

# 400G Coherent Pluggable Optics Use Cases

## Supercharge and simplify high-speed transport networks

QSFP-DD pluggable transceivers with 400G coherent optical technology deliver breakthrough capabilities that transform how companies with high traffic demands architect their transport networks.

With ever-increasing data traffic, web-scale, metro-area, and long-haul network operators are realizing benefits from 400ZR and 400ZR+ coherent pluggable optics that provide cost-effective, compact, and power-efficient alternatives to standalone DWDM transponders. By integrating coherent technology into pluggable transceivers, DWDM functionality can be implemented directly in today's high-scale/ high-capacity routers and can be deployed in standard 400G QSFP-DD ports, yielding much lower cost per bit.

The Cisco® portfolio of QSFP-DD coherent pluggable optics supercharges and simplifies transport networks for an array of use cases across data center interconnect, metro-area access and aggregation, and long-haul networks and is a key component of the Cisco Routed Optical Networking solution. These compact, modular transceivers offer flexible plug-and-play deployment and growth options and are compliant with OIF 400ZR, 400G OpenZR+, and Open ROADM specifications.



## Benefits

- Increase 400G wavelength capacity without interfering or changing existing line systems
- Reduce cost, complexity, and power consumption for high-capacity network transport
- Maximize router port density and wavelength utilization by plugging coherent optics into QSFP-DD ports
- Align coherent optics and routing life cycles across 400G, 800G and future high capacity platforms

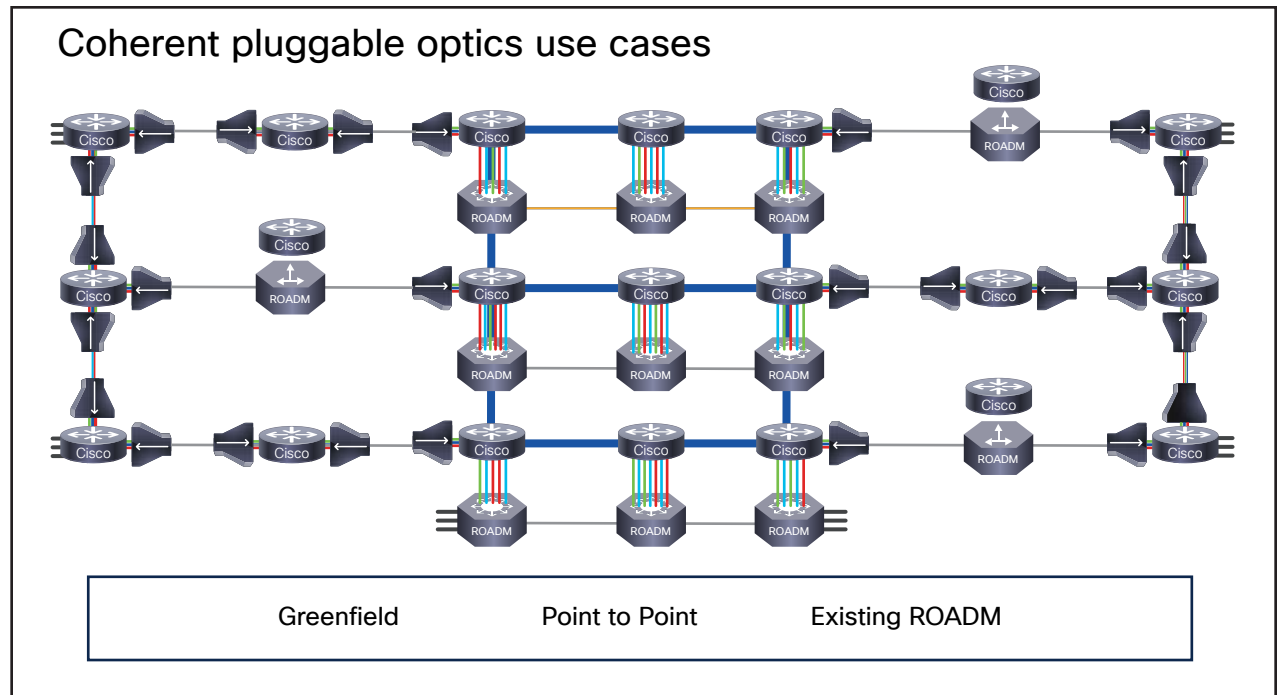


Figure 1. Point-to-point and ROADM use cases for coherent pluggable optics

## Use cases for coherent pluggable optics

Cisco offers several models of 400G QSFP-DD coherent pluggable optics that are designed for increasing capacity across point-to-point or Reconfigurable Optical Add/Drop Multiplexer (ROADM) networks characterized by varying distance and insertion loss:

### 1. Point-to-point connections

Cisco QSFP-DD 400G ZR transceiver modules

- Cost-optimized and standardized for simple network designs.

- Reach up to 120 km with amplified links with up to 25.6T capacity per fiber pair.
- Examples: data center interconnect and data center-to-peering sites.



### Cisco QSFP-DD 400G ZR+ transceiver modules

- Configurable modulation and dispersion tolerance for optimization across various fiber links.
- High-performance Forward Error Correction (FEC) for longer transmission distances.
- Reach up to 1000km at 400G with amplified links to meet metro and regional needs.
- Examples: metro and regional networks and data center interconnect.

### Cisco QSFP-DD ZR+ High-Tx Power transceiver modules

- Integrated optical amplifier offers higher transmission power and longer reach.
- Reach up to 1200km at 400G and compatible with any type of DWDM infrastructure.
- Examples: data center interconnect across longer reaches without amplification.

### Cisco QSFP-DD 400G ER1

- Transmit a single wavelength of 400Gbps connectivity up to 45km distance
- Examples: unamplified point-to-point dark fiber applications including datacenter interconnect, campus interconnect, wireless backhaul and metro access/aggregation.

### 2. Existing ROADM infrastructure

#### Cisco QSFP-DD ZR+ High-Tx Power transceiver modules

- Designed for ROADM, long distance, and brownfield networks.
- High transmission power of 1dBm compatible with deployed ROADM networks.
- Reach up to 1200km at 400G and compatible with any type of DWDM infrastructure.

- Integrated optical amplifier offers higher transmission power and longer reach.
- Examples: metro and regional brownfield Colorless, Directionless, Contentionless (CDC) ROADM networks requiring interoperability with existing transponders and line systems.

## Learn more

See [Cisco 400G QSFP-DD ZR/ZR+ modules](#) [400G QSFP-DD ZR+ High-TX Power](#) and [400G QSFP-DD ER1 modules](#) for detailed product information.

Visit [Cisco Optics](#) to learn more about Cisco coherent pluggable optics.