDs are described in [Line Card LEDs](#).

When the 16-port 100GE Line Card with QSFP28/QSFP+ is inserted in a Cisco ASR 9922 chassis, you must use the ASR 9922 Fan Tray V3.

The following figure shows the 16-Port 100-GE line card front panel and LEDs.

Figure 16: 16-Port 100-Gigabit Ethernet Line Card with QSFP28/QSFP+



1	Ejector lever (one of two)	3	Sixteen 100GE QSFP28/QSFP+ connectors
2	Captive installation screw (one of two)	4	Status LED

32-Port 100-Gigabit Ethernet Line Card with QSFP28/QSFP+

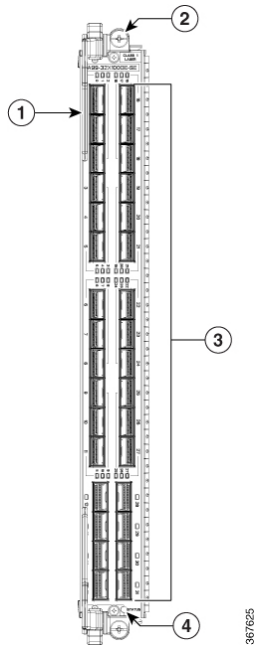
The 32-Port 100-Gigabit Ethernet (GE) line card provides thirty two ports for QSFP28/QSFP+ modules that operate at a rate of 100 Gbps.

Each line card has a single tristate Status LED to display card status. Each QSFP28/QSFP+ port on the line card has a port status LED visible on the front panel. The LEDs are described in [Line Card LEDs](#).

When the 32-port 100GE Line Card with QSFP28/QSFP+ is inserted in a Cisco ASR 9922 chassis, you must use the ASR 9922 Fan Tray V3. In a 32-port 100GE Line Card, QSFP+ is permitted only from port 0 to port 20.

The following figure shows the 32-Port 100-GE line card front panel and LEDs.

Figure 17: 32-Port 100-Gigabit Ethernet Line Card with QSFP28/QSFP+



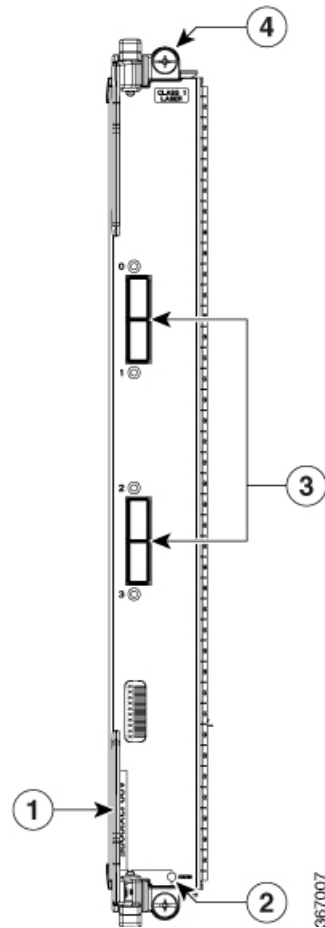
1	Ejector lever (one of two)	3	Thirty Two 100GE QSFP28 connectors
2	Captive installation screw (one of two)	4	Status LED

4-Port 100-Gigabit Ethernet Line Card with QSFP28

The 4-Port 100-Gigabit Ethernet (GE) line card provides four ports for QSFP28 modules that operate at a rate of 100 Gbps.

Each line card has a single tristate Status LED to display card status. Each QSFP28 port on the line card has a port status LED visible on the front panel. The LEDs are described in [Line Card LEDs](#). The following figure shows the 4-Port 100-GE line card front panel and LEDs.

Figure 18: 4-Port 100-Gigabit Ethernet Line Card with QSFP28



1	Ejector lever (one of two)	3	Four 100GE QSFP28 connectors
2	Status LED	4	Captive installation screw (one of two)



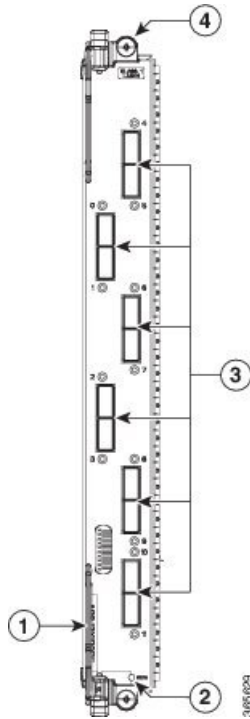
Note If the 4-port 100GE line card is inserted in a chassis, it is important to use filler panels that have two screens [A9K-LC-FILR-V2]. This ensures optimal cooling and EMI.

12-Port 100-Gigabit Ethernet Line Card with QSFP28

The 12-Port 100-Gigabit Ethernet (GE) line card provides twelve ports for QSFP28 modules that operate at a rate of 100 Gbps.

Each line card has a single tristate Status LED to display card status. Each QSFP28 port on the line card has a port status LED visible on the front panel. The LEDs are described in [Line Card LEDs](#). The following figure shows the 12-Port 100-GE line card front panel and LEDs.

Figure 19: 12-Port 100-Gigabit Ethernet Line Card with QSFP28



1	Ejector lever (one of two)	3	Twelve 100GE QSFP28 connectors
2	Status LED	4	Captive installation screw (one of two)



Note The 12-port 100-Gigabit Ethernet Line card with QSFP28 is also supported on IOS XR 64-bit environment.



Note If the 12-port 100GE line card is inserted in a chassis, it is important to use filler panels that have two screens [A9K-LC-FILR-V2]. This ensures optimal cooling and EMI.

32-Port 100-Gigabit Ethernet Line Card with QSFP28/QSFP+

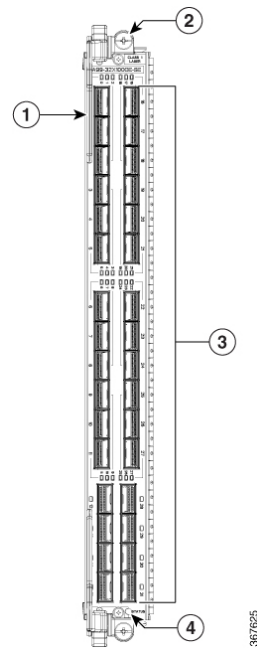
The 32-Port 100-Gigabit Ethernet (GE) line card provides thirty two ports for QSFP28/QSFP+ modules that operate at a rate of 100 Gbps.

Each line card has a single tristate Status LED to display card status. Each QSFP28/QSFP+ port on the line card has a port status LED visible on the front panel. The LEDs are described in [Line Card LEDs](#).

When the 32-port 100GE Line Card with QSFP28/QSFP+ is inserted in a Cisco ASR 9922 chassis, you must use the ASR 9922 Fan Tray V3. In a 32-port 100GE Line Card, QSFP+ is permitted only from port 0 to port 20.

The following figure shows the 32-Port 100-GE line card front panel and LEDs.

Figure 20: 32-Port 100-Gigabit Ethernet Line Card with QSFP28/QSFP+



1	Ejector lever (one of two)	3	Thirty Two 100GE QSFP28 connectors
2	Captive installation screw (one of two)	4	Status LED

20-Port 100-Gigabit Ethernet Line Card with QSFP28/QSFPDD

The 20-Port 100-Gigabit Ethernet (GE) line card provides:

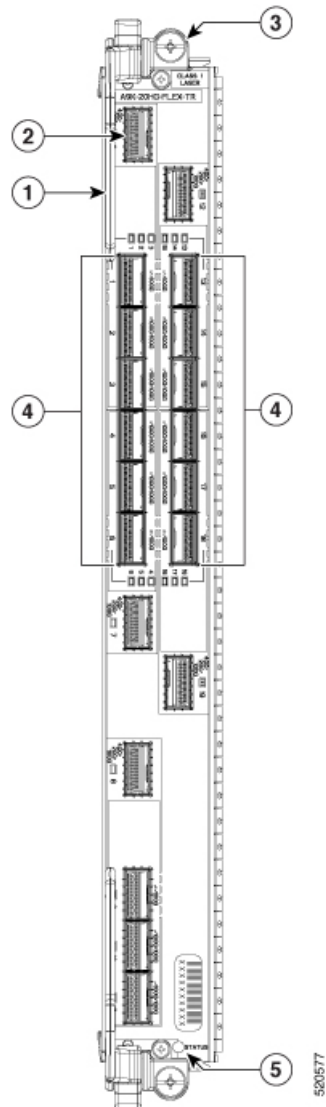
- Fifteen QSFP28 ports capable of 10Gb, 40Gb, and 100Gb Ethernet traffic support.
- Five QSFP-DD ports capable of 10Gb, 40Gb, 100Gb, 200Gb, and 400Gb Ethernet traffic support.

Each line card has a single tristate Status LED to display card status. Each QSFP28/QSFPDD port on the line card has a port status LED visible on the front panel. The LEDs are described in [Line Card LEDs](#).

When the 20-port 100GE Line Card with QSFP28/QSFPDD is inserted in a Cisco ASR 9922 chassis, you must use the ASR 9922 Fan Tray V3.

The following figure shows the 20-Port 100-GE line card front panel and LEDs.

Figure 21: 20-Port 100-Gigabit Ethernet Line Card with QSFP28/QSFPDD



1	Ejector lever (one of two)	4	Fifteen 100GE QSFP28 connectors
2	Five 400GE QSFP-DD connectors	5	Status LED
3	Captive installation screw (one of two)		

8-Port 100-Gigabit Ethernet Line Card with QSFP28/QSFPDD

The 8-Port 100-Gigabit Ethernet (GE) line card provides:

- Six QSFP28 ports capable of 10Gb, 40Gb, and 100Gb Ethernet traffic support.

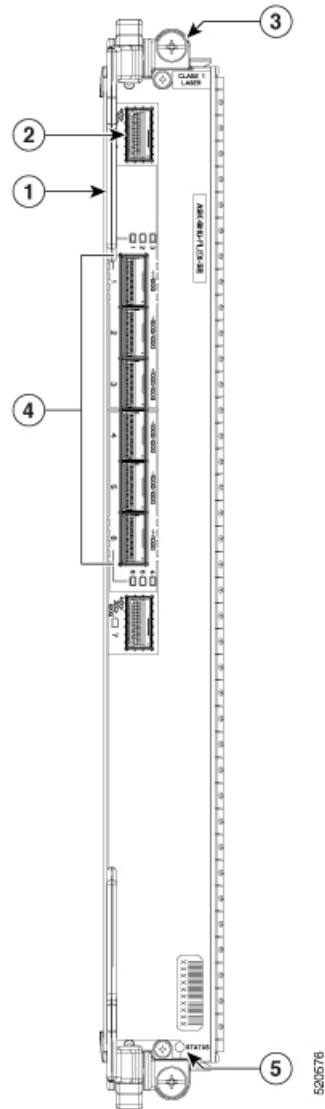
- Two QSFP-DD ports capable of 10Gb, 40Gb, 100Gb, 200Gb, and 400Gb Ethernet traffic support.

Each line card has a single tristate Status LED to display card status. Each QSFP28/QSFPDD port on the line card has a port status LED visible on the front panel. The LEDs are described in [Line Card LEDs](#).

When the 8-port 100GE Line Card with QSFP28/QSFPDD is inserted in a Cisco ASR 9922 chassis, you must use the ASR 9922 Fan Tray V3.

The following figure shows the 8-Port 100-GE line card front panel and LEDs.

Figure 22: 8-Port 100-Gigabit Ethernet Line Card with QSFP28/QSFPDD



1	Ejector lever (one of two)	4	Six 100GE QSFP28 connectors
2	Two 400GE QSFP-DD connectors	5	Status LED

3	Captive installation screw (one of two)		
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400-Gigabit Ethernet Line Cards

**Caution**

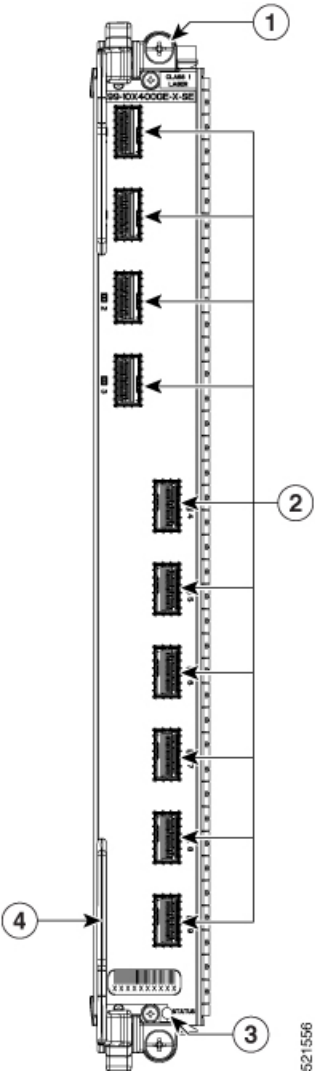
All Ethernet line cards have port Status LEDs on their front panels. Each QSFPDD port has an adjacent LED to indicate the status of the associated port. In addition, each line card has a single tristate Status LED to display card status.

10-Port 400-Gigabit Ethernet Line Cards with QSFPDD

The 10-Port 400-Gigabit Ethernet (GE) line card provides ten ports for QSFPDD modules that are capable of 10Gb, 40Gb, 100Gb, 200Gb, and 400Gb Ethernet traffic support.

Each line card has a single tristate Status LED to display card status. Each QSFPDD port on the line card has a port status LED visible on the front panel. The LEDs are described in [Line Card LEDs](#).

Figure 23: 10-Port 400-Gigabit Ethernet Line Card with QSFPDD



1	Captive installation screw (one of two)	3	Status LED
2	Ten 400GE QSFPDD connectors	4	Ejector lever (one of two)

IPoDWDM Ethernet Line Cards

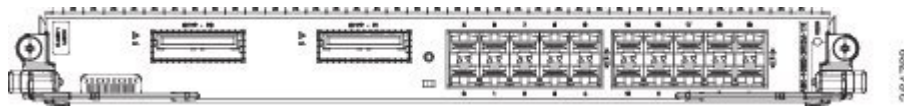
2-Port 100G + 20-Port 10-Gigabit Ethernet Combination IPoDWDM Line Card with CFP2 and SFP+

The 2-Port 100G + 20-Port 10-Gigabit Ethernet Combination IPoDWDM Line Card with CFP2 and SFP+ provides two double stacked 2x5 cage assemblies (total 20 ports) for SFP+ Ethernet optical interface modules and two cages of 100G coherent transceiver CFP2. The line card is available only in -TR (Packet Transport Optimized) version.

Each SFP+ and CFP2 cage has an adjacent Link LED visible on the front panel. The Link LED indicates the status of the associated SFP+ or CFP2 cage, as described in [Line Card LEDs](#).

The following figure shows this line card's front panel and connectors.

Figure 24: 2-Port 100G + 20-Port 10-Gigabit Ethernet Combination IPoDWDM Line Card with CFP2 and SFP+



Multi-Rate Line Cards

The multi-rate line cards have flexible interfaces that support various optics and data rates, providing flexibility to mix and match interface types on the same line card.

400G Combo Multi-Rate Line Card

The 400G combo multi-rate line card has 44 ports:

- 24 SFP+ ports capable of 10GE
- 16 SPF28 ports capable of 10GE or 25GE
- 4 QSFP+ or QSFP28 ports capable of 40GE or 100GE



Note

The line card has an aggregate bandwidth of 400GE. See the [Table 13: 400GE Combo Multi-Rate Line Card Port Configurations](#) for supported port configurations.

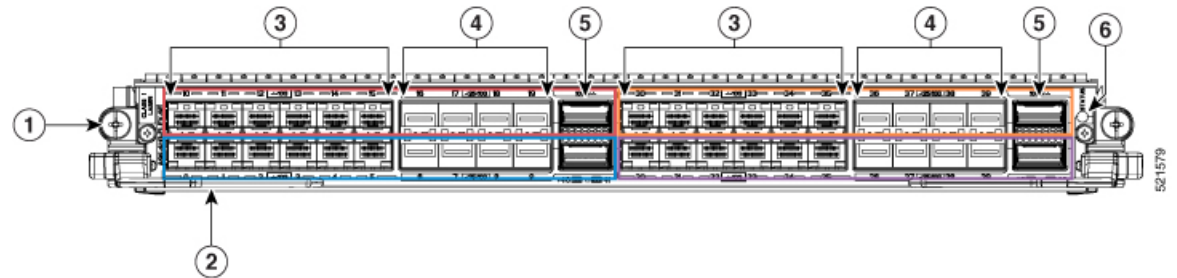
The line card ports are color-coded in the following manner:

- Ports 0 – 5 (blue), 10 – 15 (red), 20 – 25 (magenta), 30 – 35 (orange) support 10GE SFP+ modules
- Ports 6 – 9 (blue), 16 – 19 (red), 26 – 29 (magenta), 36 – 39 (orange) support 10GE/25GE SFP28 modules
- Ports 40 (blue), 41 (red), 42 (magenta), 43 (orange) support 40GE QSFP+ or 100GE QSFP28 modules



Note SFP28/QSFP+/QSFP28 optics for particular color group are mutually exclusive. Only one of the optics type can be used at a time.

Figure 25: 400G Combo Multi-Rate Line Card



1	Captive installation screw (one of two)	4	16 SFP28 ports (2 groups of 8)
2	Ejector lever (one of two)	5	4 QSFP28/QSFP+ ports (2 groups of 2)
3	24 SFP+ ports (2 groups of 12)	6	Status LED

Each group of colored ports supports up to 100GE. The following port configurations are supported:

Table 13: 400GE Combo Multi-Rate Line Card Port Configurations

Color Group	Blue			Red			Magenta			Orange			
Port # (Optics)	0–5 (SFP+)	6–9 (SFP28)	40 (QSFP+/QSFP28)	10–15 (SFP+)	16–19 (SFP28)	41 (QSFP+/QSFP28)	20–25 (SFP+)	26–29 (SFP28)	42 (QSFP+/QSFP28)	30–35 (SFP+)	36–39 (SFP28)	43 (QSFP+/QSFP28)	Agg BW (GE)
Option 1	–	4x25/ 1x40/ 1x100	–	–	4x25/ 1x40/ 1x100	–	–	4x25/ 1x40/ 1x100	–	–	4x25/ 1x40/ 1x100	–	160-400
Option 2	–	4x25/ 1x40/ 1x100	–	–	4x25/ 1x40/ 1x100	–	–	4x25/ 1x40/ 1x100	–	6x10	4x10	–	220-400
Option 3	–	4x25/ 1x40/ 1x100	–	–	4x25/ 1x40/ 1x100	–	6x10	4x10	–	6x10	4x10	–	280-400
Option 4	–	4x25/ 1x40/ 1x100	–	6x10	4x10	–	6x10	4x10	–	6x10	4x10	–	340-400
Option 5	6x10	4x10	–	6x10	4x10	–	6x10	4x10	–	6x10	4x10	–	400

For a list of the optics and connectors used by the 400GE combo multi-rate line card and for a list of all supported transceiver modules, see <https://tmgmatrix.cisco.com/home>.

Modular Line Cards and Modular Port Adapters

There are four types of modular line cards (MLCs) as follows:

- 80-Gb card
- 160-Gb card
- 200-Gb card
- 400-Gb card

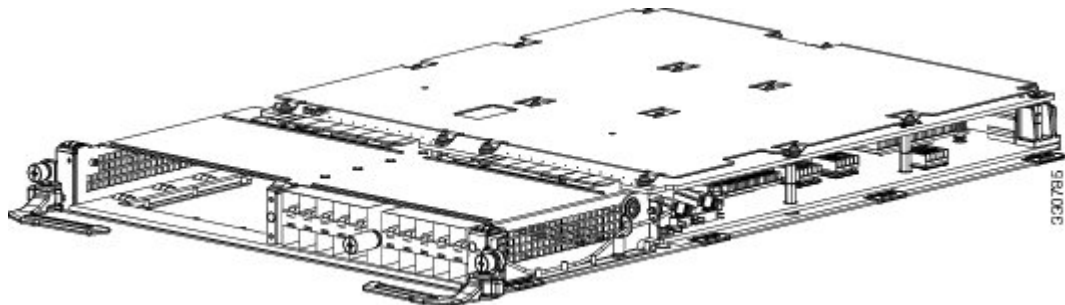
Each type of card is available in -SE (Service Edge Optimized) and -TR (Packet Transport Optimized) variants. The two variants are functionally equivalent, but vary in configuration scale and buffer capacity.

The 400 Gigabyte Modular Line Cards only support the following MPAs (Modular Port Adapters):

- 2-port 10GE Modular Port Adapter (MPA) with XFP
- 4-Port 10GE Modular Port Adapter (MPA) with XFP
- 8-port 10GE Modular Port Adapter (MPA) with SFP+
- 2-port 40GE Modular Port Adapter (MPA), with QSFP+
- 1-Port 40GE Modular Port Adapter (MPA), with QSFP+
- 20-Port 10-Gigabit Ethernet Modular Port Adapter (MPA) with SFP+
- 1-Port 100-Gigabit Ethernet Modular Port Adapter with CFP2-DCO and CPAK
- 1-Port 200-Gigabit Ethernet Modular Port Adapter with CFP2-DCO
- 2-Port 100-Gigabit Ethernet Modular Port Adapter with CFP2-DCO and CPAK
- 32-port GE Modular Port Adapter (MPA) with MACsec

The following figure shows the front panel of the modular line card with a 20-port Gigabit Ethernet MPA installed in bay 1.

Figure 26: Modular Line Card



The modular line card provides two bays that support the following Modular Port Adapters (MPAs):

1-Port 100-Gigabit Ethernet Modular Port Adapter with CFP2

The 1-Port 100-Gigabit Ethernet (GE) modular port adapter (MPA) supports LAN/WAN/OTN mode and provides a single cage of coherent transceiver CFP2 module that operate at a rate of 100 Gbps. The 1-Port 100GE MPA is supported in both bay 0 and bay 1 of 400 Gigabit Modular Line Card (A9K-MOD400-SE, A9K-MOD400-TR) and 200 Gigabit Modular Line Card (A9K-MOD200-SE, A9K-MOD200-TR).

This MPA supports 10X10 and 2X40 breakout configuration.

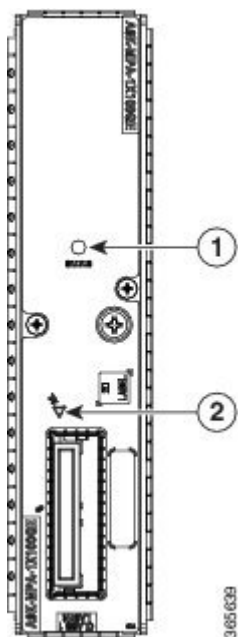
**Note**

- V02 version of the CFP2-DCO module is introduced. V02 version of the optical module supports Staircase FEC. Staircase FEC is an industry standard that enables high-speed optical communications. The version ID information of the optical module can be obtained from the output of the `show inventory` command.
- This MPA does not support 1X40 breakout configuration.
- The CFP2 Digital Coherent Optics (DCO) are supported with the following hardware versions (VID):

Line Card PID	MPA PID	MPA Hardware Version (VID)
A9K-MOD200-TR A9K-MOD200-SE A9K-MOD400-TR A9K-MOD400-SE	A9K-MPA-1x100GE	V03

The CFP2 cage on the MPA has an adjacent A/L (Active/Link) LED visible on the front panel. The A/L LED indicates the status of the associated CFP2 port and the Status LED indicates the status for the MPA.

Figure 27: 1-Port 100-Gigabit Ethernet Modular Port Adapter with CFP2



1 A/L (Active/Link) LED	2 Status LED
-------------------------	--------------

The following table shows the LED behavior when interface type is 100G breakout is configured:

Table 14: LED Behavior When Interface Type is 100G

Port LED State	Status
Off	Port is shutdown.
Red	100G interface is in down state.
Green	100G interface is in up state.
Blinking Green and Amber	100G interface is up and carrying traffic.

Table 15: LED Behavior When Breakout is Configured

Port LED State	Status
Off	Ports are shutdown.
Red	Link is down for at least one of the enabled ports.
Green	At least one port is enabled and link is up on all enabled ports.
Blinking Green and Amber	At least one port is enabled and link is up on all enabled ports.

You can use a CFP2 adapter to connect the CPAK transceivers to the MPA. The router only detects a connected CPAK transceiver module and does not detect the physically intermediate CFP2 adapter. The show inventory command shows the connected CPAK transceiver module.

This table lists the CFP2 adapters and the supported CPAK modules:

CFP2 Adaptor	Supported CPAK transceiver module
CVR-CFP2-CPAK4	CPAK-100G-LR4 CPAK-100G-ER4L CPAK-100G-CWDM4
CVR-CFP2-CPAK10	CPAK-100G-SR10 CPAK-10X10G-LR CPAK-10X10G-ERL

**Caution**

Plugging a non-supported CPAK to a CFP2 adapter can damage the CFP2 adapter. Ensure that you read the PID label on the CFP2 adapter carefully.

**Caution**

We recommend that you wait for 60 seconds before successive insertion or removal of optics. Failing to follow this recommendation may affect the functionality of optics.

**Caution**

The metal surfaces of CPF2-DCO modules may exhibit high temperatures and thus be unsafe for handling with bare hands.

For more information about how to remove the CFP2-DCO module, see [Safe Removal of CFP2-DCO Modules](#).

1-Port 200-Gigabit Ethernet Modular Port Adapter with CFP2-DCO

The 1-Port 200-Gigabit Ethernet (GE) modular port adapter (MPA) supports OTN mode and provides a single cage of coherent transceiver CFP2-DCO module that operate at a rate of 100 Gbps or 200Gbps. The 1-Port 200GE MPA is supported in both bay 0 and bay 1 of 400 Gigabit Modular Line Card (A9K-MOD400-SE, A9K-MOD400-TR) and only on Bay 0 of 200 Gigabit Modular Line Card (A9K-MOD200-SE, A9K-MOD200-TR).

**Note**

- V02 version of the CFP2-DCO module is introduced. V02 version of the optical module supports Staircase FEC. Staircase FEC is an industry standard that enables high-speed optical communications. The version ID information of the optical module can be obtained from the output of the `show inventory` command.
- This MPA does not support any breakout configuration.

The MPA provides one port of CFP2-DCO transceiver that can operate at 100GE (included) or 200GE with the CFP2-LIC-UPG-200G upgrade license. The 200GE rate is supported by combining two 100G Interfaces at the back end requiring two separate MAC/IP addresses to be assigned.

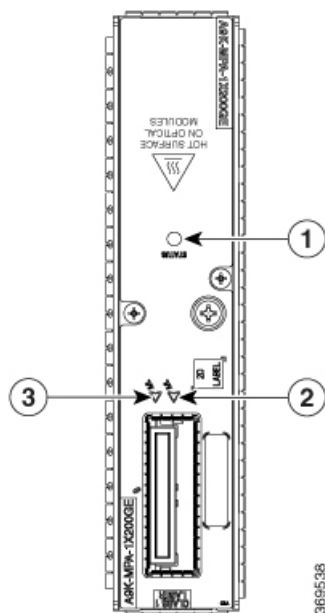


Note The CFP2 Digital Coherent Optics (DCO) are supported with the following hardware versions (VID):

Line Card PID	MPA PID	MPA Hardware Version (VID)
A9K-MOD200-TR	A9K-MPA-1x200GE	V00
A9K-MOD200-SE		
A9K-MOD400-TR		
A9K-MOD400-SE		

The CFP2 cage on the MPA has two adjacent A/L (Active/Link) LEDs visible on the front panel. The A/L LEDs indicates the status of the associated CFP2 port and the Status LED indicates the status of the MPA.

Figure 28: 1-Port 200-Gigabit Ethernet Modular Port Adapter with CFP2-DCO



1	Status LED	2 and 3	A/L (Active/Link) LED
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The following table shows the LED behavior when interface type is 100G:

Table 16: LED Behavior When Interface Type is 100G

Port LED State	Status
Off	Port is shutdown.

Port LED State	Status
Red	100G interface is in down state.
Green	100G interface is in up state.
Blinking Green and Amber	100G interface is up and carrying traffic.



Caution Plugging a non-supported CPAK to a CFP2 adapter can damage the CFP2 adapter. Ensure that you read the PID label on the CFP2 adapter carefully.



Caution We recommend that you wait for 60 seconds before successive insertion or removal of optics. Failing to follow this recommendation may affect the functionality of optics.



Caution The metal surfaces of CPF2-DCO modules may exhibit high temperatures and thus be unsafe for handling with bare hands. A hot surface warning label is provided on the faceplate of the MPA where the optical module is inserted.

For more information about how to remove the CFP2-DCO module, see [Safe Removal of CFP2-DCO Modules](#).

2-Port 100-Gigabit Ethernet Modular Port Adapter with CFP2

The 2-Port 100-Gigabit Ethernet (GE) modular port adapter (MPA) supports LAN/WAN/OTN mode and provides two cages of coherent transceiver CFP2 modules that operate at a rate of 100 Gbps.

The 2-Port 100GE MPA is supported on both bay 0 and bay 1 of 400 Gigabit Modular Line Card (A9K-MOD400-SE, A9K-MOD400-TR, A9K-MOD400-CM) and on bay 0 of the 200-Gigabit Line Card (A9K-MOD200-SE, A9K-MOD200-TR).

This MPA supports 10X10 and 2X40 breakout configuration.



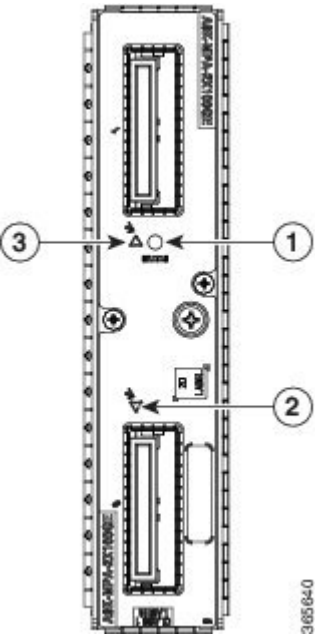
Note

- V02 version of the CFP2-DCO module is introduced. V02 version of the optical module supports Staircase FEC. Staircase FEC is an industry standard that enables high-speed optical communications. The version ID information of the optical module can be obtained from the output of the `show inventory` command output.
- This MPA does not support 1X40 breakout configuration.
- The CFP2 Digital Coherent Optics (DCO) are supported with the following hardware versions (VID):

Line Card PID	MPA PID	MPA Hardware Version (VID)
A9K-MOD200-TR A9K-MOD200-SE A9K-MOD400-TR A9K-MOD400-SE	A9K-MPA-2x100GE	V04
A9K-MOD400-CM	A9K-MPA-2x100GE-CM	V02

Each CFP2 cage on the MPA has an adjacent A/L (Active/Link) LED visible on the front panel. The A/L LED indicates the status of the associated CFP2 port and the Status LED indicates the status for the MPA.

Figure 29: 2-Port 100-Gigabit Ethernet Modular Port Adapter with CFP2



1	Status LED	3	A/L (Active/Link) LED
2	A/L (Active/Link) LED		

The following table shows the LED behavior when interface type is 100G:

Table 17: LED Behavior When Interface Type is 100G

Port LED State	Status
Off	Port is shutdown.
Red	100G interface is in down state.
Green	100G interface is in up state.
Blinking Green and Amber	100G interface is up and carrying traffic.

The following table shows the LED behavior when breakout is configured:

Table 18: LED Behavior When Breakout is Configured

Port LED State	Status
Off	Ports are shutdown.
Red	Link is down for at least one of the enabled ports.
Green	At least one port is enabled and link is up on all enabled ports.
Blinking Green and Amber	Traffic is flowing on at least one enabled ports and no enabled ports are down

You can use a CFP2 adapter to connect the CPAK transceivers to the MPA. The router only detects a connected CPAK transceiver module and does not detect the physically intermediate CFP2 adapter. The show inventory command shows the connected CPAK transceiver module.

This table lists the CFP2 adapters and the supported CPAK modules:

CFP2 Adaptor	Supported CPAK transceiver module
CVR-CFP2-CPAK4	CPAK-100G-LR4 CPAK-100G-ER4L CPAK-100G-CWDM4
CVR-CFP2-CPAK10	CPAK-100G-SR10 CPAK-10X10G-LR CPAK-10X10G-ERL



Caution

Plugging a non-supported CPAK to a CFP2 adapter can damage the CFP2 adapter. Ensure that you read the PID label on the CFP2 adapter carefully.

**Caution**

We recommend that you wait for 60 seconds before successive insertion or removal of optics. Failing to follow this recommendation may affect the functionality of optics.

**Caution**

The metal surfaces of CPF2-DCO modules may exhibit high temperatures and thus be unsafe for handling with bare hands.

For more information about how to remove the CFP2-DCO module, see [Safe Removal of CFP2-DCO Modules](#).

20-Port Gigabit Ethernet Modular Port Adapter with SFP

The 20-Port Gigabit Ethernet (GE) modular port adapter (MPA) provides 10 double-stacked SFP (20 total) cages that support either fiber-optic or copper GE transceivers.

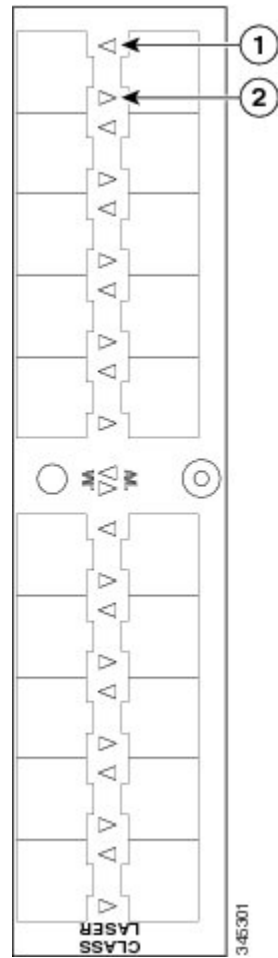
Each SFP cage on the 20-Port GE MPA has an adjacent A/L (Active/Link) LED visible on the front panel. The A/L LED indicates the status of the associated SFP port, as described in table *20-Port Gigabit Ethernet MPA LEDs*. See [Technical Specifications](#) for a list of all SFP modules supported on the 20x1GE modular port adapter.

**Note**

Note: This MPA is not compatible with the consumption-model MOD400 line card.

The following figure shows the 20-Port GE MPA and corresponding LEDs.

Figure 30: 20-Port Gigabit Ethernet Modular Port Adapter



1	A/L (Active/Link) LED	2	Status LED
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Table 19: 20-Port Gigabit Ethernet MPA LEDs

LED Label	Color	State	Meaning
A/L	Off	Off	Port is not enabled.
	Green	On	Port is enabled and the link is up. The MPA A/L (Active/Link) LED will blink green and amber when there is traffic activity.
	Amber	On	Port is enabled and the link is down.
STATUS	Off	Off	Modular port adapter power is off.
	Green	On	Modular port adapter is ready and operational.

	Amber	On	Modular port adapter power is on and good, and modular port adapter is being configured.
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2-Port 10-Gigabit Ethernet Modular Port Adapter with XFP

The 2-Port 10-Gigabit Ethernet (GE) modular port adapter (MPA) provides two cages for XFP Ethernet optical interface modules that operate at a rate of 10 Gbps. The two XFP modules can be 10GE multimode or single mode connections.

Each XFP cage on the 4-Port 10GE MPA has an adjacent A/L (Active/Link) LED visible on the front panel. The A/L (Active/link) LED indicates the status of the associated XFP port, as described in the below table *2-Port 10-Gigabit Ethernet MPA LEDs*, and a Status LED for the MPA as shown in the following figure.

Figure 31: 2-Port 10-Gigabit Ethernet Modular Port Adapter

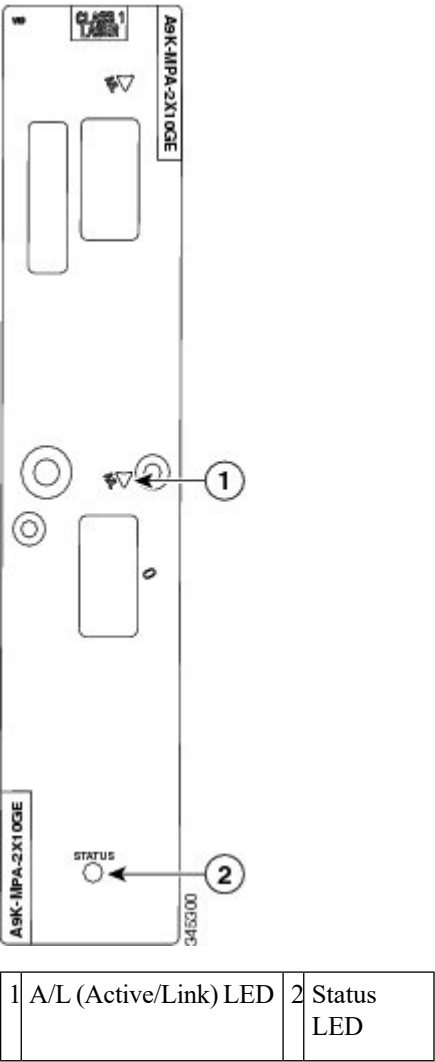


Table 20: 2-Port 10-Gigabit Ethernet MPA LEDs

LED Label	Color	State	Meaning
A/L	Off	Off	Port is not enabled.
	Green	On	Port is enabled and the link is up. The MPA A/L (Active/Link) LED will blink green and amber when there is traffic activity.
	Red	On	Port is enabled and the link is down.
STATUS	Off	Off	Modular port adapter power is off.
	Green	On	Modular port adapter is ready and operational.
	Amber	On	Modular port adapter power is on and good, and the modular port adapter is being configured.

4-Port 10-Gigabit Ethernet Modular Port Adapter with XFP

The 4-Port 10-Gigabit Ethernet (GE) modular port adapter (MPA) provides four cages for XFP Ethernet optical interface modules that operate at a rate of 10 Gbps. The four XFP modules can be 10GE multimode or single mode connections.

The MPA has two types of LEDs: an A/L (Active/Link) LED for each individual port and a Status LED for the MPA as shown in the following figure. The A/L LED indicates the status of the associated XFP port, as described in the below table *4-Port 10-Gigabit Ethernet MPA LEDs*.

Figure 32: 4-Port 10-Gigabit Ethernet Modular Port Adapter

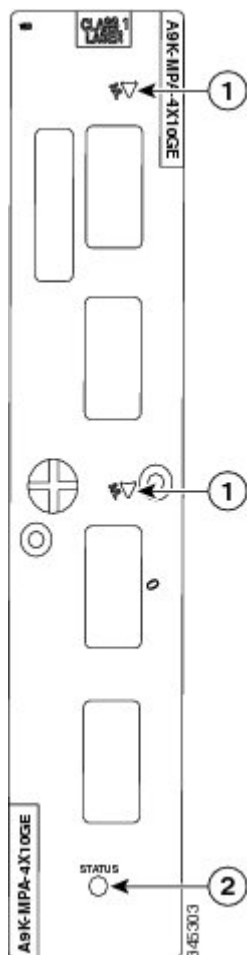


Table 21: 4-Port 10-Gigabit Ethernet MPA LEDs

LED Label	Color	State	Meaning
A/L	Off	Off	Port is not enabled.
	Green	On	Port is enabled and the link is up. The MPA A/L (Active/Link) LED will blink green and amber when there is traffic activity.
	Amber	On	Port is enabled and the link is down.
STATUS	Off	Off	Modular port adapter power is off.
	Green	On	Modular port adapter is ready and operational.
	Amber	On	Modular port adapter power is on and good, and the modular port adapter is being configured.

8-Port 10-Gigabit Ethernet Modular Port Adapter with SFP+

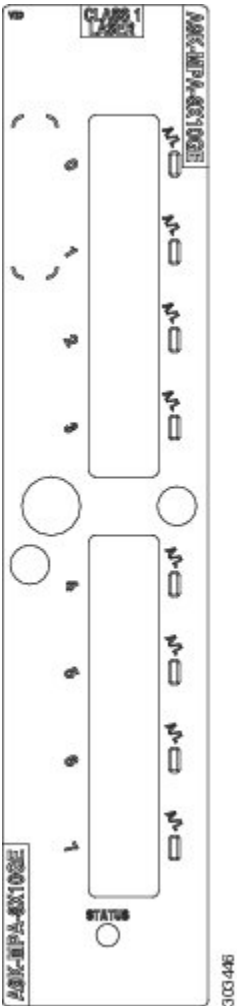


Note Each SFP+ cage on the 8-Port 10GE MPA has an adjacent A/L (Active/Link) LED of the card as shown in the following figure



Note This MPA is not compatible with MOD400 consumption-model line card

Figure 33: 8-Port 10-Gigabit Ethernet Modular Port Adapter



1	A/L (Active/Link) LED	2	Status LED
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Table 22: 8-Port 10-Gigabit Ethernet MPA LEDs

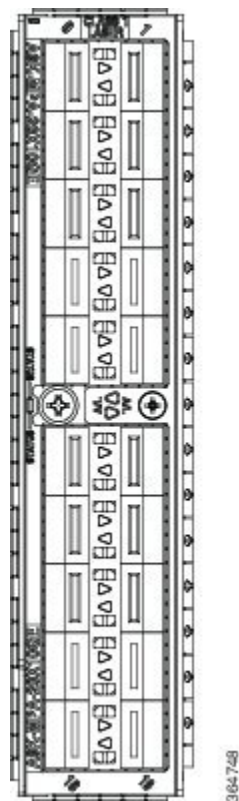
LED Label	Color	State	Meaning
A/L	Off	Off	Port is not enabled.
	Green	On	Port is enabled and the link is up.
	Amber	On	Port is enabled and the link is down.
STATUS	Off	Off	MPA power is off.
	Green	On	MPA is ready and operational.
	Amber	On	The MPA power is on and working is being configured.

20-Port 10-Gigabit Ethernet Modular Port Adapter with SFP+

The 20-Port 10-Gigabit Ethernet (GE) modular port adapter (MPA) provides two 2x5 double-stacked cages for SFP+ Ethernet optical interface modules.

Each SFP+ cage on the 20-Port 10GE MPA has an adjacent A/L (Active/Link) LED visible on the front panel of the card as shown in the following figure. The A/L (Active/Link) LED indicates the status of the associated SFP+ port, as described in [Modular Port Adapter LEDs](#).

Figure 34: 20-Port 10-Gigabit Ethernet Modular Port Adapter with SFP+



Note

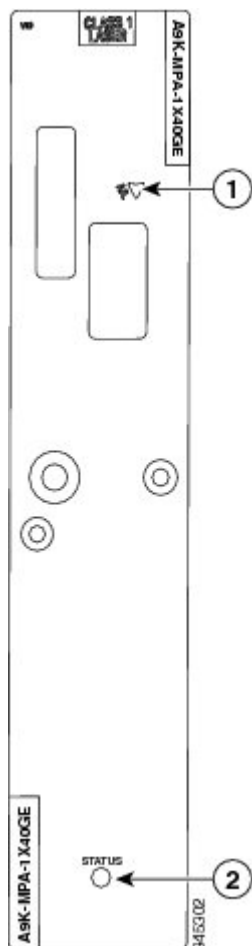
LED status could be wrong when a port is put into loopback internal mode on Gigabit Ethernet interface for 20x1EP. Loopback internal is used for debugging purpose.

1-Port 40-Gigabit Ethernet Modular Port Adapter with QSFP+

The 1-Port 40-Gigabit Ethernet (GE) modular port adapter (MPA) provides a cage for a QSFP+ Ethernet optical interface module that operates at a rate of 40 Gbps. The QSFP+ module can support either a 40GE multimode connection or a 40GE single mode connection.

Each QSFP cage on the 1-Port 40GE MPA has an adjacent A/L (Active/Link) LED visible on the front panel. The A/L LED indicates the status of the associated QSFP port, as described in *1-Port 40-Gigabit Ethernet MPA LEDs* table below and a Status LED as shown in the following figure.

Figure 35: 1-Port 40-Gigabit Ethernet Modular Port Adapter



1	A/L (Active/Link) LED	2	Status LED
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Table 23: 1-Port 40-Gigabit Ethernet MPA LEDs

LED Label	Color	State	Meaning
A/L	Off	Off	Port is not enabled.
	Green	On	Port is enabled and the link is up.
	Amber	On	Port is enabled and the link is down.
STATUS	Off	Off	Modular port adapter power is off.
	Green	On	Modular port adapter is ready and operational.
	Amber	On	Modular port adapter power is on and good, and the modular port adapter is being configured.

2-Port 40-Gigabit Ethernet Modular Port Adapter with QSFP+

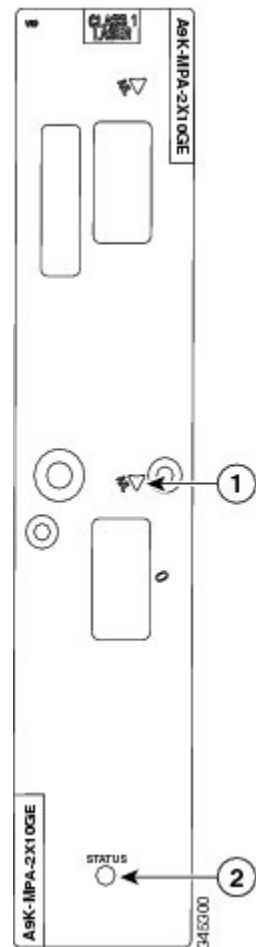
The 2-Port 40-Gigabit Ethernet (GE) modular port adapter (MPA) provides two cages for QSFP+ Ethernet optical interface modules that operate at a rate of 40 Gbps. The two QSFP+ modules can be 40-Gigabit Ethernet multimode or single mode connections.

Each QSFP cage on the MPA has an adjacent A/L (Active/Link) LED visible on the front panel. The A/L LED indicates the status of the associated QSFP port as described in *2-Port 40-Gigabit Ethernet MPA LEDs* table below, and a Status LED for the MPA as shown in the following figure.



Note Note: This MPA is not compatible with consumption-model MOD400 line card.

Figure 36: 2-Port 40-Gigabit Ethernet Modular Port Adapter



1	A/L (Active/Link) LED	2	Status LED
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Table 24: 2-Port 40-Gigabit Ethernet MPA LEDs

LED Label	Color	State	Meaning
A/L	Off	Off	Port is not enabled.
	Green	On	Port is enabled and the link is up.
	Amber	On	Port is enabled and the link is down.
STATUS	Off	Off	Modular port adapter power is off.
	Green	On	Modular port adapter is ready and operational.
	Amber	On	Modular port adapter power is on and good, and the modular port adapter is being configured.

32-Port Gigabit Ethernet Modular Port Adapter with MACsec

The 32-Port Gigabit Ethernet (GE) modular port adapter (MPA) provides support for MACsec security. The key functionality of this MPA is to provide MACsec feature over 32 ports of 1GE over 16 Compact SFP (CSFP) modules. This MPA uses dual channel 1GE Compact-SFP technology (CSFP) to increase the port density. Along with CSFP, this MPA also supports all other types of traditional SFPs.

This MPA is supported on MOD 200 and OD 400 line cards.

Each SFP cage on the 32-Port GE MPA has an adjacent A/L (Active/Link) LED visible on the front panel. The A/L LED indicates the status of the associated SFP port.

Figure 37: SFP Ports on 32-Port Gigabit Ethernet Modular Port Adapter with MACsec

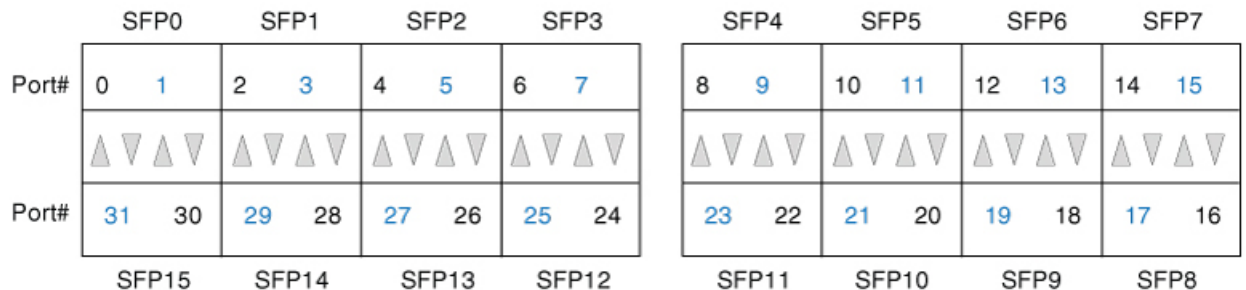
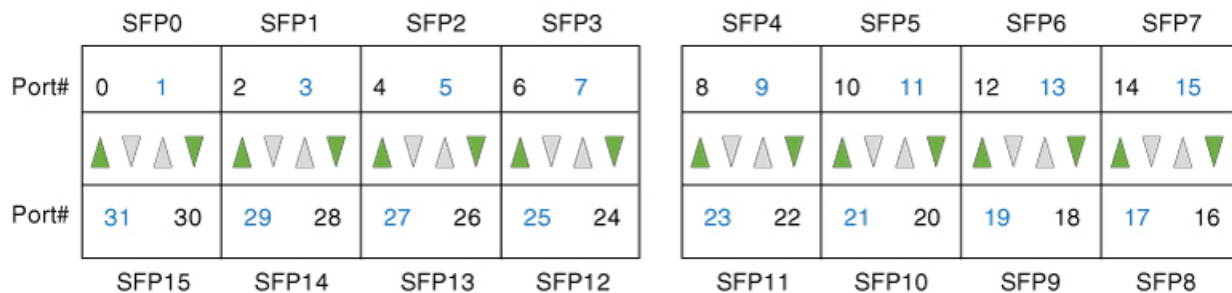


Figure 38: SFP Ports with Link Up on a 32-Port Gigabit Ethernet Modular Port Adapter with MACsec

The SFP slot 0 slot starts from top left and increments towards right till SFP slot 7. The SFP slot 8 is at the bottom right and increments towards left till SFP slot 15. If all SFP optics are plugged in, then port numbers are in even starting from 0 to 31 [For example: Starting from slot 0,2,4,6,8 till slot 30].

It is possible to have a mix of SFP and CSFP optics in this MPA. If all SFP slots are populated with SFPs, the number of slots is 16.

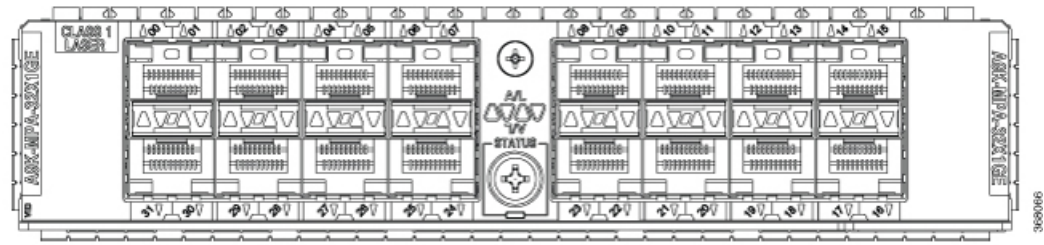
Figure 39: SFP and CSFP Ports on a 32-Port Gigabit Ethernet Modular Port Adapter with MACsec

If all the CSFP ports are used, the port numbering will be contiguous from slot 0 to 31.

Figure 40: CSFP Ports on a 32-Port Gigabit Ethernet Modular Port Adapter with MACsec

The following figure shows the 32-Port GE MPA and corresponding LEDs.

Figure 41: 32-Port Gigabit Ethernet MPA with MACsec



LED Label	Color	State	Meaning
A/L	Off	Off	Port is not enabled.
	Green	On	Port is enabled and the link is up. The MPA A/L (Active/Link) LED will blink green and amber when there is traffic activity.
	Red	On	Port is enabled and the link is down.
STATUS	Off	Off	Modular port adapter power is off.
	Green	On	Modular port adapter is ready and operational.
	Amber	On	Modular port adapter power is on and good, and modular port adapter is being configured.

Compatibility Matrix for MOD 200 and MOD 400 Line Cards

The following tables list the MPAs supported with MOD200 (A9K-MOD200-SE, A9K-MOD200-TR) and MOD400 (A9K-MOD400-SE, A9K-MOD400-TR) line cards.

Table 25: MPA supported on A9K-MOD200-SE and A9K-MOD200-TR

Bay 0	Bay 1
2x100G-MPA	None
20x10G-MPA	

Bay 0	Bay 1
1x100G-MPA	1x100G-MPA
8x10G-MPA	8x10G-MPA
4x10G-MPA	4x10G-MPA
2x10G-MPA	2x10G-MPA
2x40G-MPA	2x40G-MPA
1x40G-MPA	1x40G-MPA
20x1G-MPA	20x1G-MPA
A9K-MPA-32X1GE	A9K-MPA-32X1GE

Table 26: MPAs Supported on A9K-MOD400-SE and A9K-MOD400-TR

Bay 0	Bay 1
20x10G-MPA	20x10G-MPA
2x100G-MPA	2x100G-MPA
1x100G-MPA	1x100G-MPA
8x10G-MPA	8x10G-MPA
4x10G-MPA	4x10G-MPA
2x10G-MPA	2x10G-MPA
2x40G-MPA	2x40G-MPA
1x40G-MPA	1x40G-MPA
20x1G-MPA	20x1G-MPA
A9K-MPA-32X1GE	A9K-MPA-32X1GE



Note 100G CPAK modules, CPAK-100G-ER4L and CPAK-100G-CWDM4, are supported on 100G line cards from Release 6.3.2 onwards. Refer to [CPAK module support table](#) for more information.

The following table lists the MPAs supported with consumption-model MOD400 (A9K-MOD400-CM) line card.



Note The consumption-model MPAs can only be used only with consumption-model line cards.

Table 27: MPAs Supported on A9K-MOD400-CM

Bay 0	Bay 1
A9K-MPA20X10GE-CM	A9K-MPA20X10GE-CM

Bay 0	Bay 1
A9K-MPA2X100GE-CM	A9K-MPA2X100GE-CM