Cisco NCS 560 Series Router Interface Modules

Contents

Cisco® NCS 560 Series Router Interface modules (Figure 1) are designed to support a wide range of services, speeds, temperature ranges, and enhanced capabilities. They provide cost-effective delivery of residential and business Ethernet services.

Product overview

The Cisco® NCS 560 Series Router delivers a cost-effective, modular solution based on a protocol-independent fabric architecture. The Cisco NCS 560 Series Router, as part of the Cisco Evolved Programmable Network (EPN) architecture, is capable of delivering unbounded scale and unmatched capabilities for Carrier Ethernet business services, over redundant and protected packet-based network technologies (IP/MPLS, MPLS-TE, SR, SR-TE, TI-LFA).

Figure 1.
Cisco NCS 560 Series Router Interface Module – 2 x 100GE (QSFP28)

Figure 2.
Cisco NCS 560 Series Router Interface Module – 8 x 10GE (SFP+)

Figure 3.
Cisco NCS 560 Series Router Interface Module – 8/16 x 1GE (SFP/CSFP) + 1 x 10GE (SFP+)

Features and benefits

Feature	Benefit
Metro Carrier Ethernet Aggregation	Enables the service flexibility and delivery of Layer 2, Layer 3, IP/MPLS and SR transport for advanced L2VPN, L3VPN, EVPN and Multicast services.
Next generation access network with fully distributed and unique packet capabilities	Supports state-of-the-art Pseudowire scale, Hierarchical Quality of Service (H-QoS), and next generation IP/MPLS, MPLS-TE, SR, SR-TE and TI-LFA technologies. Cisco's SR, SR-TE and TI-LFA technologies guarantee resiliency (sub 50 ms switchover time), fault propagation, connectivity verification, scalability and programmability for SDN functionality support.
Operation Efficiency with End-to-End Network Management	Supported by the Evolved Programmable Network Manager (EPN-M), which enables business agility and operational efficiencies through automated device operations, fast provisioning and proactive assurance.
Comprehensive variety of interfaces and protocols	Ethernet interfaces are available in copper and fiber, with speeds ranging from 10 Mbps to 100 Gbps. In addition, various CWDM/DWDM interfaces are available ranging from 1Gbps to 10Gbps speeds.

Ethernet interface modules

The Cisco NCS 560 Series Router Ethernet interface modules are designed to give customers a high degree of flexibility and value. All Ethernet interface modules share a common core that supports time stamping on the module for Y.1731 Operations, Administration, and Maintenance (OAM) delay measurement functions to achieve precise results for one-way and two-way delay measurement. The modules also provide time-stamping functions for the IEEE 1588-2008 protocol. These time stamps help ensure that NCS 560 Series systems achieve outstanding results when deploying IEEE 1588-2008 protocols for frequency and phase synchronization. Not all customers will deploy IEEE 1588-2008 for synchronization. Therefore, the Ethernet interface modules also support input and output frequency synchronization using synchronous Ethernet (SyncE).

All NCS 560 Series Router Ethernet interface modules support Online Insertion and Removal (OIR), which contributes to a higher uptime for NCS 560 Series systems.

Cisco NCS 560 Series Router 2-Port 100GE QSFP Interface Module

This 2-port 100 Gigabit Ethernet Cisco CPAK™ module delivers the highest performance per slot on Cisco NCS 560 Series systems and provides physical connectivity using two pluggable 100GE QSFP28 optics. Table 2 lists the QSFP28 optics that are supported in the Cisco NCS 560 Series 2-Port 100GE QSFP28 Module, with the Cisco IOS-XR® Software releases for the NCS 560 Series Router. Interface Module Slot compatibility can be found in table 4.

Table 1. 100 Gigabit Ethernet Optics Supported in 2-Port 100GE QSFP28 Module

Optic Product Number	Supported as of Cisco IOS Software Release	Description
QSFP-100G-ER4L-S	6.6.25	Cisco 100GBASE QSFP Transceiver, 25-40KM reach over SMF, Duplex L
QSFP-100G-LR4-S	6.6.25	Cisco 100GBASE LR4 QSFP Transceiver, LC, 10km over SMF
QSFP-100G-SR4-S	6.6.25	Cisco 100GBASE SR4 QSFP Transceiver, MPO, 100m over OM4 MM
QSFP-100G-CWDM4-S	6.6.25	Cisco 100GBASE CWDM4 QSFP Transceiver, LC, 2km over SM
QSFP-100G-SM-SR	6.6.25	Cisco 100GBASE CWDM4 Lite QSFP Transceiver, 2km over SMF, 10-60C
QSFP-100G-PSM4-S	6.6.25	Cisco 100GBASE PSM4 QSFP Transceiver, MPO, 500m over SMF

Cisco NCS 560 Series Router 8-Port 10GE SFP+ Interface Module

This interface module provides eight 10 Gigabit Ethernet ports with physical connectivity, using pluggable 10 Gigabit Ethernet Enhanced Small Form-Factor Pluggable (SFP+) on each port. The module is hardware ready to support 1 Gigabit Ethernet mode per group of four interfaces, and this capability will be provided in future software releases. The interface module supports both the LAN and WAN physical layer (PHY), which allow flexible and versatile deployment models. Table 3 lists the pluggable optics that are supported in the Cisco NCS 560 Series Router 8-Port 10GE SFP+ Module, with the Cisco IOS-XR® Software releases for the NCS 560 Series Router. Interface Module Slot compatibility can be found in table 5.

Table 2. 10 Gigabit Ethernet Optics Supported in 8-Port 10GE SFP+ Module

Optic Product Number	Supported as of Cisco IOS-XR Software Release	Description
SFP-10G-SR-S	6.6.25	Cisco 10GBASE-SR Ethernet SFP+ transceiver module for MMF, 850 nm, S-class
SFP-10G-LR-S	6.6.25	Cisco 10GBASE-LR Ethernet SFP+ transceiver module for SMF, 1310 nm, S-class
SFP-10G-ER-S	6.6.25	Cisco 10GBASE-ER Ethernet SFP+ transceiver module for SMF, 1550 nm, S-class
SFP-10G-ZR-S	6.6.25	Cisco 10GBASE-ZR Ethernet SFP+ transceiver module for SMF, 1550 nm, S-class
SFP-10G-SR	6.6.25	Cisco 10GBASE-SR Ethernet SFP+ transceiver module for MMF, 850 nm
SFP-10G-LR	6.6.25	Cisco 10GBASE-LR Ethernet SFP+ transceiver module for SMF, 1310 nm
SFP-10G-ER	6.6.25	Cisco 10GBASE-ER Ethernet SFP+ transceiver module for SMF, 1550 nm

Optic Product Number	Supported as of Cisco IOS-XR Software Release	Description
SFP-10G-ZR	6.6.25	Cisco multi-rate 10GBASE-ZR, 10GBASE-ZW and OTU2e SFP+ transceiver module for SMF, 1550 nm
SFP-10G-SR-X	6.6.25	Cisco 10GBASE-SR Ethernet SFP+ transceiver module for MMF, 850 nm, extended temperature range
SFP-10G-LR-X	6.6.25	Cisco 10GBASE-LR Ethernet SFP+ transceiver module for SMF, 1310 nm, extended temperature range
ONS-SC+-10G-SR	6.6.25	Cisco 10GBASE-SR Ethernet SFP+ transceiver module for MMF, 850 nm, commercial temperature range
ONS-SC+-10G-LR	6.6.25	Cisco 10GBASE-LR Ethernet SFP+ transceiver module for SMF, 1310 nm, commercial temperature range
DWDM-SFP10G-xx.xx	6.6.25	Cisco multi-rate (LAN/WAN/OTU2E) 10GBASE-DWDM single wavelength SFP+ module (100-GHz ITU grid) – 40 individual wavelength pluggable modules
DWDM-SFP10G-C	6.6.25	Cisco 10G BASE-DWDM tunable SFP+ with 96 DWDM ITU-50GHz channels to which the device can be tuned, ranging from 1528-nm to 1566-nm
ONS-SC+-10G-C=	6.6.25	Cisco 10G BASE-DWDM full C-band tunable SFP+, ITU-50Ghz
ONS-SC+-10GEPxx.x	6.6.25	Cisco multi-rate 10G BASE DWDM Edge Performance SFP+ with different wavelengths ranging from 1530-nm to 1561-nm, 100 GHz, LC
SFP-10G-BXD-I	6.6.25	10GBASE-BX single-strand SMF bidirectional SFP+ module, 1320-nm to 1340-nm TX/1260-nm to 1280-nm RX wavelength, single LC/PC connector, 10 km reach
SFP-10G-BXU-I	6.6.25	10GBASE-BX single-strand SMF bidirectional SFP+ module, 1260-nm to 1280-nm TX/1320-nm to 1340-nm RX wavelength, single LC/PC connector, 10 km reach
SFP-10G-BX40D-I	6.6.25	10GBASE-BX single-strand SMF bidirectional SFP+ module, 1320-nm to 1340-nm TX/1260-nm to 1280-nm RX wavelength, single LC/PC connector, 40 km reach
SFP-10G-BX40U-I	6.6.25	10GBASE-BX single-strand SMF bidirectional SFP+ module, 1260-nm to 1280-nm TX/1320-nm to 1340-nm RX wavelength, single LC/PC connector, 40 km reach

Cisco NCS 560 Series Router 8/16-port 1GE (SFP/CSFP) + 1-port 10GE (SFP+) / 1/2-port 1GE (SFP/CSFP) Interface Module

This interface module can operate in a number of different modes, using specific Bandwidth subscription or oversubscription configuration, dependent on Interface module slot and optics use. The default mode is delivering one port of 10 Gigabit Ethernet and eight ports of Gigabit Ethernet using regular SFP+ and SFP interfaces respectively on the Cisco NCS 560 Series Router. Optional mode two is delivering one port of 10 Gigabit Ethernet and sixteen ports of Gigabit Ethernet using one regular SFP+ and eight bi-directional Compact SFP interfaces respectively on the Cisco NCS 560 Series Router. Optional mode three is delivering eighteen ports of 1 Gigabit Ethernet using nine bi-directional Compact SFP interfaces on the Cisco NCS 560 Series Router. The Interface Module mode selection is available through a Command Line Interface command. Interface Module Slot compatibility and subscription modes can be found in table 5. This module is capable to support MACsec in a future release.

Table 3.   Ethernet Optics Supported in 8/16-port 1GE (SFP/CSFP) + 1-port 10GE (SFP+) / 1/2-port 1GE (SFP/CSFP) Interface Module

Optic Product Number	Supported as of Cisco IOS-XR Software Release	Description
GLC-BX-D	6.6.25	1000BASE-BX10 SFP module for single-strand SMF, 1490-nm TX/1310-nm RX wavelength, single LC/PC connector
GLC-BX-U	6.6.25	1000BASE-BX10 SFP module for single-strand SMF, 1310-nm TX/1490-nm RX wavelength, single LC/PC connector
GLC-BX40-U-I	6.6.25	1000BASE-BX10 SFP module for single-strand SMF, 1310-nm TX/1490-nm RX wavelength, 40 km reach, single LC/PC connector
GLC-BX40-D-I	6.6.25	1000BASE-BX10 SFP module for single-strand SMF, 1550-nm TX/1310-nm RX wavelength, 40 km reach, single LC/PC connector
GLC-BX40-DA-I	6.6.25	1000BASE-BX10 SFP module for single-strand SMF, 1490-nm TX/1310-nm RX wavelength, 40 km reach, single LC/PC connector
GLC-BX80-U-I	6.6.25	1000BASE-BX10 SFP module for single-strand SMF, 1490-nm TX/1490-nm RX wavelength, 80 km reach, single LC/PC connector
GLC-BX80-D-I	6.6.25	1000BASE-BX10 SFP module for single-strand SMF, 1570-nm TX/1310-nm RX wavelength, 80 km reach, single LC/PC connector
GLC-TE	6.6.25	1000BASE-T SFP transceiver module for Category 5 copper wire, RJ-45 connector
GLC-SX-MMD	6.6.25	1000BASE-SX SFP transceiver module for MMF, 850-nm wavelength, extended operating temperature range and DOM support, dual LC/PC connector
GLC-LH-SMD	6.6.25	1000BASE-LX/LH SFP transceiver module for MMF and SMF, 1300-nm wavelength, extended operating temperature range and DOM support, dual LC/PC connector
GLC-EX-SMD	6.6.25	1000BASE-EX SFP transceiver module for SMF, 1310-nm wavelength, extended operating temperature range and Digital Optical Monitoring (DOM) support, dual LC/PC connector

Optic Product Number	Supported as of Cisco IOS-XR Software Release	Description
GLC-ZX-SMD	6.6.25	1000BASE-ZX SFP transceiver module for SMF, 1550-nm wavelength, extended operating temperature range and Digital Optical Monitoring (DOM) support, dual LC/PC connector
GLC-2BX-D	6.6.25	1000BASE-BX10 2 Channel Gigabit Ethernet transceiver module for SMF, 1490 nm wavelength, dual LC/PC connector
GLC-2BX-D-I	6.6.25	1000BASE-BX10 2 Channel Gigabit Ethernet transceiver module for SMF, 1490 nm wavelength, dual LC/PC connector
SFP-10G-SR	6.6.25	Cisco 10GBASE-SR Ethernet SFP+ transceiver module for MMF, 850 nm
SFP-10G-LR	6.6.25	Cisco 10GBASE-LR Ethernet SFP+ transceiver module for SMF, 1310 nm
SFP-10G-ER	6.6.25	Cisco 10GBASE-ER Ethernet SFP+ transceiver module for SMF and MMF, 1550 nm
SFP-10G-ZR	6.6.25	Cisco multi-rate 10GBASE-ZR, 10GBASE-ZW and OTU2e SFP+ transceiver module for SMF and MMF, 1550 nm
SFP-10G-SR-X	6.6.25	Cisco 10GBASE-SR Ethernet SFP+ transceiver module for MMF, 850 nm, extended temperature range
SFP-10G-LR-X	6.6.25	Cisco 10GBASE-LR Ethernet SFP+ transceiver module for SMF, 1310 nm, extended temperature range
SFP-10G-BXD-I	6.6.25	10GBASE-BX single-strand SMF bidirectional SFP+ module, 1320-nm to 1340-nm TX/1260-nm to 1280-nm RX wavelength, single LC/PC connector, 10 km reach
SFP-10G-BXU-I	6.6.25	10GBASE-BX single-strand SMF bidirectional SFP+ module, 1260-nm to 1280-nm TX/1320-nm to 1340-nm RX wavelength, single LC/PC connector, 10 km reach
SFP-10G-BX40D-I	6.6.25	10GBASE-BX single-strand SMF bidirectional SFP+ module, 1320-nm to 1340-nm TX/1260-nm to 1280-nm RX wavelength, single LC/PC connector, 40 km reach
SFP-10G-BX40U-I	6.6.25	10GBASE-BX single-strand SMF bidirectional SFP+ module, 1260-nm to 1280-nm TX/1320-nm to 1340-nm RX wavelength, single LC/PC connector, 40 km reach

Table 4.   Cisco NCS 560-4 Series Router Interface Compatibility Matrix

Slot	N560-IMA2C	A900-IMA8Z	A900-IMA8CS1Z-M
Slot 0	6.6.25[1]	6.6.25	6.6.25
Slot 1	6.6.25[1]	6.6.25	6.6.25
Slot 2	–	6.6.25	6.6.25
Slot 3	–	6.6.25	6.6.25
Slot 4	–	6.6.25	6.6.25
Slot 5	–	6.6.25	6.6.25

[1] N560-IMA2C can only be used in slots 0 and 1

Table 5.   Cisco NCS 560-7 Series Router Interface Compatibility Matrix

Slot	N560-IMA2C	A900-IMA8Z	A900-IMA8CS1Z-M
Slot 0	–	–	6.6.25[3]
Slot 1	–	–	6.6.25[3]
Slot 2	–	–	6.6.25[4]
Slot 3	–	–	6.6.25[4]
Slot 4	–	6.6.25	6.6.25
Slot 5	–	6.6.25	6.6.25
Slot 6	–	6.6.25	6.6.25[2]
Slot 7	6.6.25[1]	6.6.25	–
Slot 8	–	6.6.25	6.6.25[2]
Slot 9	6.6.25[1]	6.6.25	–
Slot 10	–	6.6.25	6.6.25
Slot 11	–	6.6.25	6.6.25
Slot 12	–	–	6.6.25[4]
Slot 13	–	–	6.6.25[4]
Slot 14	–	–	6.6.25[3]
Slot 15	–	–	6.6.25[3]

[1.] N560-IMA2C can only be used in slots 7 and 9

[2] A900-IMA8CS1Z in slots 6, 8, can only be used in 8 x 1 Gigabit Ethernet (SFP) mode

[3] A900-IMA8CS1Z in slots 0, 1, 14 and 15 can only be used in 8 x 1 Gigabit Ethernet (SFP) + 1 x 10 Gigabit Ethernet (SFP+) mode

[4] A900-IMA8CS1Z in slots 2, 3, 12 and 13 can be used in 8 x 1 Gigabit Ethernet (SFP) + 1 x 10 Gigabit Ethernet (SFP+) or 16 x 1 Gigabit Ethernet (CSFP) + 1 x 10 Gigabit Ethernet (SFP+) mode

Table 6.   NCS 560 Series Router Interface Module Specifications

Features	Description
Port density	• 8/16-port GE SFP/CSFP + 1-port 10 GE SFP+ / 1/2-port GE SFP/CSFP • 8-port 10 GE, SFP/SFP+ • 2-port 100 GE, QSFP28
Power draw	• 8/16-port GE SFP/CSFP + 1-port 10GE SFP+ / 1/2-port GE SFP/CSFP: 37W typical, 40W maximum • 8-port 10 GE SFP/SFP+: 47W typical, 51W maximum • 2-port 100 GE QSFP28: 52W typical, 59W maximum
Module shipment weight	• 8/16-port GE SFP/CSFP + 1-port 10 GE SFP+ / 1/2-port GE SFP/ CSFP: 3.5 lbs • 8-port 10 Gigabit Ethernet SFP/SFP+: 3.8 lbs • 2-port 100 Gigabit Ethernet QSFP28: 2.55 lbs
Module shipment package size (LxWxH)	• 15.44 x 9.44 x 4.31 inches
Environmental specifications[1]	–40 to 65°C (–40 to 149°F) operating temperature (using Industrial temperature XFP, SFP, and SFP+ optics) 0 to 60°C (32 to 104°F) operating temperature (CPAK and QSFP optics)
Relative humidity	5 to 95%, noncondensing
Storage environment	Temperature: –40 to 70°C (–40 to 158°F) altitude: 4570 m (15,000 ft)
MTBF at 40°C (104°F) operating temperature. (25°C / 77°F ambient temperature)	• 8/16-port GE SFP/CSFP + 1-port 10 GE SFP+ / 1/2-port GE SFP/C-FP: 1,340,000 hours • 8-port 10 GE SFP+: 1,897,000 hours • 2-port 100 GE QSFP28: 1,608,000 hours
Reliability and availability	OIR field-replaceable SFP optics modules Single interface module software reset Rolling software upgrade, interface module by interface module

[1] Optics, power supplies, fan tray, and chassis type used may limit the temperature range

Table 7.   Safety and compliance

Type	Standards
Safety	• UL 60950-1, 2nd edition • CAN/CSA C22.2 No. 60950-1-07 2nd edition • IEC 60950-1, 2nd edition • EN 60950-1, 2nd edition • AS/NZS 60950.1:2003

Type	Standards
Electromagnetic	• FCC CFR47 Part 15, Class A
Emissions compliance	• EN55022, class A • CISPR22, class A • ICES-003, class A • EN 300 386, class A • VCCI, class A • KN22, class A • EN61000-3-2 to EN61000-3-3
Immunity compliance	• EN 300 386 • EN 61000-6-1 • EN 50082-1 • CISPR24 • EN 55024 • KN 24 • EN 50121-4 • EN/KN 61000-4-2 to EN/KN 61000-4-6 • EN/KN 61000-4-8 • EN/KN 61000-4-11
Network Equipment-Building Systems (NEBS)[1]	This product is designed to meet the following requirements (qualification in progress) • GR-63-CORE[1] • GR-1089-CORE[1]
Power substation system standards	• IEC 61850-3 (2002) • IEEE 1613 (2009)
ETSI	• ETS/EN 300 119 Part 4 • ETS/EN 300 019 - Storage: Class 1.2, Transportation: Class 2.3, In-Use/Operational: Class 3.2 • ETS/EN 300 753
Telecom	Ethernet: • DSPR Technical Conditions • RRA 2009-38 (RRL 2005-96) • IEEE 802.3-2005 • IEEE 802.3z • IEEE 802.3ab • IEEE 802.3ae
Network synchronization	• GR-1244-CORE • GR-253-CORE • ANSI T1.101 • ITU-T G.813 • ITU-T G.703 clause 5 • ITU-T G.703 clause 9 • ITU-T G.823 • ITU-T G.824 • ITU-T G.8261/Y.1361

Type	Standards
	• ITU-T G.781 • ITU-T G.8262 • ITU-T G.8264 • ITU-T G.8265.1 • ITU-T G.8275.1 • ITU-T G.8275.2 • IEEE1588-2008

[1] Contact your local Cisco Sales and Marketing for the NEBS report

Ordering information

Tables 8 lists the key system components for the Cisco NCS 560 Series Router Interface Modules.

Table 8.   Cisco NCS 560 Series Router interface modules

Part Number	Description
N560-IMA-2C	NCS 560 2 port QSFP28 100 Gigabit Ethernet Interface Module, Flexible Consumption
N560-IMA-2C=	NCS 560 2 port QSFP28 100 Gigabit Ethernet Interface Module, Flexible Consumption, Spare
N560-IMA2C	NCS 560 2 port QSFP28 100 Gigabit Ethernet Interface Module
N560-IMA2C=	NCS 560 2 port QSFP28 100 Gigabit Ethernet Interface Module, Spare
A900-IMA-8Z	NCS 560 8 port SFP+ 10 Gigabit Ethernet Interface Module, Flexible Consumption
A900-IMA-8Z=	NCS 560 8 port SFP+ 10 Gigabit Ethernet Interface Module, Flexible Consumption, Spare
A900-IMA8Z	NCS 560 / ASR 900 8 port 10GE SFP+ Interface Module
A900-IMA8Z=	NCS 560 / ASR 900 8 port 10GE SFP+ Interface Module, Spare
A900-IMA-8CS1Z	NCS 560 Combo 8/16 port GE SFP/C-SFP and 1 port 10GE SFP+ / 2 port 1GE C-SFP Interface Module, Flexible Consumption
A900-IMA-8CS1Z=	NCS 560 Combo 8/16 port GE SFP/C-SFP and 1 port 10GE SFP+ / 2 port 1GE C-SFP Interface Module, Flexible Consumption, Spare
A900-IMA8CS1Z-M	NCS 560 / ASR 900 Combo 8/16 port GE SFP/C-SFP and 1 port 10GE SFP+ / 2 port 1GE C-SFP Interface Module
A900-IMA8CS1Z-M=	NCS 560 / ASR 900 Combo 8/16 port GE SFP/C-SFP and 1 port 10GE SFP+ / 2 port 1GE C-SFP Interface Module, Spare

Warranty information

Warranty information is available on Cisco.com at the Product Warranties page.

Cisco environmental 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:

Sustainability topic	Reference
Information on product material content laws and regulations	Materials
Information on electronic waste laws and regulations, including products, batteries, and packaging	WEEE compliance

Cisco makes the packaging data available for informational purposes only. It may not reflect the most current legal developments, and Cisco does not represent, warrant, or guarantee that it is complete, accurate, or up to date. This information is subject to change without notice.

Service and Support

Cisco offers a wide range of services programs to help accelerate customer success. These innovative services programs are delivered through a unique combination of people, processes, tools, and partners, promoting high levels of customer satisfaction. Cisco Services help you protect your network investment, optimize network operations, and prepare your network for new applications to extend network intelligence and the power of your business. For more information about Cisco Services, refer to Cisco Technical Support Services or Cisco Advanced Services.

Cisco is committed to reducing your total cost of ownership. Cisco offers a portfolio of technical support services to help ensure that Cisco products operate efficiently, remain highly available, and benefit from the most up-to-date system software. The services and support programs described in Table 9 are available as part of the Cisco Carrier Ethernet Switching Service and Support solution and are available directly from Cisco and through resellers.

Table 9.   Service and Support

Advanced Services	Features	Benefits
Cisco Total Implementation Solutions (TIS), available directly from Cisco **Cisco Packaged TIS, available through resellers**	• Project management • Site survey, configuration, and deployment • Installation, text, and cutover • Training • Major moves, adds, and changes • Design review and product staging	• Supplement existing staff • Help ensure functions meet needs • Mitigate risk
Cisco SP Base Support and Service Provider-Based Onsite Support, available directly from Cisco **Cisco Packaged Service Provider-Based Support, available through resellers**	• 24-hour access to software updates • Web access to technical repositories • Telephone support through the Cisco Technical Assistance Center (TAC) • Advance replacement of hardware parts	• Facilitate proactive or expedited problem resolution • Lower total cost of ownership by taking advantage of Cisco expertise and knowledge • Reduce network downtime

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