

# Cisco Network Convergence System 4000 Series

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## Product Overview

The Cisco® Network Convergence System 4000 (NCS 4000) Series is a converged optical service platform providing Dense Wavelength-Division Multiplexing (DWDM), Optical Transport Network (OTN), Multiprotocol Label Switching (MPLS), Carrier Ethernet, and Label Switch Router (LSR) or IP multiservice capabilities (Figure 1). It delivers massive scale through a state-of-the-art silicon and system design, while offering dramatic network efficiency and simplification led by innovations in usability, automation, service management, turn-up, and monitoring.



Figure 1.  
Cisco NCS 4016 Chassis (Right) and NCS 4009 Chassis (Left)

To facilitate packet-optical integration, the form factor of the NCS 4000 Series is compliant with typical carrier environments, with a notably shallow footprint to address ANSI and ETSI transport equipment requirements. You can deploy the system in 19- or 23-in.-wide ANSI footprints and 600x600-mm-ETSI footprints.

Two chassis form factors are available:

- The Cisco NCS 4016 is a 24-Rack-Unit (24RU), rack-mountable solution offering 16 service line-card slots, each with a full-duplex bandwidth of 400 Gbps, with different cards for packet forwarding, OTN switching, and coherent DWDM transponder or trunk capability.
- The Cisco NCS 4009 is a 15-Rack-Unit (15RU), rack-mountable solution offering 9 service line-card slots, each with a full-duplex bandwidth of 400 Gbps, with different cards for packet forwarding, OTN switching, and coherent DWDM transponder or trunk capability.

Depending on the specific card configuration, the NCS 4000 Series supports numerous capabilities, including:

- Packet switching and routing
- OTN switching
- DWDM transponding and muxponding

You can use the NCS 4000 Series as a converged packet-optical platform by simultaneously combining all of these functions.

## Features and Benefits

The key capabilities of the Cisco NCS 4000 Series platform include:

- Packet switching: Packet switching includes IP transport, MPLS, LSR, and Carrier Ethernet, supporting 10, 40, and 100 Gigabit Ethernet interfaces with optional OTN (OTU-2, OTU-3, or OTU-4) encapsulation.
- OTN switching: OTN switching includes full optical channel data unit level 0 (ODU-0) switching with ports supporting SONET/SDH, Ethernet, and Channelized OTN; 10 Gigabit Ethernet (OTU-2), 40 Gigabit Ethernet (OTU-3), and 100 Gigabit Ethernet (OTU-4).
- Ultra-dense integrated DWDM: This feature offers full DWDM integration with support for IP-over-DWDM features including the Cisco nLight Control Plane Protocol.
- Hybrid traffic: OTN and packet switching can occur simultaneously, providing the ability to route or switch packet flows within a larger OTN container.
- Superior power efficiency: Cisco CPAK® pluggable transceivers and innovative silicon and power management solutions reduce power draw and increase density.

The Cisco NCS 4000 Series implements numerous architectural innovations, including:

- Agnostic fabric: This highly scalable fabric supports both packet and Time-Division Multiplexing (TDM) switching, plus shelf and multichassis scale to more than 100 Tbps.
- Virtualized infrastructure: This innovative hypervisor-based software architecture supports full decoupling of the control and data planes. The architecture supports service integration capabilities that offer considerable flexibility to deploy applications within the platform or in the cloud.
- Multichassis and Back-to-Back (B2B) configurations: In a multichassis configuration, the system can deliver more than 100 Tbps of fully nonblocking switching capacity in a configuration with 16 line-card chassis and 4 fabric chassis (16 + 4).
- Full In-Service Software Upgrade (ISSU) with Zero Topology Loss (ZTL) and Zero Packet Loss (ZPL): This feature offers improved adherence to Service-Level Agreements (SLAs) and performance of software upgrades without requiring a maintenance window. This robust ISSU capability applies to the WDM, TDM, and packet capabilities of the system.
- State-of-the-art backplane technology ready to scale to 800 Gbps per slot: This technology provides the ability to scale the system by a factor of four within the initial footprint.

The NCS 4000 Series integrates easily with the Cisco NCS 2000 Series for fully programmable Reconfigurable Optical Add-Drop Multiplexer (ROADM) functions. Integration can occur at the network element, control plane, and/or network management levels, meeting the diverse needs of widely varying operational models.

## Platform Architecture

### Cisco NCS 4016 Chassis

The NCS 4016 chassis is designed to accommodate:

- Two route processors, which also act as shelf controllers for WDM or OTN applications

- Four fabric cards
- Sixteen line cards

The NCS 4016 system supports four fabric cards, which are agnostic cross-connects based on a flexible cell-switching architecture, used in a Clos configuration. The route processors handle all control functions, including both the route-processing function and the line-card processing functions necessary for high-scale Layer 1, 2, and 3 services (Figure 2).

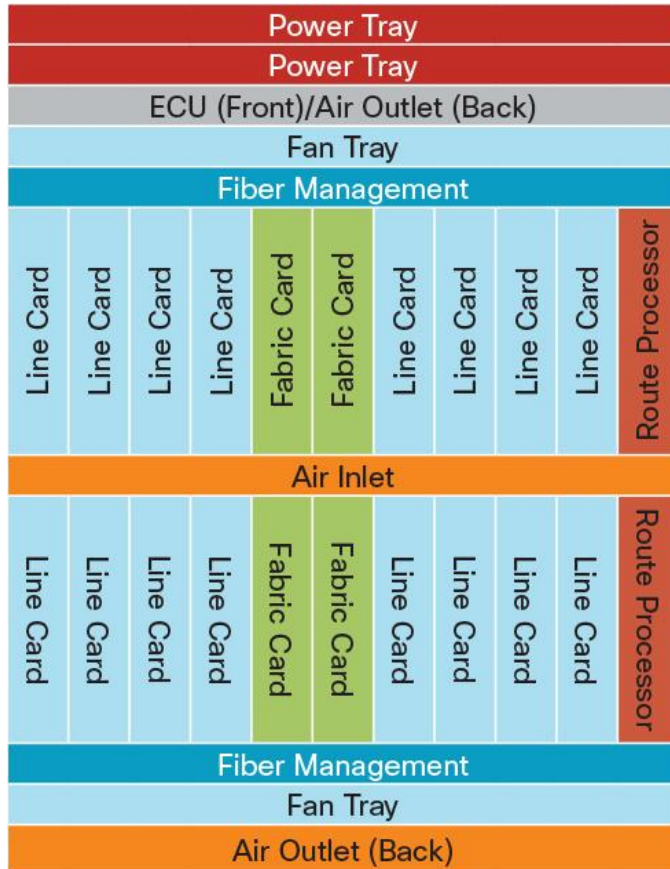


Figure 2.  
Cisco NCS 4016 Shelf Architecture

Each line card is connected through the backplane to each of the four fabrics, which operate in a 3 + 1 redundant configuration (Figure 3). Additional backplane connections are available to pair slots within each quadrant of the NCS 4016 chassis, allowing direct backplane interconnection of line cards without fabric access.

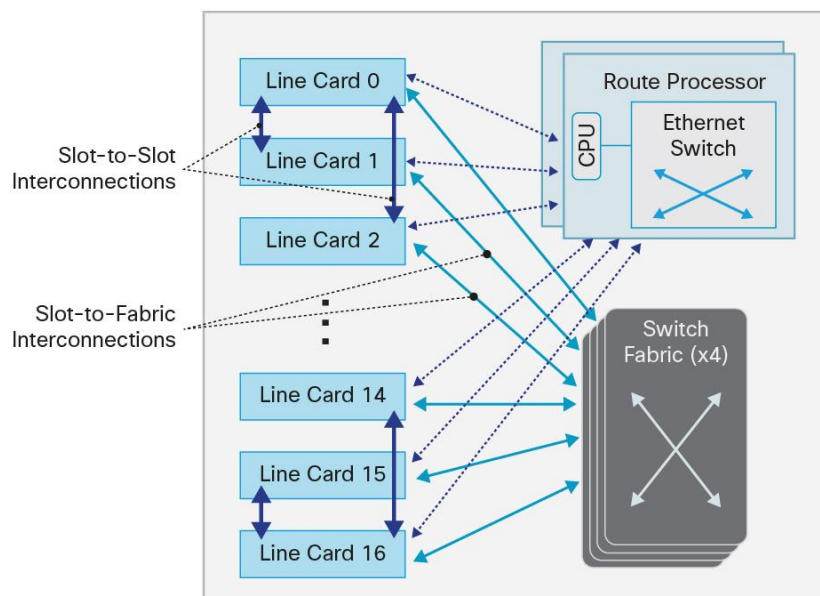


Figure 3.  
Cisco NCS 4016 Backplane Architecture

### Cisco NCS 4009 Chassis

The NCS 4009 chassis is designed to accommodate:

- Two route processors, which also act as shelf controllers for WDM or OTN applications
- Four fabric cards
- Nine line cards

The NCS 4009 system supports four fabric cards, which are agnostic cross-connects based on a flexible cell switching architecture. The route processors handle all control functions, including both the route-processing function and the line-card processing functions necessary for high-scale Layer 1, 2, and 3 services (Figure 4).

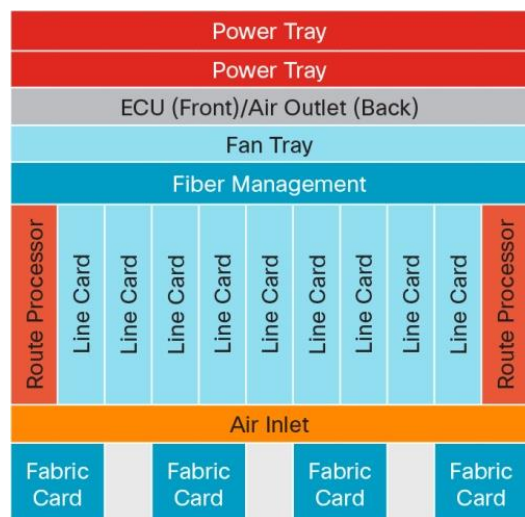


Figure 4.  
Cisco NCS 4009 Shelf Architecture

Each line card is connected through the backplane to each of the four fabrics, which operate in a 3 + 1 redundant configuration (Figure 5). Additional backplane connections are available to pair slots of the NCS 4009 chassis, allowing direct backplane interconnection of line cards without fabric access.

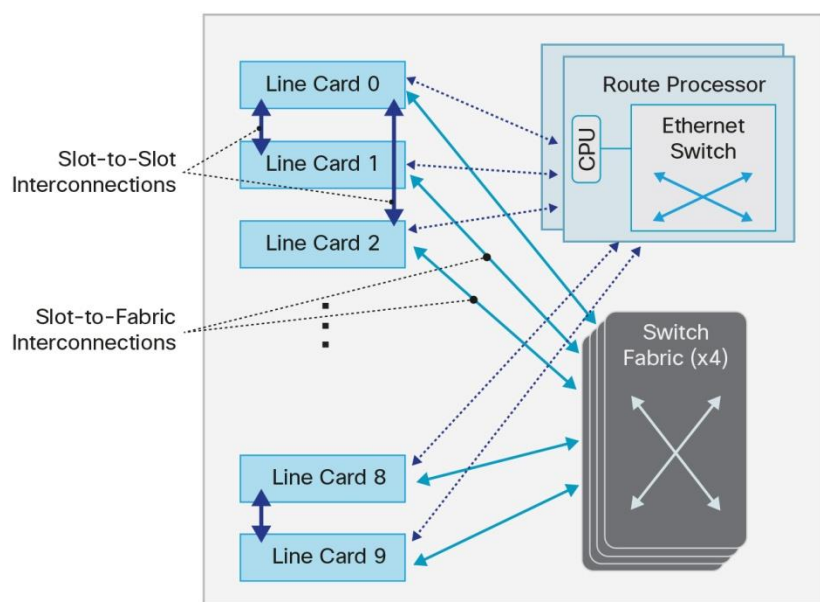


Figure 5.  
Cisco NCS 4009 Backplane Architecture

## OTN Functions

The NCS 4000 Series provides full ITU G.872-compliant OTN switching functions. It supports ODU-0 to ODU-4 multilayer switching and grooming, including nested OTN switching. The NCS 4016 system supports single-chassis switching of 6.4 Tbps fully nonblocking at ODU-0 level (2560 ODU-0 or ODU-Flex data units) while the NCS 4009 system supports single-chassis switching of 1.8 Tbps fully nonblocking at ODU-0 level (1440 ODU-0 or ODU-Flex data units).

The NCS 4000 Series is compliant with ITU G.709/G.798, allowing the cascading of at least 20 OTN cross-connects while maintaining jitter and wander specifications. It also complies with ITU G.709 Operations, Administration, and Maintenance (OAM) standards, with six levels of Tandem Connection Monitoring (TCM) support.

OTN configuration, provisioning, and protection are managed by a Generalized MPLS (GMPLS)-based OTN control plane supporting an embedded User-Network Interface (UNI) as the communication interface between control planes managing different transport layers within the same system. The control-plane instance runs inside the optical domain (overlay network scenario), providing an external UNI to client nodes for invocation of on-demand services.

As an extension of the Cisco nLight Control Plane Protocol, an OTN circuit between ingress and egress nodes can be established statically or dynamically using Resource Reservation Protocol (RSVP) signaling. An OTN circuit is established and maintained as a Label Switched Path (LSP) between the ingress and egress LSRs, switched through transit LSRs. An LSP can be established as a Soft Permanent Connection (SPC) when the request comes from the user interface.

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## Protection Mechanisms

The Cisco NCS 4000 Series platform provides a variety of different protection mechanisms operating at different layers. Although pure Layer 3, Layer 2, Layer 1, and Layer 0 protection mechanisms are defined, a holistic approach to protection is critical when multiple layers are operating simultaneously.

Currently supported protection mechanisms are:

- Layer 1: OTN: Subnetwork Connection Protection (SNCP/I, SNCP/N, and SNCP/S), 1+1

## Management Solution

The NCS 4000 Series solution integrates a state-of-the-art local craft interface, which can install, configure, monitor, and troubleshoot NCS 4000 Series applications both at the node and network levels.

Cisco Evolved Programmable Network Manager (EPN-M) provides end-to-end management as well as full Fault, Configuration, Accounting, Performance, and Security (FCAPS) functionalities for the Cisco NCS 4000 Series, NCS 2000 Series, and Cisco ONS devices. It also provides end-to-end management of OTN and IP + Optical converged services, making it possible to manage transport and IP networks with fewer steps to promote operational efficiency.

## Cisco NCS 4000 Series Line Cards

The following line cards are available for the NCS 4000 Series:

Commons:

- NCS 4000 Router Processor and Controller
- NCS 4000 External Connection Unit
- NCS 4016 Agnostic Cross Connect - Multi-chassis
- NCS 4009 Agnostic Cross Connect - Single-chassis

NCS 4000 Line card:

- NCS 4000 24 Port Low rate OTN Line Card - SFP
- NCS 4000 2x 100G CPAK 10x10G SFP+ OTN/Packet Line Card
- NCS 4000 400G OTN/Packet/WDM Combo Line card

## Route Processor

The Cisco NCS 4000 Route Processor is based on an Intel IvyBridge 10-core CPU with 32 Gigabytes of RAM and equipped with a 50-Gigabyte Solid-State Drive (SSD). A second SSD is accessible through the faceplate on the External Connection Unit (ECU) to provide access to logging data and additional storage space. A USB flash memory device is also available for debugging capabilities.



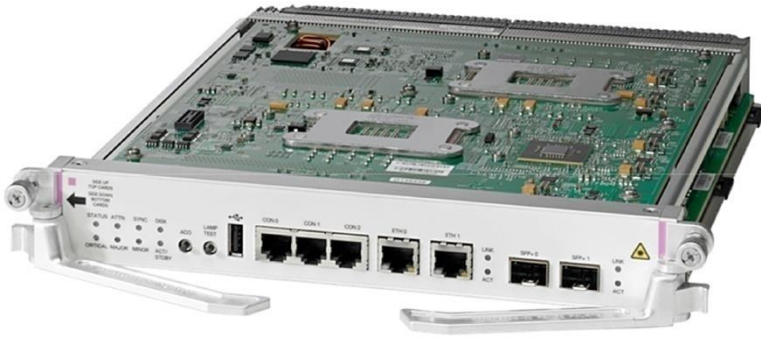


Figure 6.  
Route Processor Line Card

The route processor holds the control, timing, monitoring, and management functions of the NCS 4000 Series chassis. Multiple LEDs are available on the face plate to summarize the status of the system. The route processor provides external interfaces through an ECU and supports the following interfaces on the front panel:

- One USB 2.0 for CPU access
- Two RJ-45 10/100/1000 Ethernet interfaces
- Two enhanced Small Form-Factor Pluggable (SFP+) 10 Gigabit Ethernet management interfaces

### External Connection Unit

The ECU provides all shelf electrical I/O connectivity to the active and standby route-processor line cards (Figure 7). In addition, the ECU houses two 1.8-in. SSDs, plus the serial interface connector for the touch screen. The ECU board and carrier have openings to permit exhaust air from the fans to pass through the ECU and flow through the power filters for cooling. The available interfaces of the ECU are listed in Table 1.

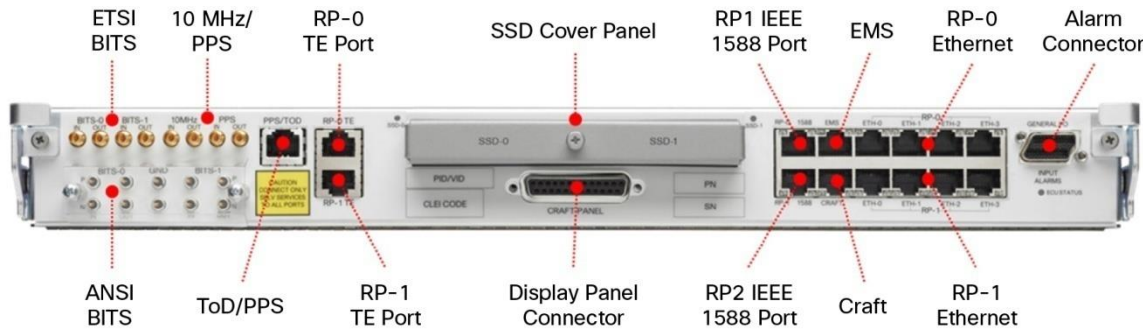


Figure 7.  
External Connection Unit

Table 1. External Connection Unit Interfaces

I/O Standard	I/O Connector Type	Quantity	Function
Fast or Gigabit Ethernet	RJ-45	1	Management of administrative virtual machine
Fast or Gigabit	RJ-45	1	Management of Cisco IOS® XR virtual

I/O Standard	I/O Connector Type	Quantity	Function
Ethernet			machine
Fast or Gigabit Ethernet	RJ-45	6	Multishelf management of Cisco NCS 2006
Fast or Gigabit Ethernet	RJ-45	2	IEEE 1588 Ethernet port
Proprietary	RJ-45	2	Proprietary timing expansion ports
Proprietary	Small Computer System Interface (SCSI)	2	2 dry contacts or alarm SCSI connectors
Telecom E1	Mini BNC	2	Building Integrated Timing - ETSI In/Out
Telecom T1	Mini BNC	2	Building Integrated Timing - ANSI In/Out
SSD	1.8-in. drive	2	1 SDD for RP0 + 1 SDD for RP1
Touch screen connector	Universal Asynchronous Receiver/Transmitter (UART)	1	ECU touchscreen connections
RS-422	RJ-45	1	IEEE 1588 Time of Day/Pulse Per Second (TOD/PPS)
	Mini BNC	2	IEEE 1588 10-MHz Clock In/Out
	Mini BNC	2	IEEE 1588 Synch In/Out

## Fabric Line Cards

The Cisco NCS 4016 system supports four fabric line cards operating in a 3 + 1 redundant configuration (Figure 8). Each fabric card supports equally distributed connectivity across all 16 line cards. The fabric card is managed directly by the centralized route processor.



Figure 8.  
NCS 4016 400G Multichassis Fabric Line Card (NCS 4016 Fabric V2)

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The fabric is considered agnostic because it switches cells of variable sizes without knowledge of the protocol being transported, whether OTN or Ethernet. Each NCS 4016 line card is connected to all four fabric cards, one of which is redundant, allowing for full operation with three functional planes. Twelve front-panel connectors (CXP for 200G version and CXP2 for 400G version) allow a single-chassis system to migrate to a back-to-back or multichassis configuration.

The Cisco NCS 4009 system supports four fabric line cards operating in a 3 + 1 redundant configuration. Each fabric card supports equally distributed connectivity across all nine line-cards. The fabric card is managed directly by the centralized route processor. The NCS 4009 has a 400G fabric line card that is unique to the NCS 4009 and optimized for single-chassis applications.



Figure 9.  
NCS 4009 400G Single-Chassis Fabric Line Card (NCS 4009 Fabric V2) with fan kit

## Powering

NCS 4016 is designed for up to 12KW from infrastructure standpoint (cooling capacity, thermal management and power distribution) while NCs 4009 is design for up 6.5KW.

Two different versions of chassis is available, AC Power and DC Power.

Power Input is on the back of the Power Entry Modules (on the Top of the chassis) even if a mechanical adapter is available to port the inputs on the front allowing “front access” only application.

## DC Power

Up to 8 Power Supplier Units feeds the two Power Entry Modules of the chassis (on top of the chassis)

Supported PSU Redundancy is M+N (up to 6+2 or 7+1).

Each PSU (showed in Figure below) supports two feeds from two pairs of redundant 48V sources with a nominal power of 1,750W



Figure 10.  
Cisco NCS 4000 DC Power System Unit - 1750 W - Balanced A and B

System can be upgraded during lifetime without any traffic disruption; adding PSU after PSU pending number of Line Cards used

Base config is with 3x PSU (2+1 DC).

50 A nominal feed shall be provided connected with 4 AWG cables

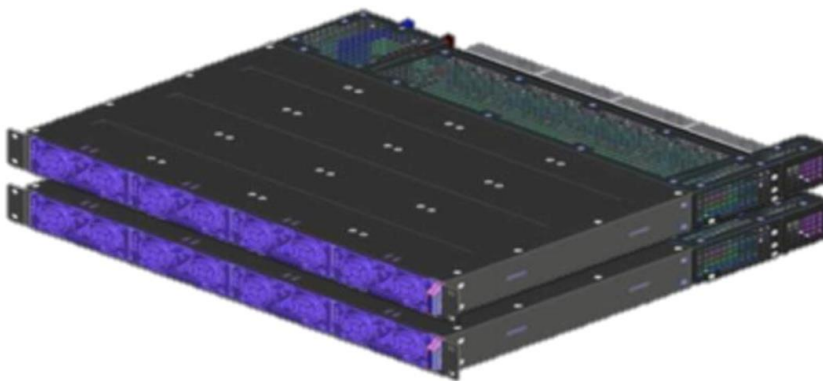


Figure 11.  
NCS 4016 Dual DC Power Entry Module equipped with 4 x DC PSU for each of the PEM

## AC Power

Up to 8 Power Supplier Units feeds the two Power Entry Module of the chassis (on top of the chassis), supporting N+N PSU Redundancy

Each AC PSU (showed in below picture) supports 3KW, with Single-phase 220V, 15A circuits



Figure 12.  
Cisco NCS 4000 AC Power System Unit - 3000 W

System can be upgraded during lifetime without any traffic disruption; adding PSU after PSU pending number of Line Cards used

Base config is with 2x PSU (2+2 AC).

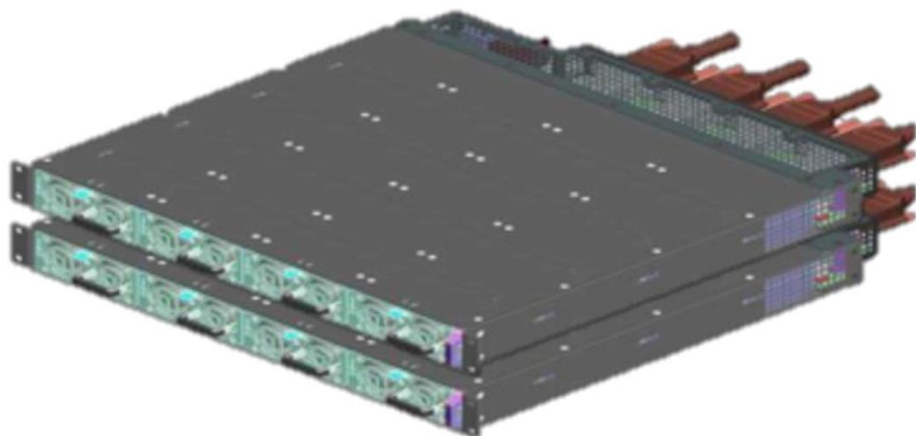


Figure 13.  
NCS 4016 Dual AC Power Entry Module equipped with 4 x AC PSU for each of the PEM

## Fans

NCS 4016 chassis accommodates two fan trays. The fan trays exist in the chassis exhaust baffle and pull air through the system. Each fan tray consists of 6 fans and a fan control board. The 6 fans in a fan tray are controlled by 3 separate control circuits, and are powered from 3 independent power feeds.

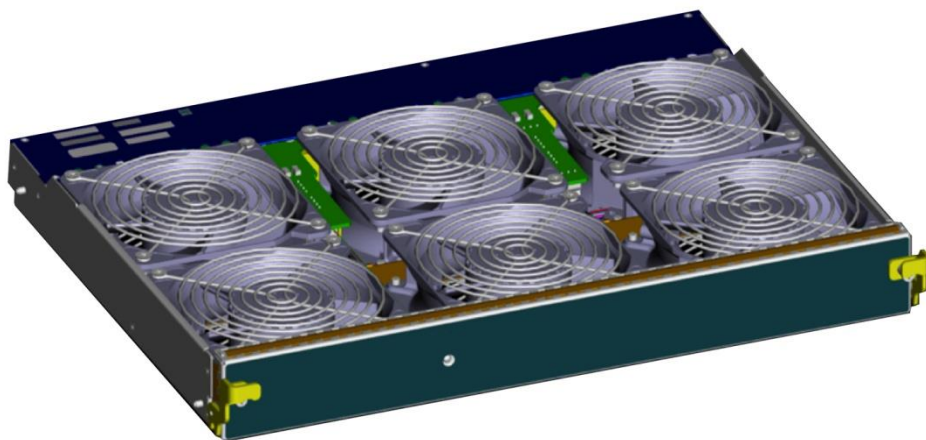


Figure 14.  
Fan trays

Fan tray in the bottom slot must be inserted reversed up compared to the one inserted in the top slot.

In NCS 4009, a single fan tray is positioned at the exhaust of each card cage. Fan Tray is common between NCS 4016 and NCS 4009

## Product Specifications

Table 2 lists the specifications of the Cisco NCS 4000 Series platform.

Table 2. Cisco NCS 4000 Product Specifications

Feature	Description				
Software compatibility	Cisco IOS XR Software Release 6.5.2 is required to support Multi-Chassis for NCS 4016 and is the recommended release for both the NCS4009 and NCS4016				
Protocols	<p>Control plane:</p> <ul style="list-style-type: none"><li>• Simple Network Management Protocol (SNMP)</li><li>• Programmatic interfaces (XML)</li><li>• GUI (Cisco Transport Controller)</li></ul> <p>Control management:</p> <ul style="list-style-type: none"><li>• SNMP</li><li>• Programmatic interfaces (XML)</li><li>• GUI (Cisco Transport Controller)</li><li>• Command-Line Interface (CLI)</li><li>• Transaction Language 1 (TL1)</li></ul> <p>Security:</p> <ul style="list-style-type: none"><li>• Message Digest Algorithm 5 (MD5)</li><li>• IP Security (IPsec) Protocol</li><li>• Secure Shell (SSH) Protocol Version 2 (SSHv2)</li><li>• Secure FTP (SFTP)</li><li>• Secure Sockets Layer (SSL)</li></ul>				
Components	<table><tr><td>Each NCS 4016 chassis supports:</td><td>Each NCS 4009 chassis supports:</td></tr><tr><td><ul style="list-style-type: none"><li>• Two route processors</li><li>• Two fan trays and filters</li><li>• Four fabric cards</li><li>• One ECU</li><li>• Two power shelves (either DC or AC)</li><li>• Cisco NCS 4000 Series Line Cards</li></ul></td><td><ul style="list-style-type: none"><li>• Two route processors</li><li>• One fan trays and filters</li><li>• Four fabric cards</li><li>• One ECU</li><li>• Two power shelves (either DC or AC)</li><li>• Cisco NCS 4000 Series Line Cards</li></ul></td></tr></table>	Each NCS 4016 chassis supports:	Each NCS 4009 chassis supports:	<ul style="list-style-type: none"><li>• Two route processors</li><li>• Two fan trays and filters</li><li>• Four fabric cards</li><li>• One ECU</li><li>• Two power shelves (either DC or AC)</li><li>• Cisco NCS 4000 Series Line Cards</li></ul>	<ul style="list-style-type: none"><li>• Two route processors</li><li>• One fan trays and filters</li><li>• Four fabric cards</li><li>• One ECU</li><li>• Two power shelves (either DC or AC)</li><li>• Cisco NCS 4000 Series Line Cards</li></ul>
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Line cards	<p>OTN/Packet line cards:</p> <ul style="list-style-type: none"><li>• Converged 2x100G, 10G line card</li></ul> <p>OTN line cards:</p> <ul style="list-style-type: none"><li>• 24 Port Low rate OTN Line Card - SFP</li></ul> <p>DWDM/OTN/Packet line cards:</p> <ul style="list-style-type: none"><li>• NCS 4000 400G OTN/Packet/WDM Combo Line card</li></ul>				

Feature	Description	
Features and functions	<p>OTN switching:</p> <ul style="list-style-type: none"> <li>• Full ODU-0 level switching with ports supporting SONET/SDH, Ethernet, Channelized OTN, 10 Gigabit Ethernet (GE) (OTU-2), 40 GE (OTU-3), and 100 GE (OTU-4)</li> <li>• ODU-Flex support</li> <li>• 6-level TCM</li> </ul> <p>DWDM functions:</p> <ul style="list-style-type: none"> <li>• 100 Gbps CP-DQPSK 96chs tunable 4500 km capable reach WDM interfaces</li> </ul> <p>OTN over DWDM functions:</p> <ul style="list-style-type: none"> <li>• Any mix of OTN and WDM services in the same chassis up to chassis capacity</li> <li>• OTN over WDM services without need of external cable connectivity between OTN and WDM line card (backplane connectivity between OTN LC and WDM LC)</li> </ul>	
System capacity	<p>NCS 4016: 400 Gbps per line card for 6.4-Tbps total switching capacity per chassis</p> <p>NCS4016 Multi-Chassis: 12.8T in a 2+1 configuration, 19.2T in a 3+1 configuration, 25.6T in a 4+1 configuration</p>	<p>NCS 4009: 400 Gbps per line card for 3.6-Tbps total switching capacity per chassis</p>
Reliability and availability	<p>System redundancy:</p> <ul style="list-style-type: none"> <li>• Power-shelf redundancy N+M</li> <li>• Fan-tray redundancy 1:1</li> <li>• Route-processor redundancy 1:1</li> <li>• Fabric-card redundancy 1:4</li> </ul> <p>Software features:</p> <ul style="list-style-type: none"> <li>• Line-card Online Insertion and Removal (OIR) support</li> <li>• Fabric-card OIR support</li> <li>• Out of resource management</li> <li>• Virtual Machine (VM) redundancy</li> <li>• O-SNCP/I 1 + 1 protection</li> <li>• O-SNCP/N 1 + 1 protection</li> <li>• O-SNCP/S 1 + 1 protection</li> <li>• 1 + R ODUk restoration in real time</li> <li>• 1 + 1 Automatic Protection Switching (APS) for SONET client</li> </ul>	
MIBs	<p>SNMP framework support:</p> <ul style="list-style-type: none"> <li>• SNMPv1</li> <li>• SNMPv2c</li> <li>• SNMPv3</li> <li>• MIB II, including interface extensions (RFC 1213)</li> <li>• SNMP-FRAMEWORK-MIB</li> <li>• SNMP-TARGET-MIB</li> <li>• SNMP-NOTIFICATION-MIB</li> <li>• SNMP-USM-MIB</li> <li>• SNMP-VACM-MIB</li> </ul> <p>System management:</p> <ul style="list-style-type: none"> <li>• CISCO- BULK-FILE-MIB</li> <li>• CISCO-CONFIG-COPY-MIB</li> </ul>	

Feature	Description
	<ul style="list-style-type: none"> <li>• CISCO-CONFIG-MAN-MIB</li> <li>• CISCO-FLASH-MIB</li> <li>• CISCO-MEMORY-POOL-MIB</li> <li>• Cisco FTP Client MIB</li> <li>• Cisco Process MIB</li> <li>• Cisco Syslog MIB</li> <li>• CISCO-SYSTEM-MIB</li> <li>• CISCO-CDP-MIB</li> <li>• IF-MIB (RFC 2233/RFC 2863)</li> </ul> <p>Quality of Service (QoS):</p> <ul style="list-style-type: none"> <li>• MQC-MIB (Cisco Class-Based QoS MIB)</li> <li>• CISCO-PING-MIB</li> </ul> <p>Chassis:</p> <ul style="list-style-type: none"> <li>• ENTITY-MIB (RFC 2737)</li> <li>• CISCO-entity-asset-MIB</li> <li>• CISCO-entity-sensor-MIB</li> <li>• CISCO-FRU-MIB (Cisco-Entity-FRU-Control-MIB)</li> </ul> <p>Fabric:</p> <ul style="list-style-type: none"> <li>• CISCO-Fabric-Mcast-MIB</li> <li>• CISCO-Fabric-Mcast-Appl-MIB</li> </ul> <p>Traps:</p> <ul style="list-style-type: none"> <li>• RFC 1157</li> <li>• Authentication</li> <li>• Linkup</li> <li>• Linkdown</li> <li>• Coldstart</li> <li>• Warmstart</li> </ul>
Network management	<ul style="list-style-type: none"> <li>• Enhanced CLI</li> <li>• XML interface</li> <li>• SNMP and MIB support</li> <li>• Cisco Transport Controller local craft interface</li> <li>• TL1</li> <li>• Cisco Prime Network</li> </ul>
Programmatic interfaces	<ul style="list-style-type: none"> <li>• XML schema support</li> </ul>
Power	<p>Support for both DC and AC power modules*:</p> <ul style="list-style-type: none"> <li>• 3-kW AC power module</li> <li>• 1.75-kW DC power modules</li> <li>• Worldwide ranging AC (200 to 240V; 50 to 60 Hz; 16A maximum)</li> <li>• Worldwide ranging DC (-40 to -72V; 50A maximum)</li> </ul>



Feature	Description		
Environmental conditions	<ul style="list-style-type: none"> <li>Storage temperature: -40 to 158°F (-40 to 70°C)</li> <li>Operating temperature: <ul style="list-style-type: none"> <li>Normal: 41 to 104°F (5 to 40°C)</li> <li>Short term: 23 to 122°F (-5 to 50°C)**</li> <li>Relative humidity: 5 to 85%</li> </ul> </li> </ul>		
Physical Specifications	<table> <tr> <td> <b>NCS 4016</b> <ul style="list-style-type: none"> <li>Height: 42 in. (1067 mm)</li> <li>Width: 17.5 in. (444 mm)</li> </ul> <b>Depth:</b> <ul style="list-style-type: none"> <li>DC power: 17.71 in. (450 mm) including cosmetic door, fiber horizontal cable management, and backplane rear cover</li> <li>AC power: 18.7 in. (475 mm) including cosmetic door, fiber horizontal cable management, and backplane rear cover. AC power cables will extend to 550 mm.</li> </ul> <b>Weight:</b> <ul style="list-style-type: none"> <li>Unloaded: 157.6 lb (71.5 kg)</li> <li>Fully Loaded: 283.3 lb (128.5kg)</li> </ul> </td><td> <b>NCS 4009</b> <ul style="list-style-type: none"> <li>Height: 26.25 in. (667 mm)</li> <li>Width: 17.5 in. (444 mm)</li> </ul> <b>Depth:</b> <ul style="list-style-type: none"> <li>DC power: 17.71 in. (450 mm) including cosmetic door, fiber horizontal cable management, and backplane rear cover</li> <li>AC power: 18.7 in. (475 mm) including cosmetic door, fiber horizontal cable management, and backplane rear cover. AC power cables will extend to 550 mm.</li> </ul> <b>Weight:</b> <ul style="list-style-type: none"> <li>Unloaded: 105.1 lb (48 kg)</li> </ul> </td></tr> </table>	<b>NCS 4016</b> <ul style="list-style-type: none"> <li>Height: 42 in. (1067 mm)</li> <li>Width: 17.5 in. (444 mm)</li> </ul> <b>Depth:</b> <ul style="list-style-type: none"> <li>DC power: 17.71 in. (450 mm) including cosmetic door, fiber horizontal cable management, and backplane rear cover</li> <li>AC power: 18.7 in. (475 mm) including cosmetic door, fiber horizontal cable management, and backplane rear cover. AC power cables will extend to 550 mm.</li> </ul> <b>Weight:</b> <ul style="list-style-type: none"> <li>Unloaded: 157.6 lb (71.5 kg)</li> <li>Fully Loaded: 283.3 lb (128.5kg)</li> </ul>	<b>NCS 4009</b> <ul style="list-style-type: none"> <li>Height: 26.25 in. (667 mm)</li> <li>Width: 17.5 in. (444 mm)</li> </ul> <b>Depth:</b> <ul style="list-style-type: none"> <li>DC power: 17.71 in. (450 mm) including cosmetic door, fiber horizontal cable management, and backplane rear cover</li> <li>AC power: 18.7 in. (475 mm) including cosmetic door, fiber horizontal cable management, and backplane rear cover. AC power cables will extend to 550 mm.</li> </ul> <b>Weight:</b> <ul style="list-style-type: none"> <li>Unloaded: 105.1 lb (48 kg)</li> </ul>
<b>NCS 4016</b> <ul style="list-style-type: none"> <li>Height: 42 in. (1067 mm)</li> <li>Width: 17.5 in. (444 mm)</li> </ul> <b>Depth:</b> <ul style="list-style-type: none"> <li>DC power: 17.71 in. (450 mm) including cosmetic door, fiber horizontal cable management, and backplane rear cover</li> <li>AC power: 18.7 in. (475 mm) including cosmetic door, fiber horizontal cable management, and backplane rear cover. AC power cables will extend to 550 mm.</li> </ul> <b>Weight:</b> <ul style="list-style-type: none"> <li>Unloaded: 157.6 lb (71.5 kg)</li> <li>Fully Loaded: 283.3 lb (128.5kg)</li> </ul>	<b>NCS 4009</b> <ul style="list-style-type: none"> <li>Height: 26.25 in. (667 mm)</li> <li>Width: 17.5 in. (444 mm)</li> </ul> <b>Depth:</b> <ul style="list-style-type: none"> <li>DC power: 17.71 in. (450 mm) including cosmetic door, fiber horizontal cable management, and backplane rear cover</li> <li>AC power: 18.7 in. (475 mm) including cosmetic door, fiber horizontal cable management, and backplane rear cover. AC power cables will extend to 550 mm.</li> </ul> <b>Weight:</b> <ul style="list-style-type: none"> <li>Unloaded: 105.1 lb (48 kg)</li> </ul>		
Rack Mounting	<ul style="list-style-type: none"> <li>ANSI 19 in. or 23 in.</li> <li>ETSI 600x600</li> </ul>		
Airflow	Front-to-back		

\* Mixing of AC and DC modules is not supported.

\*\* 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. (This number refers to a total of 360 hours in any given year, but no more than 15 occurrences during that 1-year period.)

## Approvals and Compliance

Table 3 lists compliance and agency approvals for the Cisco NCS 4000 Series platform.

Table 3. Compliance and Agency Approvals for Cisco NCS 4000 Series

Feature	Description
Safety standards	<ul style="list-style-type: none"> <li>UL/CSA/IEC/EN 60950-1</li> <li>IEC/EN 60825 Laser Safety</li> <li>FDA: Code of Federal Regulations Laser Safety</li> </ul>
Electromagnetic interference (EMI)	<ul style="list-style-type: none"> <li>FCC Class A</li> <li>ICES 003 Class A</li> <li>CISPR 22 (EN55022) Class A</li> <li>VCCI Class A</li> <li>IEC/EN 61000-3-2: Power Line Harmonics</li> <li>IEC/EN 61000-3-3: Voltage Fluctuations and Flicker</li> </ul>

Feature	Description
Immunity (basic standards)	<ul style="list-style-type: none"> <li>• IEC/EN-61000-4-2: Electrostatic Discharge Immunity</li> <li>• IEC/EN-61000-4-3: Radiated Immunity</li> <li>• IEC/EN-61000-4-4: Electrical Fast Transient Immunity</li> <li>• IEC/EN-61000-4-5: Surge AC Port</li> <li>• IEC/EN-61000-4-5: Signal Ports</li> <li>• IEC/EN-61000-4-5: Surge DC Port</li> <li>• IEC/EN-61000-4-6: Immunity to Conducted Disturbances</li> <li>• IEC/EN-61000-4-11: Voltage Dips, Short Interruptions, and Voltage Variations</li> </ul>
ETSI and EN	<ul style="list-style-type: none"> <li>• EN300 386: Telecommunications Network Equipment (EMC)</li> <li>• EN55022: Information Technology Equipment (Emissions)</li> <li>• EN55024: Information Technology Equipment (Immunity)</li> <li>• EN50082-1/EN-61000-6-1: Generic Immunity Standard</li> </ul>
Network Equipment Building Standards (NEBS)	<p>This product is designed to meet the following requirements (qualification in progress):</p> <ul style="list-style-type: none"> <li>• SR-3580: NEBS Criteria Levels (Level 3)</li> <li>• GR-1089-CORE: NEBS EMC and Safety</li> <li>• GR-63-CORE: NEBS Physical Protection</li> </ul>

## Warranty Information

Find warranty information on Cisco.com at the [Product Warranties](#) page.

## Ordering Information

To place an order, visit the [Cisco Ordering Home Page](#) and refer to Table 4. To download software, visit the [Cisco Software Center](#).

Table 4. Ordering Information for Cisco NCS 4000 Series Products

Part Number	Description
Cisco NCS 4000 Series Common Equipment	
NCS4009-SA-AC=	NCS 4009 shelf assembly - AC Power
NCS4009-SA-DC=	NCS 4009 shelf assembly - DC Power
NCS4009-FC2-S-KIT	NCS 4009 Fabric - Single-chassis - V2 with Fan - kit
NCS4009-DOOR=	NCS 4009 Door
NCS4016-SA-DC=	NCS 4016 shelf assembly - DC Power
NCS4016-SA-AC=	NCS 4016 shelf assembly - AC Power
NCS4016-FC2-M=	NCS 4016 Agnostic Cross connect - Multichassis - V2
NCS4016-DOOR=	NCS 4016 Door
NCS4K-AC-PEM=	NCS 4000 AC Power Entry Module - Power Tray

Part Number	Description
NCS4K-AC-PSU=	NCS 4000 AC Power System Unit - 3000 W
NCS4K-BLANK=	NCS 4000 Blank Filler
NCS4K-CRAFT=	NCS 4000 Craft Panel
NCS4K-DC-FA=	NCS 4000 AC Power front connection adapter
NCS4K-DC-PEM=	NCS 4000 DC Power Entry Module - Power Tray
NCS4K-DC-PSU-V1=	NCS 4000 DC Power System Unit - 1750 W - Balanced A and B
NCS4K-ECU=	NCS 4000 External Connection Unit (used with 4009)
NCS4K-ECU2=	NCS 4000 External Connection Unit - Version 2 (used with 4016)
NCS4K-FTA=	NCS 4000 Fan tray Assembly
NCS4K-FTF=	NCS 4000 Fan Tray Filter
NCS4K-RP=	NCS 4000 Router Processor and Controller (32G RAM)
NCS4K-SSD-100G=	NCS 4000 100G SSD disk for ECU
NCS4K-SSD-200G=	NCS 4000 200G SSD disk for ECU
Cisco NCS 4000 Line Cards	
NCS4K-24LR-O-S=	NCS 4000 24-port Low rate OTN LC - SFP
NCS4K-2H10T-OP-KS=	NCS 4000 2x 100G CPAK 10x10G SFP+ OTN Line Card
NCS4K-4H-OPW-QC2=	NCS 4000 400G Packet/OTN/WDM - QSFP28/CFP2 - Line card
NCS4K-4H-OPW-LO=	NCS 4000 400G Packet/OTN/WDM - QSFP28/CFP2 - Lic. 100G OTN
S-CFP2-WDM-LIC=	SW License for WDM CFP2 Pluggable - 100 G QPSK 15% SD-FEC
S-NCS4K-100G-LIC=	SW License for 100 G Bandwidth Licenses
S-NCS4K-POTS=	License POTS - CE and MPLS - for NCS 4000 Packet Line Card
Cisco NCS 4000 Accessories	
NCS4K-AC-CBL-IEC=	NCS 4000 AC Power Cable - IEC compliant
NCS4K-AC-CBL-NEMA=	NCS 4000 AC Power Cable - NEMA compliant
NCS4K-CBL-HKA=	NCS 4000 Housekeeping Alarm Cable

## MTBF Information

Table 5 lists the MTBF for the Cisco NCS 4000 Series platform.

Table 5. Cisco NCS 4000 MTBF Data

Cisco Part Number	Description	MTBF (Hours)
Common Equipment (Shelves, Power, Etc.)		
NCS4016-STRT-KIT	NCS 4016 DC Starter Kit	
NCS4016-SA-DC	NCS 4016 shelf assembly - DC Power	995,430
NCS4K-DC-PEM	NCS 4000 DC Power Entry Module - Power Tray	1,562,840
NCS4K-DC-PSU-V1	DC Power System Unit - 1750 W - Balanced Power	341,360
NCS4K-CRAFT	NCS 4000 Craft Panel	1,410,050
NCS4K-ECU2	NCS 4000 External Connection Unit - Version 2	529,080
NCS4K-FTA	NCS 4000 Fan tray Assembly	1,207,250
NCS4009-STRT-KIT	NCS 4009 DC Starter Kit	
NCS4009-SA-DC	NCS 4009 shelf assembly - DC Power	1,434,680
NCS4K-DC-PEM	NCS 4000 DC Power Entry Module - Power Tray	1,562,840
NCS4K-DC-PSU-V1	DC Power System Unit - 1750 W - Balanced Power	341,360
NCS4K-CRAFT	NCS 4000 Craft Panel	1,410,050
NCS4K-ECU	NCS 4000 External Connection Unit	529,080
NCS4K-FTA	NCS 4000 Fan tray Assembly	1,207,250
NCS4KF-STRT-KIT	NCS 4000 Multi-Chassis Fabric Starter Kit	
NCS4KF-SA-DC	NCS 4000 Centralized Fabric Chassis Shelf Assembly - DC Power	5,071,610
NCS4K-DC-PEM	NCS 4000 DC Power Entry Module - Power Tray	5,163,810
NCS4K-DC-PSU-V1	DC Power System Unit - 1750 W - Balanced Power	1,013,212
NCS4KF-FTA	NCS 4000 Centralized Fabric Chassis Fan Tray Assembly	327,810
NCS4KF-CRAFT	NCS 4000 Centralized Fabric Chassis Craft Panel	3,841,650

Cisco Part Number	Description	MTBF (Hours)
Controllers, Switch Fabric, Etc.		
NCS4016-FC-M=	NCS 4016 Agnostic Cross connect - Multichassis	457,470
NCS4016-FC2-M=	NCS 4016 Agnostic Cross connect - Multichassis - 400G	347,820
NCS4009-FC-S=	NCS 4009 Agnostic Cross connect - Single-chassis	833,590
NCS4009-FC2-S=	NCS 4009 Agnostic Cross connect - Single-chassis - 400G	689,730
NCS4K-RP=	NCS 4000 Router Processor and Controller (32G RAM)	248,000
NCS4KF-FC2-C=	NCS 4016 Centralized Agnostic Xross connect 24 CXP2 - 400G	268,120
NCS4KF-RPMC=	NCS 4000 Centralized Fabric Chassis RP w/Ethernet Switch for Multi-Chassis Inter-Connect	188,760
Client I/O modules		
NCS4K-2H10T-OP-KS=	NCS 4000 2x 100G CPAK 10x10G SFP+ OTN/Packet Line Card	345,570
DWDM I/O modules		
NCS4K-2X100G-SK	NCS4000 2x 100G CP-DQPSK WDM Line Card + 4x CPAK LR4 STARTER KIT	
NCS4K-2H-W	NCS 4000 2x 100G CP-DQPSK - Full C band Tunable	213,370
CPAK-100G-LR4	CPAK-100G-LR4 Transceiver module, 10km SMF	1,093,310
NCS4K-2H10T-OP-KS	NCS 4000 2x 100G CPAK 10x10G SFP+ OTN/Packet Line Card	345,570
NCS4K-4H-OPW-QC2=	NCS 4000 400G WDM w/Packet/OTN - 10x QSFP + 2x CFP2 Line Card	272,380
Pluggable Optics <= 10G		
CPAK-10X10G-LR=	CPAK - 10x10G LR Transceiver module	1,761,291
ONS-QSFP-4X10-MLR=	4x10Gbps Multi-rate QSFP+, LR	1,620,746
QSFP-40G-LR4=	QSFP 40GBASE-LR4 OTN Transceiver, LC, 10KM	1,779,359
ONS-SC+-10G-ZR=	SFP+ ZR - Commercial Temp	2,372,479
ONS-SC+-10G-SR=	SFP+ SR - Commercial Temp	8,234,485
ONS-SC+-10G-LR=	SFP+ LR - Commercial Temp	4,328,311

Cisco Part Number	Description	MTBF (Hours)
Pluggable Optics 100G and greater		
CPAK-100G-LR4=	CPAK-100G-LR4 Transceiver module, 10km SMF	1,093,310
ONS-CFP2-WDM=	50G/100G/200G/250G CFP2 WDM - C-Band Tunable	500,000

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## For More Information

For more information about the Cisco Network Convergence System 4000 Series, visit <https://www.cisco.com/go/ncs4000> or contact your local Cisco account representative.

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