

# Cisco NCS 1004 High-Density QSFP-DD Transponder

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Video traffic continues to grow rapidly. Nearly two-thirds of the global population will have internet access by 2023. There will be 5.3 billion total internet users (66 percent of global population) by 2023, up from 3.9 billion (51 percent of global population) in 2018. Each year, various new devices in different form factors with increased capabilities and intelligence are introduced and adopted in the market. Networks need to be designed with “web scale” in mind. A web-scale network needs to scale at deployment speed while being operationally simple. The Cisco Network Convergence System (NCS) 1004 High-Density QSFP-DD Transponder provides the largest flexibility to transport any kind of different service along with complete automation and real-time visibility to deliver a multipurpose/multifunctional card for a variety of different applications.

## Product overview

The Cisco NCS 1004 High-Density QSFP-DD Transponder (Figure 1) is a single-slot line card capable of supporting 16xQSFP-DD ports, -8xQSFP-DD client ports with 400GE, 100GE and OTU4 interfaces (available in roadmap) and 8xQSFP-DD trunk ports.

Each NCS 1004 chassis provide four line card slots, and the Cisco NCS 1004 High-Density QSFP-DD Transponder can be placed in any of them to fill maximum capacity of the shelf (4x).



**Figure 1.**  
NCS 1004 High-Density QSFP-DD Transponder

The Cisco NCS 1004 High-Density QSFP-DD Transponder line card supports the following optics on client and trunk: QSFP-DD, QDD-ZR, QDD-ZR+, QDD-ZR++, QSFP-100G-LR-S, QSFP-100G-FR-S, and QSFP-100G-DR-S.

The line card supports the following functionalities:

1. 8 x 400GE Transponder
2. 8 x 4 x 100GE Muxponder
3. 100GE Transponder mode
4. 4 x ZR/ZR+/ZR++ regens (available in roadmap)
5. Encryption with 0dBm QSFP-DD

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## Management

The Cisco NCS 1004 provides comprehensive management capabilities to support Operations, Administration, Maintenance, and Provisioning (OAM&P) capabilities through IOS XR CLI, SNMP, syslog, and XML. In addition, iPXE for automated software download and Zero-Touch Provisioning (ZTP) for automated configuration download are available for simplified installation. For machine-to-machine configuration and management of NCS 1004, NETCONF, RESTCONF, and gRPC transport protocols with JSON, XML, and GPB encoding are provided. OpenConfig protocols for management GNMI and operations GNOI are also supported. The NCS 1004 provides a set of native YANG models as well as the ability to map into any industry standard or customer-defined YANG data models. For monitoring, NCS 1004 provides a streaming telemetry feature that relies on a push mechanism to disseminate user-selected PM and status information at user-specified frequencies at granular 10-second intervals. This improves monitoring speed and scale compared to traditional pull-based mechanisms such as SNMP. The telemetry infrastructure also allows for events such as alarms and port-state changes to be notified.

The NCS 1004 High-Density QSFP-DD Transponder can be managed completely using CLI or XML.

OpenConfig is supported for 4x100GE MXP and 400GE TXP configurations.

In the upcoming software releases, the line card is capable of supporting remote node management with GCC Functionality, and the line card is capable of supporting AES-256 encryption of the data with IKEv2 between two end points.

## Performance monitoring

The Cisco NCS 1004 supports performance monitoring of optical parameters on the client and DWDM line interface, including laser bias current, transmit, and receive optical power. Ethernet RMON statistics for the client ports and OTN error counters for the trunk are also available. Calculation and accumulation of the performance-monitoring data are supported in 15-minute and 24-hour intervals as per G.7710.

## Wavelength tunability

The line interface supports software-provisionable tunability across the full C band, covering 96 channels across 191.25 to 196.10 THz (1528.77 to 1566.72 nm).

## Key elevator pitch

The Cisco NCS 1004 High-Density QSFP-DD Transponder takes advantage of DCO optics innovation without router dependency and compliment high-performance transponder cards with low-cost, low-power, dense, and simple TXP/MXP options.

The typical use cases for the line card includes:

- Customer router infrastructure that is not 400G ready
- Web/MSDC niche use cases
- Optical transport applications at service providers
- Encryption use cases
- Regen use cases in the Cisco Routed Optical Network

## Licensed transponder

The Cisco NCS 1004 High-Density QSFP-DD Transponder supports both smart and electronic licensing. The base licensed hardware will not have any capacity by default. The user must purchase incremental QDD trunk licenses – unencrypted and encrypted. There is no distinction between MXP, TXP, or regen modes.

The following licenses shall be purchased:

S-N1K-QXP-TRK-L=: Smart license for NCS 1004 QDD-TXP trunk

E-N1K-QXP-TRK-L=: E-delivery license for NCS 1004 QDD-TXP trunk

S-N1K-QXP-TRKE-L=: Smart license for NCS 1004 encrypted QDD-TXP trunk

E-N1K-QXP-TRKE-L=: E-delivery license for NCS 1004 encrypted QDD-TXP trunk

## Feature summary

The following table summarizes the features of the NCS 1004 High-Density QSFP-DD Transponder.

Feature	Description
<b>Software Compatibility</b>	<ul style="list-style-type: none"><li>• Cisco IOS XR 7.7.1 or later</li></ul>
<b>Port Density</b>	<ul style="list-style-type: none"><li>• 8 QSFP-DD client and 8 QSFP-DD trunk ports</li></ul>
<b>Line Card Functionality</b>	<ul style="list-style-type: none"><li>• 8 x 400GE Transponder</li><li>• 8 x 4 x 100GE Muxponder</li><li>• 100GE Transponder mode</li><li>• 8 x ZR/ZR+/ZR++ regens (available in roadmap)</li></ul>
<b>OTN Feature Summary</b>	<ul style="list-style-type: none"><li>• Alarm reporting for Loss of Signal (LOS), Loss of Frame (LOF), Loss of Multiform (LOM), Alarm Indication Signal (AIS), Backward Defect Indicator (BDI)</li><li>• OTUk, ODUk, OPUk Performance Monitoring</li><li>• Threshold Crossing Alerts (TCAs)</li><li>• Local (internal) and line (network) loopbacks</li><li>• Trunk Trace Identifier, Generic Communication Channel</li></ul>
<b>Ethernet Feature Summary</b>	<ul style="list-style-type: none"><li>• Alarms and Performance Monitoring</li><li>• Squelch and Local Fault Propagation</li><li>• LLDP Snooping</li><li>• Performance Monitoring and Threshold Crossing Alerts (TCAs)</li><li>• Local (internal) and line (network) loopbacks</li></ul>
<b>Availability</b>	<ul style="list-style-type: none"><li>• Headless mode of operation</li></ul>
<b>Network Management</b>	<ul style="list-style-type: none"><li>• iPXE and Zero-Touch Provisioning (ZTP)</li><li>• IOS XR CLI</li><li>• SNMP</li><li>• Streaming telemetry, including event-driven telemetry</li><li>• NETCONF, RESTCONF, gRPC with YANG data models</li></ul>
<b>Physical Dimensions</b>	<ul style="list-style-type: none"><li>• Occupies 1 of the 4 line card slots of the NCS 1004 or NCS1004-4S 2RU chassis</li></ul>
<b>Environmental Conditions</b>	Operating temperature: 0 to 40°C (32 to 104°F)

## Product specifications

**Table 1.** NCS 1004 High-Density QSFP-DD Transponder specifications

Physical		
<b>Power Consumption</b>		
<b>Transponder card with NCS1004 Chassis (with client and trunk optics)</b>	Typical: 345W	Maximum: 382W
<b>Transponder card with high-power NCS 1004 chassis (with client and trunk optics)</b>	Typical: 447W	Maximum: 494W
<b>Other Physical Parameters</b>		
<b>Dimensions</b>	Height: 6.4 in.; width: 11 in.; depth: 1.09 in.	
<b>Weight</b>	7.32 lb	
<b>Storage Temperature</b>	-5 to 55° C	
<b>Operating Temperature</b>		
<b>Normal</b>	0 to 40° C (32 to 104° F)	
<b>Relative humidity</b>		
<ul style="list-style-type: none"> <li>• Normal</li> <li>• Short-term<sup>1</sup></li> </ul>	5% to 85%, noncondensing 5% to 90% but not to exceed 0.024 kg water/kg of dry air	
<sup>1</sup> Short-term refers to a period of not more than 96 consecutive hours and a total of not more than 15 days in 1 year (a total of 360 hours in any given year, but no more than 15 occurrences during that 1-year period).		

## Regulatory compliance

The following table lists regulatory compliance information for the trunk card. Note that all compliance documentation may not be completed at the time of product release. Please check with your Cisco sales representative for countries other than Canada, the United States, and the European Union.

**Table 2.** NCS 1004 High-Density QSFP-DD Transponder regulatory compliance

ANSI System	ETSI System
<b>Countries and Regions Supported</b>	
Canada United States Korea Japan European Union	European Union Africa CSI Australia New Zealand China Korea India Saudi Arabia South America
<b>EMC (Emissions)</b>	FCC 47CFR15, Class A AS/NZS CISPR 22, Class A CISPR 22, Class A EN55022, Class A ICES-003, Class A VCCI, Class A KN 22, Class A CNS-13438, Class A
<b>EMC (Immunity)</b>	IEC/EN61000-4-2 Electrostatic Discharge Immunity IEC/EN61000-4-3 Radiated Immunity IEC/EN61000-4-4 EFT-B Immunity IEC/EN61000-4-5 Surge AC Port IEC/EN61000-4-6 Immunity to Conducted Disturbances IEC/EN61000-4-11 Voltage Dips, Short Interruptions, and Voltage Variations KN 24

ANSI System	ETSI System
<b>EMC (ETSI/EN)</b>	EN 300 386 Telecommunications Network Equipment (EMC) EN55022 Information Technology Equipment (Emissions) EN55024/CISPR 24 Information Technology Equipment (Immunity) EN50082-1/EN61000-6-1 Generic Immunity Standard EN61000-3-2 Power Line Harmonics EN61000-3-3 Voltage Changes, Fluctuations, and Flicker
<b>Safety</b>	
CSA C22.2 #60950-1 - Edition 7, March 2007 UL 60950-1 - Edition 2, 2014	IEC 60950-1 Information technology equipment Safety Part 1: General requirements - Edition 2, 2005 + Amendment 1 2009 + Amendment 2 2013 EN 60950-1: Edition 2 (2006) Information technology equipment - Safety - Part 1: General requirements + A11:2009 + A1:2010 + A12:2011 + A2:2013 CE Safety Directive: 2006/95/EC
<b>Laser</b>	
21CFR1040 (2008/04) (Accession Letter and CDRH Report) Guidance for Industry and FDA Staff (Laser Notice No. 50), June 2007	IEC 60825-1: 2007 Ed. 2.0 Safety of laser products Part 1: Equipment classification, requirements, and users guide IEC60825-2 Ed.3.2 (2010) Safety of laser products Part 2: Safety of optical fiber communication systems
<b>Optical</b>	
ITU-T G.691	ITU-T G.975
<b>Quality</b>	
TR-NWT-000332, Issue 4, Method 1 calculation for 20-year Mean Time Between Failure (MTBF)	

## Ordering information

**Table 3.** NCS 1004 High-Density QSFP-DD Transponder line cards and license product ID

Part #	Product Description
<b>NCS1K4-QXP-K9=</b>	NCS1004 3.2T QSFP-DD DCO Transponder
<b>NCS1K4-QXP-L-K9=</b>	NCS1004 3.2T QSFP-DD DCO Licensed Transponder
<b>S-N1K-QXP-TRK-L=</b>	Smart License for NCS 1004 QDD-TXP Trunk
<b>E-N1K-QXP-TRK-L=</b>	E-delivery License for NCS 1004 QDD-TXP Trunk
<b>S-N1K-QXP-TRKE-L=</b>	Smart License for NCS 1004 Encrypted QDD-TXP Trunk
<b>E-N1K-QXP-TRKE-L=</b>	E-delivery License for NCS 1004 Encrypted QDD-TXP Trunk



**Table 4.** NCS 1004 High-Density QSFP-DD Transponder pluggable list

Part #	Product Description
QSFP-100G-SR4-S	100GBASE SR4 QSFP Transceiver, MPO, 100 m over OM4 MMF
QSFP-100G-LR4-S	100GBASE LR4 QSFP Transceiver, LC, 10 km over SMF
QSFP-100G-CWDM4-S	100GBASE CWDM4 QSFP Transceiver, LC, 2 km over SMF
QSFP-100G-ER4L-S	100GBASE QSFP Transceiver, 40 km reach over SMF, Duplex LC
QSFP-100G-PSM4-S	100GBASE PSM4 QSFP Transceiver, MPO, 500 m over SMF
QSFP-100G-SM-SR	100GBASE CWDM4 Lite QSFP Transceiver, 2 km over SMF, 10-60C
QSFP-100G-FR-S	100G QSFP28 Transceiver 100G-FR, 2 km SMF, duplex, LC
QDD-400G-DR4-S	400G QSFP-DD Transceiver, 400GBASE-DR4, MPO-12,500 m parallel
QDD-400G-FR4-S	400G QSFP-DD Transceiver, 400G-FR4, Duplex LC, 2 km Duplex SMF
QDD-400G-LR8	400G QSFP-DD Transceiver, 400GBASE-LR8, Duplex LC, 10 km Duplex
QDD-400-AOC1M	400G QSFP-DD Active Optical Cable, 1 m
QDD-400-AOC3M	400G QSFP-DD Active Optical Cable, 3 m
QDD-400-AOC5M	400G QSFP-DD Active Optical Cable, 5 m
QDD-400-AOC7M	400G QSFP-DD Active Optical Cable, 7 m
QDD-400-AOC10M	400G QSFP-DD Active Optical Cable, 10 m
QDD-400-AOC15M	400G QSFP-DD Active Optical Cable, 15M
QDD-400-AOC20M	400G QSFP-DD Active Optical Cable, 20M
QDD-400-AOC25M	400G QSFP-DD Active Optical Cable, 25M
QDD-400-AOC30M	400G QSFP-DD Active Optical Cable, 30M
QDD-400G-ZR-S	QSFP-DD Transceiver Module, Coherent DCO, 400G-ZR
QDD-400G-ZRP-S	QSFP-DD Transceiver Module, Coherent DCO, 400G-ZR+

## Warranty

The following warranty terms apply to the Cisco NCS 1004 High-Density Transponder as well as services you may use during the warranty period. Your formal warranty statement appears in the Cisco Information Packet that accompanies your Cisco product.

- Hardware warranty duration: 5 years
- Software warranty duration: 1 year
- Hardware replacement, repair, or refund procedure: Cisco or our service center will use commercially reasonable efforts to ship a replacement part for delivery within 15 working days after receipt of the defective product at Cisco’s site. Actual delivery times of replacement products may vary depending on customer location.

Product warranty terms and other information applicable to Cisco products are available at [www.cisco.com/go/warranty](http://www.cisco.com/go/warranty).

## Product sustainability

Information about Cisco’s environmental sustainability policies and initiatives for our products, solutions, operations, and extended operations or supply chain is provided in the “Environment Sustainability” section of Cisco’s **Corporate Social Responsibility** (CSR) Report.

Reference links to information about key environmental sustainability topics (mentioned in the “Environment Sustainability” section of the CSR Report) are provided in the following table:

**Table 5.** Cisco environmental sustainability information

Sustainability Topic		Reference
General	Information on product-material-content laws and regulations	<a href="#">Materials</a>
	Information on electronic waste laws and regulations, including our products, batteries, and packaging	<a href="#">WEEE Compliance</a>
	Information on product takeback and reuse program	<a href="#">Cisco Takeback and Reuse Program</a>
	Sustainability inquiries	Contact: <a href="mailto:csr_inquiries@cisco.com">csr_inquiries@cisco.com</a>
Power	Card power	<a href="#">Table 1: NCS 1004 High-Density QSEF-DD Transponder Specifications</a>
Material	Product packaging weight and materials	Contact: <a href="mailto:environment@cisco.com">environment@cisco.com</a>

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## Document history

New or Revised Topic	Described In	Date
First release of the NCS 1004 high density QSFP-DD transponder	Whole Datasheet	Feb 22, 2022.

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