

## Cisco ASR 920 Series Aggregation Services Routers: High-Port-Density Models

The Cisco® ASR 920 Series Aggregation Services Router (ASR) is a full-featured converged access platform designed for the cost-effective delivery of wireline and wireless services. These temperature-hardened, high-throughput, small-form-factor, low-power-consumption routers are optimized for mobile backhaul and business applications. The Cisco ASR 920 Router provides a comprehensive and scalable feature set of Layer 2 VPN (L2VPN) and Layer 3 VPN (L3VPN) services in a compact package. It also enables service providers to deploy Multiprotocol Label Switching (MPLS)-based VPN services from within the access layer. The Cisco ASR 920 Series offers key Carrier Ethernet features that simplify network operation; you can use them for premium services with enhanced service-level agreements (SLAs). An optional "pay-as-you-grow" feature and service-activation model makes the Cisco ASR 920 Series flexible and cost-effective.

The Cisco ASR 920 Series has multiple models with different port densities, including the following models that feature high port densities:

- Cisco ASR 920 Series (part number ASR-920-24TZ-M)
- Cisco ASR 920 Series (ASR-920-24SZ-M)
- Cisco ASR 920 Series (ASR-920-24SZ-IM)

### Major Applications

#### **Broadband Access**

The Cisco ASR 920 Router supports broadband access for delivering "any-play" services (voice, video, data, and mobility) to thousands of subscribers, with quality of service (QoS) on the Cisco ASR 920 Router capable of scaling up to a large number of queues per device. The large number of queues, combined with the three-level hierarchical QoS algorithm, results in an enhanced broadband user experience. This full-featured Layer 2 switch and Layer 3 router supports a variety of broadband applications including IPTV and video on demand (VoD), enhancing and extending the Cisco Evolved Programmable Network (EPN) architecture.

#### **Converged Access for Mobile Applications**

Deployed as a converged access platform for mobile backhaul, the Cisco ASR 920 Router can aggregate multiple base stations through multiple Ethernet and IP interfaces and can use MPLS as a transport for mobile backhaul traffic. It provides the Synchronous Ethernet (SyncE) and IEEE-1588 timing services required in today's converged access networks. The router can be deployed in small, completely sealed cabinets in outside environments because of its small form factor and durability in extended temperature ranges.

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## **Metro Ethernet Access**

The Cisco ASR 920 Router is built to meet service provider requirements for Carrier Ethernet access. It is optimized for remote access and central offices for smaller aggregation sites where a full-featured, small-footprint converged platform is needed. The router offers service flexibility and delivers Layer 2, IP, and MPLS transport for advanced L2VPN, L3VPN, and multicast services.

## **Major Differentiators**

The Cisco ASR 920 Router helps service providers deliver differentiated, cost-effective services such as Residential Broadband, Mobile, and Metro Ethernet based on a variety of features.

## **Flexible Deployment Options**

The Cisco ASR 920 Router is designed with a 1RU compact form factor to accommodate deployment in small spaces. One model, the Cisco ASR 920 Router (model ASR-920-24SZ-IM), is 1.5RU to accommodate the interface module in the chassis. Available with a range of mounting options, the router can be deployed in space-constrained locations such as ETSI 300-mm-deep cabinets. The extended temperature range supported by the Cisco ASR 920 Router allows it to be deployed in locations with minimal environmental control. Small footprint and extended temperature range support allows service providers to extend the reach of their Carrier Ethernet networks to more challenging and remote locations.

## **Power-Supply Unit: High Availability**

The Cisco ASR 920 product family offers a choice of AC and DC power supplies. They are redundant and built into the chassis. The Ethernet interfaces are available in copper and fiber, with speeds ranging from 10 Mbps to 10 Gbps. The TDM interfaces are available in one of the product models, the Cisco ASR 920 (model ASR-920-24SZ-IM), with speeds ranging from n x DS-0 to OC-12/STM-4 for PDH, SDH, and SONET. The interface modules, power supplies, and fan tray are all field-replaceable.

## **Powered by the Cisco Carrier Ethernet ASIC**

Powered by the Cisco Carrier Ethernet application-specific integrated circuit (ASIC), which was designed specifically for service providers, the Cisco ASR 920 Series delivers essential Carrier Ethernet technologies, including hierarchical quality of service (HQoS), MPLS, and Virtual Private LAN Services (VPLS). This custom and advanced ASIC design provides uninterrupted line-rate performance while delivering complex services such as access control list (ACL) and HQoS. The Carrier Ethernet ASIC integrates Cisco traffic-management innovation to deliver intelligent packet switching and routing operations.

## **Service Enhancement**

In the Cisco ASR 920 Router, each service is assigned enhanced QoS and security attributes. The router provides advanced per-traffic-class metering and offers bidirectional packet-count and byte-count statistics. The service offering is enhanced with operations, administration, and maintenance (OAM) functions that include Layer 2 Connectivity Fault Management (CFM), IP service-level agreement (SLA) for Layer 3, and MPLS OAM.

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## Benefits

### **MPLS in the Access layer**

The Cisco ASR 920 Series extends MPLS into the access layer by allowing service providers to initiate MPLS-based Layer 2 and Layer 3 VPN services from within the access layer. The router gives service providers the ability to expand MPLS toward their network edge to gain the advantages of a single unified MPLS control plane across their networks. It offers full VPLS support allowing multipoint services definition. For additional flexibility, VPLS can be deployed as a full mesh or as Hierarchical VPLS (H-VPLS).

### **Pay-as-You-Grow Investment Model**

The return on investment (ROI) on an access element is heavily influenced by its location in the network and proximity to customers. The ability to deploy the Cisco ASR 920 Series and later activate features on demand delivers investment protection. This protection allows flexible timing for deploying MPLS and 10-Gigabit Ethernet services and boosting service capacity.

### **Advanced Service-Level Agreements**

Service-aware QoS allows service providers to expand and differentiate their services portfolio with highly advanced and differentiating SLAs. The HQoS capabilities of the Cisco ASR 920 Series scale to eight queues per service, three levels of scheduling, and buffer volumes capable of accommodating today's most demanding wireline and wireless applications.

### **Mobile Timing and Synchronization Services**

The Cisco ASR 920 Series provides the timing services required in a converged access network to support mobile solutions, including Radio Access Network (RAN) applications, and offers support for SyncE with Ethernet Synchronization Messaging Channel (ESMC) and Synchronization Status Messages (SSM) to allow excellent clock-source traceability. The Cisco ASR 920 Series supports IEEE-1588 as well.

### **Operational Efficiency for Carrier Ethernet Access Deployments**

The Cisco ASR 920 Series features major enhancements that help service providers simplify and facilitate the management of their networks, resulting in diminishing operational costs. This innovative feature set allows the Cisco ASR 920 Series to be deployed in a variety of applications, including business service with 10-Gigabit Ethernet User Network Interface (UNI) and Ethernet mobile backhaul. These features enhance performance awareness, facilitate troubleshooting, and simplify service turn-up and restoration, ultimately reducing operational costs. "Dying gasp" for power indicators and four external alarm inputs to detect changes in remote sites further help service providers manage the health of network elements.

### **Universal Customer Premises Equipment**

With all interfaces built in, this fixed-form-factor platform is versatile and can cover many deployment scenarios including Gigabit Ethernet and 10-Gigabit Ethernet deployments. The licensing mechanism supports enabling additional 1-Gigabit/10-Gigabit Ethernet interfaces as required for a particular deployment, allowing service providers to customize the configuration of the device and pay only when their services grow. With support for extended temperatures, the Cisco ASR 920 Series can be deployed in outside environments and remote locations.

## Software

The Cisco ASR 920 Series Routers are supported in Cisco IOS® XE Software, which is a modular operating system. Cisco IOS XE Software is designed to provide modular packaging, feature velocity, and powerful resiliency. For more information on the supported features and software capabilities, see the Cisco IOS XE Software for Cisco ASR 920 Series Aggregation Services Router data sheet.

## Network Management

Cisco ASR 920 Series Routers are supported in Cisco Prime™ for EPN architectures. The Cisco Prime end-to-end network management solution drastically simplifies the design, provisioning, and management of carrier-grade networks. It is a comprehensive solution that centralizes and automates service design, fulfillment, assurance, and performance analysis to help service providers and enterprises lower their costs while meeting high customer expectations.

## Interface Modules

Interface modules supported on the Cisco ASR 920 Router are listed in Table 1.

**Table 1.** Interface Modules Supported on Cisco ASR 920 Router

Part Number	Description	Supported as of Cisco IOS XE Release
<b>A900-IMA8T</b>	ASR 900 8 port 10/100/1000 Ethernet Interface Module	3.14.0S
<b>A900-IMA1X</b>	ASR 900 1 port 10GE XFP Interface Module	3.14.0S
<b>A900-IMA2Z</b>	ASR 900 2 port 10GE SFP+/XFP Interface Module	3.14.0S
<b>A900-IMA8D</b>	ASR 900 8 port RJ48C T1/E1 Interface Module	3.14.0S

### Cisco ASR 900 Series 8-Port 1 Gigabit Ethernet RJ-45 Module

The Cisco ASR 900 Series 8-Port 1 Gigabit Ethernet RJ-45 Module delivers eight ports of Gigabit Ethernet, Fast Ethernet, and Ethernet connectivity on the Cisco ASR 920 Series Routers. The interface speed can be software-selected per interface. This interface module provides physical connectivity using eight RJ-45 connectors. When this module is inserted in the Cisco ASR 920 Router, ports 16-23 of the chassis are not usable.

### Cisco ASR 900 Series 1-Port 10 Gigabit Ethernet XFP Module

The Cisco ASR 900 Series 1-Port 10 Gigabit Ethernet XFP Module provides physical connectivity using a single pluggable 10 Gigabit Ethernet XFP optic.

Table 2 lists the pluggable optics that are supported in the Cisco ASR 900 Series 1-Port 10 Gigabit Ethernet XFP Module, on the Cisco IOS XE Software releases for the Cisco ASR 920 Series Router.

Higher combined interface bandwidth may be accepted in the router configuration, though beyond the maximum interface throughput the functions of the router cannot be guaranteed. Oversubscription is not supported.

**Table 2.** 10 Gigabit Ethernet Optics Supported in the 1-Port 10 Gigabit Ethernet XFP Module

Optic Product Number	Supported as of Cisco IOS XE Release	Description
XFP10GER-192IR-L	3.14.0S	Cisco multirate XFP transceiver module for 10GBASE-ER/-EW Ethernet and OC-192/STM-64 intermediate-reach (IR-2), single-mode fiber (SMF), dual LC connector, low power (2.5W)
XFP10GLR-192SR-L	3.14.0S	Cisco multirate XFP transceiver module for 10GBASE-LR/-LW Ethernet and OC-192/STM-64 short-reach (SR-1), SMF, dual LC connector, low power (1.5W)
XFP-10GZR-OC192LR	3.14.0S	Cisco multirate XFP transceiver module for 10GBASE-ZR/-ZW Ethernet and OC-192/STM-64 long-reach, SMF, dual LC connector
DWDM-XFP-C	3.14.0S	10GBASE-DWDM Tunable XFP (50-GHz ITU grid), dual LC connector
DWDM-XFP-xx.yy	3.14.0S	10GBASE-DWDM single-wavelength XFP (100-GHz ITU grid), dual LC connector - 32 individual wavelength pluggable modules
ONS-XC-10G-EPxx.y=	3.14.0S	10GBASE-DWDM single-wavelength Edge Performance XFP (100-GHz ITU grid), dual LC connector, 50-km reach - 40 individual wavelength pluggable modules
ONS-XC-10G-xxxx=	3.14.0S	10GBASE-CWDM single-wavelength XFP (ITU G694.2), dual LC connector, 40-km reach - 8 individual wavelength pluggable modules
XFP-10G-MM-SR	3.14.0S	Cisco 10GBASE-SR Ethernet XFP transceiver module for multimode fiber (MMF), dual LC connector
XFP-10GLR-OC192SR	3.14.0S	Cisco multirate XFP transceiver module for 10GBASE-LR Ethernet and OC-192/STM-64 short-reach (SR-1) PoS applications, SMF, dual LC connector
XFP-10GZR-OC192LR	3.14.0S	Cisco multirate XFP transceiver module for 10GBASE-ZR Ethernet and OC-192/STM-64 long-reach PoS applications, SMF, dual LC connector

### Cisco ASR 900 Series 2-Port 10 Gigabit Ethernet XFP/SFP+ Module

The Cisco ASR 900 Series 2-Port 10 Gigabit Ethernet XFP/SFP+ pluggable interface module delivers the highest performance per slot on the Cisco ASR 920 Series Routers. This interface module provides two 10 Gigabit Ethernet ports with physical connectivity, using either a pluggable 10 Gigabit Ethernet Enhanced Small Form Factor Pluggable (SFP+) or a pluggable 10 Gigabit Ethernet XFP optic per port.

Table 3 lists the pluggable optics that are supported in the Cisco ASR 900 Series 2-Port 10 Gigabit Ethernet XFP/SFP+ Module on the Cisco IOS XE Software releases for the Cisco ASR 920 Series Router.

Higher combined interface bandwidth may be accepted in the router configuration, though beyond the maximum interface throughput the functions of the router cannot be guaranteed. Oversubscription is not supported.

**Table 3.** 10 Gigabit Ethernet Optics Supported in the 2-Port 10 Gigabit Ethernet XFP/SFP+ Module

Optic Product Number	Supported as of Cisco IOS XE Release	Description
XFP10GER-192IR-L	3.14.0S	Cisco multirate XFP transceiver module for 10GBASE-ER/-EW Ethernet and OC-192/STM-64 intermediate-reach (IR-2), single-mode fiber (SMF), dual LC connector, low power (2.5W)
XFP10GLR-192SR-L	3.14.0S	Cisco multirate XFP transceiver module for 10GBASE-LR/-LW Ethernet and OC-192/STM-64 short-reach (SR-1), SMF, dual LC connector, low power (1.5W)
XFP-10GZR-OC192LR	3.14.0S	Cisco multirate XFP transceiver module for 10GBASE-ZR/-ZW Ethernet and OC-192/STM-64 long-reach, SMF, dual LC connector
DWDM-XFP-C	3.14.0S	10GBASE-DWDM Tunable XFP (50-GHz ITU grid), dual LC connector
DWDM-XFP-xx.yy	3.14.0S	10GBASE-DWDM single-wavelength XFP (100-GHz ITU grid), dual LC connector - 32 individual wavelength pluggable modules
ONS-XC-10G-EPxx.y=	3.14.0S	10GBASE-DWDM single-wavelength Edge Performance XFP (100-GHz ITU grid), dual LC connector, 50-km reach - 40 individual wavelength pluggable modules
ONS-XC-10G-xxxx=	3.14.0S	10GBASE-CWDM single-wavelength XFP (ITU G694.2), dual LC connector, 40-km reach - 8 individual wavelength pluggable modules

Optic Product Number	Supported as of Cisco IOS XE Release	Description
<b>XFP-10G-MM-SR</b>	3.14.0S	Cisco 10GBASE-SR Ethernet XFP transceiver module for multimode fiber (MMF), dual LC connector
<b>XFP-10GLR-OC192SR</b>	3.14.0S	Cisco multirate XFP transceiver module for 10GBASE-LR Ethernet and OC-192/STM-64 short-reach (SR-1) PoS applications, SMF, dual LC connector
<b>XFP-10GZR-OC192LR</b>	3.14.0S	Cisco multirate XFP transceiver module for 10GBASE-ZR Ethernet and OC-192/STM-64 long-reach PoS applications, SMF, dual LC connector
<b>SFP-10G-SR</b>	3.14.0S	Cisco 10GBASE-SR Ethernet SFP+ transceiver module for MMF, 850 nm
<b>SFP-10G-LR</b>	3.14.0S	Cisco 10GBASE-LR Ethernet SFP+ transceiver module for SMF, 1310 nm
<b>SFP-10G-ER</b>	3.14.0S	Cisco 10GBASE-ER Ethernet SFP+ transceiver module for SMF and MMF, 1550 nm
<b>SFP-10G-ZR</b>	3.14.0S	Cisco multirate 10GBASE-ZR, 10GBASE-ZW and OTU2/OTU2e SFP+ transceiver module for SMF and MMF, 1550 nm
<b>DWDM-SFP10G-xx.xx=</b>	3.14.0S	Cisco multirate (LAN/WAN/OTU2/OTU2E) 10GBASE-DWDM single-wavelength SFP+ module (100-GHz ITU grid) - 40 individual wavelength pluggable modules

### Cisco ASR 900 Series 8-Port T1/E1 Module

The Cisco ASR 900 Series 8-Port T1/E1 Module delivers 8 ports of T1 or E1 connectivity on the Cisco ASR 920 Series Routers. The interface module can be software-configured as either T1 mode or E1 mode per interface module in a Cisco ASR 920 Series platform. This interface module provides physical connectivity using 8 onboard individual physical RJ-48C port connectors. When using this interface module with the Cisco ASR 920, ports 20-23 of the chassis are not usable.

The module is software-configurable for 8 T1 or 8 E1 ports; mixing of T1 and E1 ports on the same interface module is not supported. The module can be clocked from a line or from an internal clock source. The protocols supported on the module are software-configurable per interface, allowing for flexible deployment and efficient use of the hardware.

**Table 4.** Hardware Components for Cisco ASR 920 Router

Part Number	Description
<b>ASR-920-24SZ-M</b>	Cisco ASR920 Series - 24GE Fiber and 4-10GE - Modular PSU
<b>ASR-920-24SZ-IM</b>	Cisco ASR920 Series - 24GE and 4-10GE - Modular PSU and IM
<b>ASR-920-24TZ-M</b>	Cisco ASR920 Series - 24GE Copper and 4-10GE - Modular PSU
<b>ASR-920-FAN-F</b>	ASR920 Fan for Fixed Chassis
<b>ASR-920-FAN-M</b>	ASR920 Fan for Modular Chassis
<b>ASR-920-PWR-A</b>	ASR920 AC Power Supply
<b>ASR-920-PWR-D</b>	ASR920 DC Power Supply
<b>ASR920-PWR-BLANK</b>	ASR920 Power Supply Blank Cover
<b>A900-IMA-BLANK</b>	ASR 900 Interface Module Type-A Blank Cover
<b>ASR 920 Accessories</b>	
<b>A920-RCKMT-ETSI</b>	ETSI Rack mount Option for the Cisco ASR 920
<b>A920-RCKMT-19</b>	EIA 19" Rack mount Option for the Cisco ASR 920
<b>A920-RCKMT-23</b>	EIA 23" Rack mount Option for the Cisco ASR 920
<b>A920-DRIP-TRAY*</b>	ASR 920 Drip Tray - Modular

Tables 5 through 7 list the product, power, and environmental specifications for the Cisco ASR 920 Router. Table 8 provides safety and compliance information.

\* Applicable for the Cisco ASR 920 Series, ASR-920-24SZ-IM model only.

**Table 5.** Cisco ASR 920 Router System Specifications

Description	Cisco ASR 920 Router
<b>Physical specifications<sup>1</sup> (H * W * D)</b>	ASR-920-24SZ-M: 1.72 x 17.5 x 9.43 in. (43.6 x 444.5 x 239.5 mm), 1RU ASR-920-24TZ-M: 1.72 x 17.5 x 9.43 in. (43.6 x 444.5 x 239.5 mm), 1RU ASR-920-24SZ-IM: 2.60 x 17.5 x 9.43 in. (66 x 444.5 x 239.5 mm), 1.5RU
<b>Weight</b>	ASR-920-24TZ-M: 8.3 lb (3.8 kg) - empty chassis ASR-920-24SZ-M: 8.5 lb (3.9kg) - empty chassis ASR-920-24SZ-IM: 10.3 lb (4.7kg) - empty chassis ASR-920-24TZ-M: 10.5 lb (4.8 kg) with two AC PSU ASR-920-24SZ-M: 10.5 lb (4.8 kg) with two AC PSU ASR-920-24SZ-IM: 14.1 lb (6.4 kg) with two AC PSU and IM card
<b>Rack mounts</b>	ETSI rack-mount kit 19-in. rack-mount kit 23-in. rack-mount kit
<b>Air flow</b>	Front-to-Back airflow (ASR-920-24TZ-M, ASR-920-SZ-M) Front-to-Back & Side-to-Back airflow (ASR-920-SZ-IM)
<b>Power supplies</b>	2 power supplies (AC or DC)
<b>MTBF (hrs)</b>	ASR-920-24TZ-M: 582,610 ASR-920-24SZ-M: 546,260 ASR-920-24SZ-IM: 471,530 ASR-920-FAN-F: 2,581,770 ASR-920-FAN-M: 2,681,720 ASR-920-PWR-A: 1,598,000 ASR-920-PWR-D: 1,129,417

<sup>1</sup> Measured from the front of the chassis (excluding handles from the power supply, fan tray, and interface modules installed in the chassis)

**Table 6.** Power Specifications

Description	Cisco ASR 920 Router
<b>Power consumption</b>	ASR-920-24TZ-M: Max 130W, Typical : 100W ASR-920-24SZ-M: Max 145W, Typical : 110W ASR-920-24SZ-IM: Max 180W, Typical : 130W
<b>AC input voltage and frequency</b>	Voltage range: 85V AC to 264V AC, nominal 100V AC to 240V AC Frequency Range: 47 to 63 Hz, nominal 50 to 60 Hz
<b>DC input voltage</b>	Voltage range: -18 to -32 VDC or -36 to -72 VDC, nominal: -24 VDC/-48 VDC

**Table 7.** Environmental Specifications

Description	Cisco ASR 920 Router
<b>Operating environment and altitude</b> <sup>1</sup>	-40 to +70°C, up to 1,000 feet (300m) -40 to +65°C, up to 6,000 feet (1800m) -40 to +55°C, up to 13,000 feet (4000m)
<b>Relative humidity</b>	5 to 95 percent, noncondensing
<b>Acoustic noise</b> <sup>2</sup>	Acoustic noise peak operation maximum 55dBA sound pressure level, bystander position for rack-mount products at 20°C operation as measured by ISO 7779 NAIS noise measurement test standard.  Acoustic noise peak operation compliant to the Network Equipment Building Standards (NEBS) GR-63-Core Issue 3 sound power level of 78 dB at 27°C operation as measured by the ANSI S12.10/ISO 7779 NAIS noise measurement test standard.
<b>Storage environment</b>	Temperature: -40 to +70°C altitude: 15,000 ft (4570m)
<b>Seismic</b>	Zone 4

<sup>1</sup>. Optics used may limit the temperature range.

<sup>2</sup>. The numbers in Table 7 are for normal (nonfailure) operation. When operating with a fan failure, these numbers may be exceeded.

**Table 8.** Safety and Compliance

Type	Standards
<b>Safety</b>	<ul style="list-style-type: none"> <li>• UL 60950-1, 2<sup>nd</sup> edition</li> <li>• CAN/CSA C22.2 No. 60950-1-07 2<sup>nd</sup> edition</li> <li>• IEC 60950-1, 2<sup>nd</sup> edition</li> <li>• EN 60950-1, 2<sup>nd</sup> edition</li> <li>• AS/NZS 60950.1:2003</li> </ul>
<b>Electromagnetic</b>	<ul style="list-style-type: none"> <li>• FCC CFR47 Part 15 Class A</li> </ul>
<b>Emissions compliance</b>	<ul style="list-style-type: none"> <li>• EN55022, class A</li> <li>• CISPR22, class A</li> <li>• ICES-003, class A</li> <li>• EN 300 386, class A</li> <li>• VCCI, class A</li> <li>• KN22, class A</li> <li>• EN61000-3-2 to EN61000-3-3</li> </ul>
<b>Immunity compliance</b>	<ul style="list-style-type: none"> <li>• EN 300 386</li> <li>• EN 61000-6-1</li> <li>• EN 50082-1</li> <li>• CISPR24</li> <li>• EN 55024</li> <li>• KN 24</li> <li>• EN 50121-4</li> <li>• EN/KN 61000-4-2 to EN/KN 61000-4-6</li> <li>• EN/KN 61000-4-8</li> <li>• EN/KN 61000-4-11</li> </ul>
<b>NEBS</b> <sup>1</sup>	<ul style="list-style-type: none"> <li>• GR-63-CORE Issue 4</li> <li>• GR-1089-CORE Issue 6</li> <li>• SR-3580 NEBS Level 4</li> </ul>
<b>ETSI</b>	<ul style="list-style-type: none"> <li>• ETS/EN 300 119 Part 4</li> <li>• ETS/EN 300 019 - Storage: Class 1.2, Transportation: Class 2.3, In-Use/Operational: Class 3.2</li> <li>• ETS/EN 300 753</li> </ul>



Type	Standards
Network synchronization	<ul style="list-style-type: none"> <li>• ANSI T1.101</li> <li>• GR-1244-CORE</li> <li>• GR-253-CORE</li> <li>• ITU-T G.703 clause 5</li> <li>• ITU-T G.703 clause 9</li> <li>• ITU-T G.781</li> <li>• ITU-T G.813</li> <li>• ITU-T G.823</li> <li>• ITU-T G.824</li> <li>• ITU-T G.8261/Y.1361</li> <li>• ITU-T G.8262</li> <li>• ITU-T G.8264</li> <li>• IEEE1588-2008</li> </ul>

<sup>1</sup>: Notable exceptions: Fans do not have filters, and all cabling is provided through the front panel.

## Warranty Information

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

## Service and Support

Cisco offers a wide range of services programs to accelerate customer success. These innovative services programs are delivered through a unique combination of people, processes, tools, and partners, resulting in 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 minimizing 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
<b>Cisco Total Implementation Solutions (TIS), available directly from Cisco</b> <b>Cisco Packaged TIS, available through resellers</b>	<ul style="list-style-type: none"> <li>• Project management</li> <li>• Site survey, configuration, and deployment</li> <li>• Installation, text, and cutover</li> <li>• Training</li> <li>• Major moves, adds, and changes</li> <li>• Design review and product staging</li> </ul>	<ul style="list-style-type: none"> <li>• Supplement existing staff</li> <li>• Help ensure functions meet needs</li> <li>• Mitigate risk</li> </ul>
<b>Cisco SP Base Support and Service Provider-Based Onsite Support, available directly from Cisco</b> <b>Cisco Packaged Service Provider- Based Support, available through resellers</b>	<ul style="list-style-type: none"> <li>• 24-hour access to software updates</li> <li>• Web access to technical repositories</li> <li>• Telephone support through the Cisco Technical Assistance Center (TAC)</li> <li>• Advance replacement of hardware parts</li> </ul>	<ul style="list-style-type: none"> <li>• Facilitate proactive or expedited problem resolution</li> <li>• Lower total cost of ownership by taking advantage of Cisco expertise and knowledge</li> <li>• Minimize network downtime</li> </ul>




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