

QSFP-4X10GE-SR

Part number: 740-054053

Optics Overview

Juniper Networks offers a complete portfolio of modular and fixed-chassis routers and switches for both WAN and data center networks. These solutions span Juniper’s MX-Series Universal Routing Platform and PTX-Series Packet Transport Routers to EX-Series Ethernet Switches and QFX-Series Data Center Switches among others. Depending on deployment scenarios, Juniper’s platforms support different pluggable optic modules that can be selected based on speed, distance, form-factor, and wavelength among other relevant attributes.

Additional Resources

Hardware Compatibility Tool

HCT contains a regularly updated database of Juniper’s transceivers, DACs, and AOCs along with information regarding compatibility with Juniper’s platforms and interface modules.

<https://apps.juniper.net/hct/home/>

Product Description

40G QSFP+ breakout into 4x10GBASE SR Ethernet module

Overview

Part Number	740-054053
Speed	4 x 10 Gigabit Ethernet, 40 Gigabit Ethernet
Breakout Capable	Yes
Transceiver Type	QSFP+
Product Type	Optical Transceiver
Connector	MPO-12
Monitoring Available	Yes
Digital Optical Monitoring	Yes

Note:

- Monitoring Available - Can measure received optical power and display in CLI.
- Digital Optical Monitoring - Full support for SFF-8636.
- Common Optic - The common optics product line provides competitively priced single-SKU optics offerings for use across Juniper routing, switching, and security platforms.

Specifications

Standard: 10GBASE-SR

Diagnostic support	Yes	
Signaling rate, each lane	9.95328 +/- 20 ppm 10.3125 GBd +/-100 ppm	
Transmitter wavelengths (range)	840 nm through 860 nm	
Receive lane wavelengths (range)	840 nm through 860 nm	
Transmitter output power, each lane (minimum)	-7.3 dBm	
Transmitter output power, each lane (maximum)	-1.3 dBm	
Receiver input power, each lane (minimum)	-9.9 dBm	
Receiver input power, each lane (maximum)	-1.0 dBm	
Optical Transmitter 3-dB spectral width (maximum)	0.45 nm	
Cable type	MMF	
Core size/cladding	50/125 μ m	
Fiber grade	OM3	OM4
Effective modal bandwidth	2000 MHz x km	4700 MHz x km
Distance	300 m	400 m
Maximum Power consumption (W)	3.5 W	
Operating Temperature (range)	0° C to 70° C	
Storage temperature	-40° C to 85° C	

Supported Platforms

Platform	Introduced Release	Additional Information
Routing		
ACX5000 Breakout Supported		
ACX7100-32C Breakout Supported	Junos OS Evolved 21.2R1	
ACX7100-48L Breakout Supported	Junos OS Evolved 21.1R1	
MX204 Breakout Supported	Junos OS 17.4R1	
MX240 Breakout Supported	Junos OS 15.1F5	
MX304 Breakout Supported	Junos OS 22.2R1	Starting in 23.R1, QSFPP-4X10GE-SR are qualified to be used as 4x1G breakout paired with 1G-SX (link budget of 1.8 dB over 70m OM3 MMF and 100m OM4 MMF.)
MX480 Breakout Supported	Junos OS 15.1F5	
MX960 Breakout Supported	Junos OS 15.1F5	
MX2008 Breakout Supported	Junos OS 15.1F7	
MX2010 Breakout Supported	Junos OS 15.1F5	
MX2020 Breakout Supported	Junos OS 15.1F5	
MX10003 Breakout Supported	Junos OS 17.3R1	
MX10004 Breakout Supported	Junos OS 22.3R1	
MX10008 Breakout Supported	Junos OS 18.2R1	
MX10016 Breakout Supported	Junos OS 19.2R1	

Platform	Introduced Release	Additional Information
PTX10001-36MR Breakout Supported	Junos OS Evolved 20.2R1	
PTX1000 Breakout Supported	Junos OS 16.1X65-D30	
PTX3000 Breakout Supported		
PTX5000 Breakout Supported		
PTX10002-60C Breakout Supported	Junos OS 18.2R1	
PTX10003 Breakout Supported	Junos OS Evolved 19.1R1	
PTX10004 Breakout Supported	Junos OS Evolved 20.3R1	
PTX10008 Breakout Supported	Junos OS Evolved 20.3R1 Junos OS 17.2R1	
PTX10016 Breakout Supported	Junos OS Evolved 21.2R2 Junos OS 17.4R1	
Security		
SRX4600 Breakout Supported	Junos OS 17.4R2	
SRX5400 Breakout Supported	Junos OS 19.3R1	
SRX5600 Breakout Supported	Junos OS 19.3R1	
SRX5800 Breakout Supported	Junos OS 19.3R1	
Switching		
EX4300 Multigigabit Breakout Supported	Junos OS 19.3R1	
EX4400 Breakout Supported	Junos OS 23.2R1	
EX4400-48T Breakout Supported	Junos OS 23.2R1	

Platform	Introduced Release	Additional Information
EX4400-24T Breakout Supported	Junos OS 23.2R1	
EX4400 Multigigabit Breakout Supported	Junos OS 23.2R1	
EX4400-24X Breakout Supported	Junos OS 23.2R1	
EX4400-48F Breakout Supported	Junos OS 23.2R1	
EX4550 Breakout Supported		
EX4600 Breakout Supported		
EX9204 Breakout Supported	Junos OS 12.3R2	
EX9208 Breakout Supported	Junos OS 12.3R2	
EX9214 Breakout Supported	Junos OS 12.3R2	
QFX3500 Breakout Supported		
QFX5100 Breakout Supported		
QFX5110 Breakout Supported	Junos OS 18.3R1	
QFX5120-32C Breakout Supported	Junos OS 20.3R1	
QFX5130-32CD Breakout Supported	Junos OS Evolved 22.2R1	
QFX5120-48T Breakout Supported	Junos OS 20.3R1 Junos OS 20.3R1	Only ports 50 and 51 support 4x10G.
QFX5120-48Y Breakout Supported	Junos OS 20.3R1	
QFX5120-48YM Breakout Supported	Junos OS 22.2R1	

Platform	Introduced Release	Additional Information
QFX5200-32C Breakout Supported	Junos OS 18.3R1	
QFX5210-64C Breakout Supported	Junos OS 22.2R1	
QFX5220-32CD Breakout Supported	Junos OS Evolved 22.2R1	
QFX5220-128C Breakout Supported	Junos OS Evolved 22.2R1	
QFX5700 Breakout Supported	Junos OS Evolved 22.2R1	
QFX10002 Breakout Supported		
QFX10008 Breakout Supported		
QFX10016 Breakout Supported		

Supported Interface Modules

Flexible PIC Concentrators (FPCs)

Name	Description	Platforms and Introduced Releases
40 Gigabit Ethernet		
QFX5K-FPC-16C	16X100G linecard for QFX5700 chassis	QFX5700 Junos OS Evolved 22.2R1 Breakout Supported
QFX5K-FPC-4CD	4X400G linecard for QFX700 chassis	QFX5700 Junos OS Evolved 22.2R1 Breakout Supported

Name	Description	Platforms and Introduced Releases
4 x 10 Gigabit Ethernet		
QFX5K-FPC-16C	16X100G linecard for QFX5700 chassis	QFX5700 Junos OS Evolved 22.2R1 Breakout Supported
QFX5K-FPC-4CD	4X400G linecard for QFX700 chassis	QFX5700 Junos OS Evolved 22.2R1 Breakout Supported

I/O cards (IOCs)

Name	Description	Platforms and Introduced Releases				
40 Gigabit Ethernet						
SRX5K-IOC4-MRAT	SRX5K-IOC4-MRAT is a fixed-configuration interface card with a Packet Forwarding Engine that provides up to 480-Gbps (240-Gbps per PIC slot) line rate. This interface card provides scalability in bandwidth and services to the SRX5400, SRX5600, and SRX5800 Services Gateways. Note: SRX5K-IOC4-MRAT cards do not support plug-in Modular Interface Cards (MICs).</br>	<table border="0"> <tr> <td>SRX5400 Junos OS 19.3R1 Breakout Supported</td> <td>SRX5600 Junos OS 19.3R1 Breakout Supported</td> </tr> <tr> <td>SRX5800 Junos OS 19.3R1 Breakout Supported</td> <td></td> </tr> </table>	SRX5400 Junos OS 19.3R1 Breakout Supported	SRX5600 Junos OS 19.3R1 Breakout Supported	SRX5800 Junos OS 19.3R1 Breakout Supported	
SRX5400 Junos OS 19.3R1 Breakout Supported	SRX5600 Junos OS 19.3R1 Breakout Supported					
SRX5800 Junos OS 19.3R1 Breakout Supported						
4 x 10 Gigabit Ethernet						
SRX5K-IOC4-MRAT	SRX5K-IOC4-MRAT is a fixed-configuration interface card with a Packet Forwarding Engine that provides up to 480-Gbps (240-Gbps per PIC slot) line rate. This interface card provides scalability in bandwidth and services to the SRX5400, SRX5600, and SRX5800 Services Gateways. Note: SRX5K-IOC4-MRAT cards do not support plug-in Modular Interface Cards (MICs).</br>	<table border="0"> <tr> <td>SRX5400 Junos OS 19.3R1 Breakout Supported</td> <td>SRX5600 Junos OS 19.3R1 Breakout Supported</td> </tr> <tr> <td>SRX5800 Junos OS 19.3R1 Breakout Supported</td> <td></td> </tr> </table>	SRX5400 Junos OS 19.3R1 Breakout Supported	SRX5600 Junos OS 19.3R1 Breakout Supported	SRX5800 Junos OS 19.3R1 Breakout Supported	
SRX5400 Junos OS 19.3R1 Breakout Supported	SRX5600 Junos OS 19.3R1 Breakout Supported					
SRX5800 Junos OS 19.3R1 Breakout Supported						

Line Cards

Name	Description	Platforms and Introduced Releases	
40 Gigabit Ethernet			
EX9200-12QS	A line card with six 40-Gigabit Ethernet rate-selectable ports, each of which can house transceivers	EX9204 Junos OS 16.1R1 Breakout Supported	EX9208 Junos OS 16.1R1 Breakout Supported
EX9200-15C	Fixed-configuration line card with 15 rate-selectable ports. All ports can operate at 10-Gbps, 25-Gbps, 40-Gbps, or 100-Gbps speeds. The ports are configured to operate at 100-Gbps speed by default.	EX9204 Junos OS 20.3R1 Breakout Supported	EX9208 Junos OS 20.3R1 Breakout Supported
EX9200-6QS	A line card with six 40-Gigabit Ethernet ports and 24 10-Gigabit Ethernet ports	EX9204 Junos OS 12.3R2 Breakout Supported	EX9208 Junos OS 12.3R2 Breakout Supported
MX10K-LC2101	JNP10008/MX10008 24x100G/24x40G/96x10G Line Card	MX10008 Junos OS 18.2R1 Breakout Supported	MX10016 Junos OS 19.2R1 Breakout Supported
MX10K-LC9600	The MX10K-LC9600 (Model number: JNP10K-LC9600) is a fixed-configuration 24-port line card, which provides a line rate throughput of 9.6 Tbps	MX10004 Junos OS 22.3R1 Breakout Supported	MX10008 Junos OS 21.4R1 Breakout Supported
PTX10K-LC1101	30x100G/30x40G Line Card	PTX10008 Junos OS 17.2R1 Breakout Supported	PTX10016 Junos OS 17.4R1 Breakout Supported

Name	Description	Platforms and Introduced Releases	
PTX10K-LC1102	36X40G/12X100G Line Card	PTX10008 Junos OS 17.2R1 Breakout Supported	PTX10016 Junos OS 17.4R1 Breakout Supported
PTX10K-LC1105	PTX10K 3Tbps MACse Line Card - 30x100G/30x40G	PTX10008 Junos OS 17.4R2 Breakout Supported	PTX10016 Junos OS 18.3R1 Breakout Supported
PTX10K-LC1202-36MR	36-port line card that has thirty-two QSFP28 ports capable of supporting 100-Gbps speed, and four QSFP56-DD ports capable of supporting 400-Gbps speed	PTX10004 Junos OS Evolved 20.4R1 Breakout Supported PTX10016 Junos OS Evolved 21.2R2 Breakout Supported	PTX10008 Junos OS Evolved 20.3R1 Breakout Supported
4 x 10 Gigabit Ethernet			
EX9200-12QS	A line card with six 40-Gigabit Ethernet rate-selectable ports, each of which can house transceivers	EX9204 Junos OS 16.1R1 Breakout Supported EX9214 Junos OS 16.1R1 Breakout Supported	EX9208 Junos OS 16.1R1 Breakout Supported
EX9200-15C	Fixed-configuration line card with 15 rate-selectable ports. All ports can operate at 10-Gbps, 25-Gbps, 40-Gbps, or 100-Gbps speeds. The ports are configured to operate at 100-Gbps speed by default.	EX9204 Junos OS 20.3R1 Breakout Supported EX9214 Junos OS 20.3R1 Breakout Supported	EX9208 Junos OS 20.3R1 Breakout Supported
EX9200-6QS	A line card with six 40-Gigabit Ethernet ports and 24 10-Gigabit Ethernet ports	EX9204 Junos OS 12.3R2 Breakout Supported EX9214 Junos OS 12.3R2 Breakout Supported	EX9208 Junos OS 12.3R2 Breakout Supported

Name	Description	Platforms and Introduced Releases	
MX10K-LC2101	JNP10008/MX10008 24x100G/24x40G/96x10G Line Card	MX10004 Junos OS 22.3R1 Breakout Supported	MX10008 Junos OS 18.2R1 Breakout Supported
		MX10016 Junos OS 19.2R1 Breakout Supported	
MX10K-LC9600	The MX10K-LC9600 (Model number: JNP10K-LC9600) is a fixed-configuration 24-port line card, which provides a line rate throughput of 9.6 Tbps	MX10004 Junos OS 22.3R1 Breakout Supported	MX10008 Junos OS 21.4R1 Breakout Supported
MX304-LMIC16	The MX304-LMIC16-BASE is a 16-port line card that supports maximum data throughput of 1.6 TB ingress and 1.6 TB egress	MX304 Junos OS 22.2R1 Breakout Supported	
PTX10K-LC1101	30x100G/30x40G Line Card	PTX10008 Junos OS 17.2R1 Breakout Supported	PTX10016 Junos OS 17.4R1 Breakout Supported
PTX10K-LC1102	36X40G/12X100G Line Card	PTX10008 Junos OS 17.2R1 Breakout Supported	PTX10016 Junos OS 17.4R1 Breakout Supported
PTX10K-LC1105	PTX10K 3Tbps MACse Line Card - 30x100G/30x40G	PTX10008 Junos OS 17.4R2 Breakout Supported	PTX10016 Junos OS 18.3R1 Breakout Supported
PTX10K-LC1202-36MR	36-port line card that has thirty-two QSFP28 ports capable of supporting 100-Gbps speed, and four QSFP56-DD ports capable of supporting 400-Gbps speed	PTX10004 Junos OS Evolved 20.4R1 Breakout Supported	PTX10008 Junos OS Evolved 20.3R1 Breakout Supported
		PTX10016 Junos OS Evolved 21.2R2 Breakout Supported	

Modular Interface Cards (MICs)

Name	Description	Platforms and Introduced Releases	
40 Gigabit Ethernet			
EX9200-10XS-MIC	EX9200 MIC, 10-port 10GbaseX (Half-slot)	EX9204 Junos OS 12.3R2 Breakout Supported EX9214 Junos OS 12.3R2 Breakout Supported	EX9208 Junos OS 12.3R2 Breakout Supported
JNP-MIC1	12x100G/12x40G/48x10G Universal MIC	MX10003 Junos OS 17.3R1 Breakout Supported	
JNP-MIC1-MACSEC	12x100G/12x40G/48x10G Universal MACSEC MIC	MX10003 Junos OS 17.3R2 Breakout Supported	
MIC-MACSEC-MRATE	8x100G/12x40G/48x10G MACSEC MIC for MX2K	MX2008 Junos OS 17.4R1 Breakout Supported MX2020 Junos OS 17.4R1 Breakout Supported	MX2010 Junos OS 17.4R1 Breakout Supported
MIC-MRATE	MIC MRATE	MX2008 Junos OS 15.1F7 Breakout Supported MX2020 Junos OS 16.1R1 Breakout Supported	MX2010 Junos OS 16.1R1 Breakout Supported

Name	Description	Platforms and Introduced Releases	
4 x 10 Gigabit Ethernet			
EX9200-10XS-MIC	EX9200 MIC, 10-port 10GbaseX (Half-slot)	EX9204 Junos OS 12.3R2 Breakout Supported	EX9208 Junos OS 12.3R2 Breakout Supported
		EX9214 Junos OS 12.3R2 Breakout Supported	
JNP-MIC1	12x100G/12x40G/48x10G Universal MIC	MX10003 Junos OS 17.3R1 Breakout Supported	
JNP-MIC1-MACSEC	12x100G/12x40G/48x10G Universal MACSEC MIC	MX10003 Junos OS 17.3R2 Breakout Supported	
MIC-MACSEC-MRATE	8x100G/12x40G/48x10G MACSEC MIC for MX2K	MX2008 Junos OS 17.4R1 Breakout Supported	MX2010 Junos OS 17.4R1 Breakout Supported
		MX2020 Junos OS 17.4R1 Breakout Supported	
MIC-MRATE	MIC MRATE	MX2008 Junos OS 15.1F7 Breakout Supported	MX2010 Junos OS 16.1R1 Breakout Supported
		MX2020 Junos OS 16.1R1 Breakout Supported	

Modular Port Concentrators (MPCs)

Name	Description	Platforms and Introduced Releases	
40 Gigabit Ethernet			
MPC10E-10C	MPC10E-10C-MRATE/MPC10E-10C-P-BASE, 10 x QSFP28/QSFP56-DD multirate port line card	MX240 Junos OS 19.2R1 Breakout Supported MX960 Junos OS 19.2R1 Breakout Supported	MX480 Junos OS 19.2R1 Breakout Supported
MPC10E-15C	MPC10E-15C-MRATE/MPC10E-15C-P-BASE, 15 x QSFP28/QSFP56-DD multirate port line card	MX240 Junos OS 19.1R1 Breakout Supported MX960 Junos OS 19.1R1 Breakout Supported	MX480 Junos OS 19.1R1 Breakout Supported
MPC7E-MRATE	MPC7E (Multi-Rate)	MX240 Junos OS 16.1R1 Breakout Supported MX960 Junos OS 16.1R1 Breakout Supported MX2010 Junos OS 16.1R1 Breakout Supported	MX480 Junos OS 16.1R1 Breakout Supported MX2008 Junos OS 15.1F7 Breakout Supported MX2020 Junos OS 16.1R1 Breakout Supported
MX2K-MPC11E	The MX2K-MPC11E is a fixed-configuration Module Port Concentrator (MPC) which delivers bandwidth up to 4-Tbps per MPC slot for MX2020 and MX2010 routers.	MX2010 Junos OS 20.1R1 Breakout Supported	MX2020 Junos OS 20.1R1 Breakout Supported

Name	Description	Platforms and Introduced Releases	
4 x 10 Gigabit Ethernet			
MPC10E-10C	MPC10E-10C-MRATE/MPC10E-10C-P-BASE, 10 x QSFP28/QSFP56-DD multirate port line card	MX240 Junos OS 19.2R1 Breakout Supported MX960 Junos OS 19.2R1 Breakout Supported	MX480 Junos OS 19.2R1 Breakout Supported
MPC10E-15C	MPC10E-15C-MRATE/MPC10E-15C-P-BASE, 15 x QSFP28/QSFP56-DD multirate port line card	MX240 Junos OS 19.1R1 Breakout Supported MX960 Junos OS 19.1R1 Breakout Supported	MX480 Junos OS 19.1R1 Breakout Supported
MPC7E-MRATE	MPC7E (Multi-Rate)	MX240 Junos OS 16.1R1 Breakout Supported MX960 Junos OS 16.1R1 Breakout Supported MX2010 Junos OS 16.1R1 Breakout Supported	MX480 Junos OS 16.1R1 Breakout Supported MX2008 Junos OS 15.1F7 Breakout Supported MX2020 Junos OS 16.1R1 Breakout Supported
MX2K-MPC11E	The MX2K-MPC11E is a fixed-configuration Module Port Concentrator (MPC) which delivers bandwidth up to 4-Tbps per MPC slot for MX2020 and MX2010 routers.	MX2010 Junos OS 20.1R1 Breakout Supported	MX2020 Junos OS 20.1R1 Breakout Supported

Physical Interface Cards (PICs)

Name	Description	Platforms and Introduced Releases	
40 Gigabit Ethernet			
P2-10G-40G-QSFP	10-Gigabit Ethernet/40-Gigabit Ethernet LAN/WAN OTN PIC with QSFP+ (PTX Series)	PTX3000 Junos OS 15.1F6 Breakout Supported	PTX5000 Junos OS 14.1R2 Breakout Supported

Name	Description	Platforms and Introduced Releases	
P3-10-U-QSFP28	10-Port 10-Gigabit Ethernet, 40-Gigabit Ethernet, 100-Gigabit Ethernet PIC with QSFP28 (PTX Series)	PTX3000 Junos OS 16.1R3 Breakout Supported	PTX5000 Junos OS 17.1R1 Breakout Supported
P3-15-U-QSFP28	15 Port 10-Gigabit, 40-Gigabit Ethernet, 100-Gigabit Ethernet PIC with QSFP28 (PTX Series)	PTX5000 Junos OS 15.1F5 Breakout Supported	
P3-24-U-QSFP28	24 Port 10-Gigabit Ethernet, 40-Gigabit Ethernet PIC with QSFP+ (PTX Series)	PTX3000 Junos OS 15.1F6 Breakout Supported	PTX5000 Junos OS 15.1F3 Breakout Supported
4 x 10 Gigabit Ethernet			
P2-10G-40G-QSFP	10-Gigabit Ethernet/40-Gigabit Ethernet LAN/WAN OTN PIC with QSFP+ (PTX Series)	PTX3000 Junos OS 15.1F6 Breakout Supported	PTX5000 Junos OS 14.1R2 Breakout Supported
P3-10-U-QSFP28	10-Port 10-Gigabit Ethernet, 40-Gigabit Ethernet, 100-Gigabit Ethernet PIC with QSFP28 (PTX Series)	PTX3000 Junos OS 16.1R3 Breakout Supported	PTX5000 Junos OS 17.1R1 Breakout Supported
P3-15-U-QSFP28	15 Port 10-Gigabit, 40-Gigabit Ethernet, 100-Gigabit Ethernet PIC with QSFP28 (PTX Series)	PTX5000 Junos OS 15.1F5 Breakout Supported	
P3-24-U-QSFP28	24 Port 10-Gigabit Ethernet, 40-Gigabit Ethernet PIC with QSFP+ (PTX Series)	PTX3000 Junos OS 15.1F6 Breakout Supported	PTX5000 Junos OS 15.1F3 Breakout Supported

Uplink Modules

Name	Description	Platforms and Introduced Releases
40 Gigabit Ethernet		
EX-UM-2QSFP-MR	EX4300MP 2-port 40GbE QSFP+/1-port 100GbE QSPF28 Uplink Module for EX4300-48MP	EX4300 Multigigabit Junos OS 19.3R1 Breakout Supported

Name	Description	Platforms and Introduced Releases
4 x 10 Gigabit Ethernet		
EX-UM-2QSFP-MR	EX4300MP 2-port 40GbE QSFP+/1-port 100GbE QSPF28 Uplink Module for EX4300-48MP	EX4300 Multigigabit Junos OS 19.3R1 Breakout Supported

Why buy optics from Juniper?

There is value in choosing Juniper over 3rd party optics

✓ Full testing, validation, and JTAC support for Juniper optics

- Power, Electrical, and Management interfaces tested at the system level.
- Extended temperature and functional testing in DVT chamber using fully loaded systems.
- Full software integration into JUNOS/EVO for seamless part recognition, functionality, and telemetry.
- Latest qualification status and optics specifications published on [Hardware Compatibility Tool](#).

✓ Single-source provider for 1G to 400G on a variety of optical technologies

- Juniper's optics portfolio is maintained and constantly refreshed based on vendor availability.
- Automatic supply chain diversity and supply continuity - multiple optics suppliers fulfilled through Juniper.

✓ Rigorous evaluation of optical vendors

- Juniper ensures uniformity across all vendors by standardizing P-Specs for management, specs, and logs.
- Vendors are scored based on engineering and supply-chain analysis.
- Factory audits and critical component evaluation (Ex. Who is supplying the laser?).

Aren't 3rd party optics the same?

Optics may be a commodity, but some things are too good to be true

× Juniper does not Provide JTAC support for 3rd party optics

- JTAC will only assist with host-related issues unrelated to the use of 3rd party optics.

× Not all optics are the same - standards compliance does not guarantee quality or performance

- Third-party providers lack system-level knowledge and testing.
- No guarantee of vendor reliability or accountability.

× Newer technologies (ex. Coherent 400G ZR/ZR+) are complex and not simply plug-and-play

- Significant software integration necessary to enable full functionality, management, and telemetry.
- Use of unqualified 3rd party high-power optics can damage the host equipment.

× Third-party providers simply can't scale

- Incomplete solution offerings and fast turnaround times only for limited quantities.

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