Cisco QSFP Pluggable Protection Switch Module (PSM)

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The Cisco® QSFP Pluggable Protection Switch Module (PSM) is a protection switch in a pluggable form factor. In addition to standard multiplex and fiber-path protection, it supports wavelength-selective channel protection, integrated monitoring, and flexible MPO-to-LC connectivity.

Product overview

A protection switch module sends the common transmit signal over working and protection paths, then selects the receive path delivered to the common interface. The Cisco QSFP Pluggable PSM brings this function into a Quad Small Form-Factor Pluggable (QSFP) form factor, allowing protection to scale with host-port density and helping reduce reliance on a separate PSM shelf.

The hardware is designed for channel, multiplex, and fiber-path protection with automatic switching, forced manual switching, and lockout. Channel mode locks monitoring to a provisioned wavelength and can detect loss of that wavelength even when other channels remain present, enabling use with colorless and contentionless add/drop architectures. Multiplex and fiber-path modes use conventional total-power criteria.

On transmit, COM-RX is split toward W-TX and P-TX through independent variable optical attenuators. On receive, the module selects W-RX or P-RX and routes it through a receive attenuator to COM-TX. An APC MPO-12 male interface carries common, working, protection, and check signals, with direct MPO-to-LC cables and passive breakout options for labeled LC access.

Features and benefits

- **Pluggable protection form factor:** Reduces reliance on a separate PSM shelf.
- **3-mode protection hardware:** Supports channel, multiplex, and fiber-path designs.
- **Selected-channel wavelength intelligence:** Protects one channel behind colorless and contentionless add/drop.
- **Flexible switching controls:** Automates switching or accepts manual force and lockout.
- **Integrated optical controls:** Monitors power and balances or shuts off paths.
- **Flexible connection choices:** Supports direct fanouts and passive LC breakouts.

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Protection operation

All three protection modes use the same working and protection optical paths. Operators can configure automatic switching or explicitly force and lock a path for maintenance or recovery. The switching criterion changes by mode, and software availability is release-dependent.

Table 1. Protection modes and software availability

Protection mode	Switching criterion and operation	Software availability
Channel	Locks monitoring to a provisioned channel wavelength and switches from selected-channel power. Supports automatic, forced-manual, and lockout operation.	Supported with Cisco IOS® XR Software Release 26.3.1.
Multiplex	Uses total optical power across the Wavelength Division Multiplexing (WDM) multiplex for conventional working/protection switching. Supports automatic, forced-manual, and lockout operation.	Planned for Cisco IOS XR Software Release 27.2.1.
Fiber path	Uses conventional total-power criteria to protect a complete optical path. Supports automatic, forced-manual, and lockout operation.	Planned for Cisco IOS XR Software Release 27.2.1.

Feature availability depends on the host platform, line card, and installed software. Verify availability in the applicable Cisco release notes before deployment.

Platform and software support

Table 2. Platform and software support

Product family	Supported host	Software support
Cisco Network Convergence System (NCS) 1000 Series	Cisco NCS 1014 with a qualified QSFP port on a supported high-density line card.	IOS XR 26.3.1: Channel protection. IOS XR 27.2.1: Multiplex qualification planned. Fiber-path availability: Verify availability in current release notes.

Warranty information

Product warranty terms and other information are available at cisco.com/go/warranty.

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Product sustainability

Table 3. Cisco environmental sustainability information

Sustainability topic	Product information	Reference
Power	5.5W maximum operating power; 1W maximum low-power-mode consumption	Product specifications

Product specifications

Table 4. Product specifications

Parameter	Specification
Module and optical interface	QSFP protection switch module; single-mode APC MPO-12 male; common, working, protection, and check signals through one front-panel connector.
Protection modes	Channel-selective, multiplex, and fiber-path protection; automatic or forced-manual switching; lockout; revertive or nonrevertive behavior. Software availability is release-dependent.
Wavelength and channel ranges	Optical paths: 1500 to 1628 nm; selected-channel monitoring: 1520 to 1610 nm. Supports full C-Band and full L-Band operation.
Selected-channel operation	Monitors power at the provisioned receive-channel wavelength. Up to 16 channels can be present at the receive inputs.
Passive optical performance	Wavelength- and polarization-dependent loss: 0.5 dB maximum each at Variable Optical Attenuator (VOA) = 0 dB; chromatic dispersion: -5 to +5 ps/nm; Polarization Mode Dispersion (PMD): 0.2 ps maximum; crosstalk, directivity, and return loss: 40 dB minimum each.
Variable optical attenuators	0 to 15 dB range; 0.1 dB resolution; 35 dB minimum shutoff attenuation.
Optical switch settling time	4 ms maximum from management command to 90% of reference power at COM-TX; not an end-to-end restoration guarantee.
Optical power monitoring	COM-RX: -23 to +27 dBm; COM-TX: -40 to +20 dBm; W/P-TX: -25 to +25 dBm; W/P-RX total: -35 to +23 dBm; accuracy: ±0.5 dB.

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Parameter	Specification
Selected-channel monitoring	-25 to +5 dBm per channel and -30 to -4 dBm per 12.5 GHz; up to 16 channels; +15 dBm aggregate maximum.
Electrical and management	3.10V to 3.47V; 5.5W maximum operating power; 1W maximum low-power-mode consumption; host-managed diagnostics, alarms, and status.
Environment	Operating: 0° to 70°C (32° to 158° F), 10% to 90% Relative Humidity (RH), 0 to 3050 m. Storage: -40° to 85°C (-40° to 185° F), 5% to 95% RH, 0 to 9144 m; humidity is noncondensing.

Table 5. Optical-path insertion loss

Optical-path insertion loss	Typical	Maximum
COM-RX to W-TX or P-TX	6.1 dB	6.5 dB
W-RX or P-RX to COM-TX	3.5 dB	4.0 dB
W-RX to CHK-W-TX or P-RX to CHK-P-TX	20 dB	23.5 dB

Insertion-loss values cover C- and L-band operation and include the module connector unless noted. Main-path values apply with the VOA set to 0 dB under the specified worst-case operating conditions.

Table 6. Simplified optical layout and port labeling

Module input	Internal optical function	Module output
COM-RX ->	1x2 split with independent working and protection transmit VOAs.	-> W-TX and P-TX
W-RX or P-RX ->	Selected-channel or total-power monitoring, 1x2 receive selector, and receive VOA.	-> COM-TX
W-RX and P-RX monitor taps ->	Receive-path check outputs.	-> CHK-W-TX and CHK-P-TX

All eight optical signals share the module's front-panel APC MPO-12 male connector.

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Table 7. Front-view MPO-12 fiber assignment

MPO fiber	Signal	MPO fiber	Signal
10	COM-RX	9	COM-TX
8	CHK-P-TX	7	CHK-W-TX
6	W-RX	5	W-TX
4	P-RX	3	P-TX

The interface drawing does not assign signals to MPO fibers 1, 2, 11, or 12.

Cabling and breakout options

Table 8. Supported connection options

Connection option	Ports and interconnection	Recommended use
ONS-MPO-6LC-3= direct cable, 3 m **ONS-MPO-8LC-2= direct cable, 2 m**	MPO-12 to three LC-duplex pairs labeled W-TX/W-RX, P-TX/P-RX, and COM-TX/COM-RX.	Direct channel or fiber-path protection connection.
ONS-MPO-8LC-2= direct cable, 2 m	MPO-12 to eight LC connectors labeled W-TX/W-RX, P-TX/P-RX, COM-TX/COM-RX, CHK-W-TX, and CHK-P-TX.	Direct multiplex protection connection with all eight module signals exposed.
ONS-MF-MPO-8LC= dual passive breakout	Two PSM MPO inputs; each LC bank exposes working, protection, common, and check ports. Connect with 15454-MPO-MPO-2= or ONS-12MPO-MPO-2= patch cords.	Structured LC breakout for any protection mode and flexible patch-cord reach.
NCS2K-MF-MPO-8LC= existing monitored breakout	Connect through 15454-MPO-MPO-2= or ONS-12MPO-MPO-2=. Port groups map to working, protection, common, and check pairs.	Reuse an existing Cisco NCS 2000 Series MPO-to-LC breakout for any protection mode.

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Table 9. System requirements

Component	Description
Host platform and port	Cisco NCS 1014 with a qualified QSFP port on a supported line card.
Software and capability	Cisco IOS XR Release 26.3.1 supports channel protection. Multiplex qualification is planned for Release 27.2.1; review current release notes for fiber-path availability.
Optical connection	Single-mode fiber; APC MPO-12; compatible 1500-to-1628-nm signals; and a qualified cable or breakout listed above.
Channel-protection wavelength	Provision the protected channel within the 1520-to-1610-nm monitoring range.

Ordering information

Table 10. Ordering information

Product ID	Product description
ONS-QSFP-PSM2=	Cisco QSFP pluggable protection switch module for two-path protection
ONS-MPO-6LC-3=	Cisco MPO-to-6-LC breakout cable, 3 m
ONS-MPO-8LC-2=	Cisco MPO-to-8-LC breakout cable, 2 m
ONS-MF-MPO-8LC=	Cisco dual passive MPO-to-8-LC mechanical-frame breakout
15454-MPO-MPO-2=	Cisco MPO-to-MPO multifiber patch cord, 2 m
ONS-12MPO-MPO-2=	Cisco 12-fiber MPO-to-MPO patch cord, 2 m
NCS2K-MF-MPO-8LC=	Cisco NCS 2000 MPO-to-8-LC fanout unit with integrated monitoring

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