Cisco IOS XR Software Release 4.0.0 for Cisco ASR 9000 Series Routers

PB623620

Product Overview

The Cisco® ASR 9000 Series Aggregation Services Router delivers unprecedented scale, service flexibility, and high availability into Carrier Ethernet and business-VPN services-transport networks. It is powered by Cisco IOS® XR Software – an innovative, self-healing, distributed operating system designed for always-on operation while scaling system capacity up to 6.4 Tbps. Cisco IOS XR Software Release 4.0.0 provides new software and hardware feature support for the Cisco ASR 9000 Series router. This release further enhances the place of the Cisco ASR 9000 Series in the Cisco IP Next-Generation Network (NGN). The Cisco IP NGN delivers a Carrier Ethernet design for converged, resilient, intelligent, and scalable transport of consumer, business, wholesale, and mobile services. Applications supported within this framework include residential broadband services such as IPTV and video on demand (VoD), Layer 2 and Layer 3 business-VPN services, and next-generation mobile backhaul transport.

New Hardware Features

Cisco IOS XR Software Release 4.0.0 introduces support for several new shared port adapters (SPAs) on the Cisco ASR 9000 Series SPA Interface Processor-700 (SIP-700) as well an upgraded memory version of the route switch processor (RSP) designed to support high multidimensional scale critical for business-VPN applications.

Table 1 lists the new hardware support added in Cisco IOS XR Software Release 4.0.0.

Table 1. New Hardware Supported on Cisco ASR 9000 in Cisco IOS XR Software Release 4.0.0

Part Number	Description
SPA-OC192POS-XFP=	1-port OC192/STM64 POS/RPR XFP Optics
SPA-2XOC48POS/RPR=	2-port OC48/STM16 POS/RPR Shared Port Adapters
SPA-8XOC12-POS=	8-port OC12/STM4 POS Shared Port Adapters
SPA-1XCHOC48/DS3=	1-port Channelized OC48 to DS3 SPA
A9K-RSP-8G=	ASR9K Fabric, Controller 8G memory

New Software Features

Cisco IOS XR Software Release 4.0.0 also adds new software features for the Cisco ASR 9000 Series, including enhancements for Layer 2 (802.3ah Unidirectional Link Detection, Multichassis Link Aggregation Groups, Y.1731 Performance Monitoring Enhancements, and 802.1ad Discard Eligible Indicator [DEI] support); Layer 3 (Multiprotocol Label Switching-Traffic Engineering [MPLS-TE] auto-bandwidth, Bidirectional Forwarding Detection [BFD] enhancements, local proxy Address Resolution Protocol [ARP], Inter-Autonomous System [Inter-AS] option B for MPLS Layer 3 VPN [L3VPN] or VPNv6, and Inter-AS option A for Multicast VPN Version 4 [MVPNv4]); optical (IP over dense wavelength-division multiplexing [IPoDWDM] Proactive Protection); and items specifically for the Cisco ASR 9000 Series SIP-700 (IP Header Compression, Frame Relay over MPLS [FRoMPLS], routed Cisco Any Transport over MPLS [AToM] interworking, Link Noise Monitoring [LNM], Multilink Frame Relay [MLFR] with link fragmentation and interleaving [LFI] and Frame Relay fragmentation [FRF.12] support, and Multilink Point-to-Point Protocol [MLPPP] [n x DS-0]).

Table 2 lists new software features in Cisco IOS XR Software Release 4.0.0 supported on the Cisco ASR 9000 Series Aggregation Services Routers.

Table 2. New Software Features Supported on Cisco ASR 9000 in Cisco IOS XR Software Release 4.0.0

Feature	Description
802.3ah Unidirectional Link Detection	• The advent of Ethernet as a metropolitan and WAN technology imposes a new set of operations, administration, and maintenance (OA&M) requirements on the traditionally enterprise-oriented functions of Ethernet. The expansion of this technology into the larger and more complex user base makes operational management of link uptime crucial. Isolating and responding to failures quickly directly affects the competitiveness of the service provider. • A critical component of the introduction of Ethernet OAM is the support of 802.3ah Unidirectional Fault Detection, which provides notification of faults that are happening in one direction and subsequent shutdown of traffic on the link. This shutdown forces reconvergence and avoids blackholing of traffic.
Multichassis Link Aggregation Groups (MC-LAG)	• The Cisco ASR 9000 sits at a critical point in the network that often mandates dual-node deployments. In this situation, the presentation of this dual-node deployment to connecting dual-homed devices is important. The primary focus with a solution like this should be redundancy with fast failover times and consideration of the operational efficiency of a solution like this. • MC-LAG provides a standards-based 802.3ad bundle to a connecting device to two Cisco ASR 9000 routers; the bundle appears as a single router to the connecting device. Link or node failures result in excellent restoration times and simplify the operational environment for the connecting device. • MC-LAG can be coupled with a long list of solutions on the Cisco ASR 9000, such as business Layer 2 VPN (L2VPN) and L3VPN residential service backhaul, mobile aggregation, and service provider edge.
Y.1731 Performance-monitoring enhancements	The Cisco ASR 9000 introduced Y.1731 performance monitoring in the Cisco IOS XR Software Release 3.9.0. This function is enhanced in Cisco IOS XR Software Release 4.0.0 to include on-demand measurements, one-way delay and jitter measurements, and 4x the per–line-card performance. This technology is critical to implementing and validating service-level agreements (SLAs) for Ethernet-based services.
802.1ad DEI bit-directed queuing and marking	As Ethernet services continue to grow, the need for additional ways of classifying, marking, and queuing arises. In an effort to provide additional flexibility and alignment with Metro Ethernet Forum (MEF)-defined services, the Cisco ASR 9000 has added full support of the DEI bit to be used in quality-of-service (QoS) classification, marking, and queuing algorithms. The DEI bit is resident to the Ethernet VLAN tag field in an 802.1ad format frame.
MPLS-TE auto-bandwidth	• MPLS-TE automatic bandwidth adjustment provides the means to automatically adjust the bandwidth allocation for traffic-engineering tunnels based on their measured traffic load. • Traffic-engineering auto-bandwidth samples the average output rate for each tunnel marked for automatic bandwidth adjustment. For each marked tunnel, it periodically (for example, once per day) adjusts the allocated bandwidth of the tunnel. • The auto-bandwidth feature makes it easy to configure and monitor the bandwidth for MPLS-TE tunnels. If the feature is configured for a tunnel, traffic engineering automatically adjusts the bandwidth of the tunnel.
BFD enhancements	The Cisco ASR 9000 continues to evolve its industry-leading BFD implementation in Cisco IOS XR Software Release 4.0.0. Enhancements include: • Increase to 1250 sessions and line cards • BFD for IPv6 static interfaces • BFD integration with Open Shortest Path First Version 3 (OSPFv3) • BFD IPv6 encapsulation for asynchronized non-echo mode
Local proxy Address Resolution Protocol (ARP)	The local proxy ARP feature allows the Cisco ASR 9000 to respond to ARP requests for IP addresses within a subnet where normally no routing is required. With this feature enabled, the platform responds to all ARP requests for IP addresses within the subnet and forwards all traffic between hosts in the subnet.
Inter-AS option B for Layer 3 MPLS VPN or VPNv6	The need to interconnect providers continues to grow. For the L3VPN solution, several options are available, and option B is the latest to be supported on the Cisco ASR 9000. In option B, the autonomous-system border routers (ASBR) peer with each other using an exterior Border Gateway Protocol (eBGP) session. The ASBR also performs the function of a provider-edge router and therefore peers with every other provider-edge router in its autonomous system. The ASBR does not hold any virtual-route-forwarding (VRF) instances but instead holds all or a subset (those that need to be passed to the other autonomous system) of the VPNv4 routes from every other provider-edge router.
Inter-AS option A for MVPNv4	The need to interconnect providers also exists for multicast traffic. The addition of MVPN introduces a similar need for options, and option A is the latest to be supported. The MVPN Inter-AS support feature enables Multicast Distribution Trees (MDTs) used for MVPNs to span multiple autonomous systems. Benefits include increased multicast coverage to customers who require multicast to span multiple service providers in a MPLS Layer 3 VPN service with the flexibility to support all options described in RFC 4364. Additionally, the MVPN Inter-AS support feature can be used to consolidate an existing MVPN service with another MVPN service, such as the case with a company merger or acquisition.
IPoDWDM Proactive Protection	G.709 Proactive Protection is a software feature that takes advantage of G.709 pre-Forward Error Correction (FEC) Performance Monitoring data as a trigger mechanism to initiate protection switching prior to link failure. The pre-FEC Performance Monitoring trigger enables the switching of data away from a degraded link before it is expected to fail.

Feature	Description
Cisco ASR 9000 SIP-700 Features	• IP header compression: Header compression is a mechanism that compresses the IP header in a data packet before the packet is transmitted. Header compression reduces network overhead and speeds the transmission of Real-Time Transport Protocol (RTP) and TCP packets. Header compression also reduces the amount of bandwidth consumed when the RTP or TCP packets are transmitted. • FRoMPLS AToM interworking: Cisco Any Transport over MPLS (AToM) is a solution for transporting Layer 2 packets over an MPLS backbone. It enables service providers to supply connectivity between customer sites with existing data link layer (Layer 2) networks through a single, integrated, packet-based network infrastructure: a Cisco MPLS network. Without separate networks, each having network management environments, service providers can deliver Layer 2 connections over an MPLS backbone. Cisco AToM provides a common framework to encapsulate and transport supported Layer 2 traffic types over an MPLS network core. Service providers can use a single MPLS network infrastructure to offer connectivity for supported Layer 2 traffic and for IP traffic in Layer 3 VPNs. • Link Noise Monitoring: LNM monitors noise associated with communication links between the base transceiver station (BTS) and the aggregation node. The links are leased spans (lines) from a service provider. Noise associated with these leased spans results in loss of data. LNM detects, alerts, and removes noisy links from a bundle based on user-defined thresholds and durations. Additionally, LNM notifies the operator when the quality of the line improves. • MLFR with LFI: The LFI for Frame Relay Virtual Circuits feature supports the transport of real-time (voice) and non–real-time (data) traffic on lower-speed Frame Relay permanent virtual circuits (PVCs) without causing excessive delay of real-time traffic. This feature implements LFI using MLPPP over Frame Relay. The feature enables delay-sensitive real-time packets and non–real-time packets to share the same link by fragmenting the long data packets into a sequence of smaller data packets (fragments). The fragments are then interleaved with the real-time packets. On the receiving side of the link, the fragments are reassembled and the packets are reconstructed. This method of fragmenting and interleaving helps guarantee the appropriate QoS for the real-time traffic. Without this feature, MLPPP supported packet fragmentation and interleaving at the bundle layer; however, it did not support interleaving on Frame Relay. This feature supports low-speed Frame Relay as well as Frame Relay interworking (FRF.8) and Frame Relay fragmentation (FRF.12).

Ordering Information

Table 3 lists ordering information for Cisco IOS XR Software Release 4.0.0 for Cisco ASR 9000 Series Aggregation Services Routers. Only these part numbers are orderable. When future releases of Cisco IOS Software Release 4.0.0 are available, if you order these part numbers we will automatically ship the latest release.

Table 3. Ordering Information for Cisco IOS XR Software Release 4.0.0 for Cisco ASR 9000 Series Aggregation Services Routers

Product Name	Part Number
A9K-04.00	Cisco IOS-XR IP/MPLS Core Software
A9K-K9-04.00	Cisco IOS-XR IP/MPLS Core Software 3DES

Release 4.0 Lifecycle

The Cisco IOS XR Software release strategy is time-based, with a fixed release date and lifecycle, as opposed to being a feature-based release strategy with a variable release date. Table 4 lists the major milestones of Cisco IOS XR Software Release 4.0.0 and later.

Table 4. Major Milestones for Cisco IOS XR Software Release 4.0.0 and Later

Milestone	Definition	Date
Availability date	The date that the Cisco IOS XR Software Release 4.0.0 information is published on Cisco.com and becomes available to the general public.	September 13, 2010
End-of-life announcement date	The official end-of-life document that announces the end of sale and end of life that Cisco IOS XR Software 4.0 is distributed to the general public.	June 13, 2011
End-of-sale date and end-of-maintenance date	The last date to order Cisco IOS XR Software 4.0 through Cisco point-of-sale mechanisms. The product is no longer for sale after this date. This also marks end of engineering, maintenance rebuilds, and software fixes through rebuilds of Cisco IOS XR Software 4.0. After this date, maintenance rebuilds and software-fix support will be provided only through rebuilds of Cisco IOS XR Software 4.1 or later.	March 13, 2012
End of software maintenance releases through migration: OS software	The last date that Cisco Engineering may release any final software maintenance releases or bug fixes through a Software Maintenance Upgrade (SMU). From March 13, 2012, until March 13, 2013, maintenance rebuilds and software fixes through SMU support for Cisco IOS XR Software 4.0 will be provided only through migration to rebuilds of Cisco IOS XR Software 4.1. After March 14, 2013, Cisco Engineering will no longer develop, repair, maintain, or test Cisco IOS XR Software 4.0.	March 13, 2013

Milestone	Definition	Date
Last date of support	The last date to receive service and support for the product. After this date, all support services for the product are unavailable and the product becomes obsolete.	March 13, 2017

For official end-of-life and end-of-sale announcements for Cisco IOS XR Software, please visit http://www.cisco.com/en/US/products/ps5845/prod_eol_notices_list.html or contact your local Cisco account representative.

For More Information

For more information about the Cisco ASR 9000 Series or Cisco IOS XR Software, visit http://www.cisco.com/ or contact your local Cisco account representative.

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