

# Cisco IOS XR Software Release 3.9.1 for Cisco ASR 9000 Series Aggregation Services Routers

Product Bulletin No. 602910

## Product Overview

The Cisco® ASR 9000 Series Aggregation Services Router delivers unprecedented scale, service flexibility, and high availability into Carrier Ethernet 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 3.9.1 supports the Cisco ASR 9000 Series router, which is designed to provide a Carrier Ethernet foundation for visual networking. The Cisco ASR 9000 Series further enhances Cisco's IP Next-Generation Network (NGN) Carrier Ethernet design for converged, resilient, intelligent, and scalable transport of consumer, business, wholesale, and mobile services. Applications supported include residential broadband services such as IPTV and video on demand (VoD), Layer 2 and Layer 3 VPN business services, and next-generation mobile backhaul transport.

Cisco IOS XR Software Release 3.9.1 introduces support for the 16-port 10 Gigabit Ethernet line card, adds support for the medium-queue variant of the 8-port 10 Gigabit Ethernet line card, and adds support for a low-queue variant of the 2-port 10 Gigabit Ethernet/20-port Gigabit Ethernet line card.

## New Hardware Features

Table 1 lists the hardware modules that Cisco IOS XR Software Release 3.9.1 supports on the Cisco ASR 9000 Series.

**Table 1.** New Hardware Supported

Part Number	Description
A9K-2T20GE-L	2-port 10GE, 20-port GE low-queue combo line card, requires XFPs for 10GE, SFPs for GE
A9K-8T-B	8-port 10GE medium-queue line card, requires XFPs
A9K-16T/8-B	16-port 10GE medium-queue line card, requires SFP+

## New Software Features

New software features are supported for the Cisco ASR 9000 Series, including enhancements for Layer 2 (Y.1731 AIS, CFM, and MST over Link Aggregation Groups [LAGs]; Layer 2 Protocol Tunneling [L2PT]; MST Topology Change Tracking; Multicast VLAN Registration Protocol Lite (MVRP-lite); 802.1ah Provider Backbone Bridging; VLAN hopping; and BGP-based auto-discovery for LDP signaled VPLS); Layer 3 (NetFlow version 9, 6PE/6VPE, and Layer 3 load balancing on Layer 2 LAG bundles); video (Multicast VPN, uncompressed Video Monitoring [VidMon]); and several infrastructure enhancements.

Table 2 lists new software features in Cisco IOS XR Software Release 3.9.1 supported on the Cisco ASR 9000 Series Aggregation Services Routers.

**Table 2.** New Software Features

Feature	Description
Y.1731 Alarm Indication Signal (AIS)	<ul style="list-style-type: none"> <li>The advent of Ethernet as a metropolitan and WAN technology imposes a new set of operations, administration, and maintenance (OAM) requirements on Ethernet's traditionally enterprise-oriented functions. 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.</li> <li>Key component of the introduction of Ethernet OAM is the AIS is a component of the ITU-T Y.1731 standard that provides: <ul style="list-style-type: none"> <li>Notification of faults from lower to upper maintenance domain levels (potentially allowing longer continuity check intervals to be used in upper levels).</li> <li>Suppression of multiple redundant alarms by notifying upper levels that detected faults originate from a lower level.</li> </ul> </li> </ul>
802.1ag/ Connectivity Fault Management (CFM) over Link Aggregation Groups	<ul style="list-style-type: none"> <li>The use of link aggregation groups is wide and prevalent in today's Carrier Ethernet networks. Coupled with this is the ever-increasing use of the 802.1ag Ethernet OAM solution set. This development allows for 802.1ag to operate with MIPs and MEPs being resident to a Link Aggregation Group.</li> </ul>
Multiple Spanning Tree (MST) over Link Aggregation Groups	<ul style="list-style-type: none"> <li>Similar to 802.1ag, the use of MST must be possible in conjunction with Link Aggregation Groups. This feature allows for these two widely used features to coexist.</li> </ul>
Interoperability with Cisco Q-in-Q/Layer 2 Protocol Tunneling (L2PT)	<ul style="list-style-type: none"> <li>Layer 2 Protocol Tunneling is particularly useful at the UNI of a Q-in-Q network, so that customer frames can be carried across the provider's network even though the provider's devices may be standard 802.1Q bridges. For a set of protocols industry standard and Cisco proprietary protocols, identified by name, L2PT allows these protocol frames to either be dropped, forwarded, forwarded after rewriting the destination MAC address, or locally peered.</li> </ul>
MST topology tracking	<ul style="list-style-type: none"> <li>This provides the ability to track the number of times a MST topology change occurs. This can be particularly useful in troubleshooting and identifying unstable Layer 2 networks managed by MST.</li> </ul>
Multicast VLAN Registration Protocol Lite	<ul style="list-style-type: none"> <li>MVRP is one of a family of protocols built on top of the Multiple Registration Protocol defined in 802.1ak, clause 10. In MVRP, VLAN IDs are used to form a reachability tree. This allows for pruning of sub trees that contain no end stations pertaining to specified VLAN IDs. The reachability tree also allows for source pruning on links blocked by STP.</li> <li>The Cisco ASR 9000 Series has implemented MVRP-lite, which is designed for the edge of an MVRP network and operates in static node role without having to enact attribute registrations in the local forwarding table.</li> </ul>
VLAN hopping	<ul style="list-style-type: none"> <li>This feature allows some packets to be deliberately hopped (leaked) from one VLAN to another VLAN. This can be used in situations where different traffic types share a common VLAN but need to follow different forwarding models after service classification.</li> </ul>
SNMP test trap	<ul style="list-style-type: none"> <li>This feature can be used in situations where the network operator wishes to validate the ability of the Cisco ASR 9000 Series to generate a trap to a network management platform. This will most commonly be used in initial commissioning of the platform in the network.</li> </ul>
802.1ah (Provider Backbone Bridging)	<ul style="list-style-type: none"> <li>The IEEE 802.1ah standard provides a means for interconnecting multiple Provider Bridged Networks in order to build a truly large-scale, end-to-end Layer 2 Provider Bridged Network. 802.1ah builds on the IEEE 802.1ad standard and eliminates some of its limitations.</li> <li>The specific advantages of the 802.1ah architecture include increased service scalability by service multiplexing, increased MAC address scalability by tunneling customer MAC addresses, backbone flooding reduction, and provides a framework for future Carrier Ethernet architectural enhancements.</li> </ul>
6PE/6VPE	<ul style="list-style-type: none"> <li>The transition to IPv6 is expected to lead to a long period of coexistence between IPv4 and IPv6. There are multiple different ways of making the transition to IPv6 but it is commonly believed that the use of 6PE and 6VPE for IPv6 VPNs presents the least amount of risk to existing networks without additional requirements being placed on the new IPv6 network. This is done by migrating to IPv6 in the access network while keeping the core network IPv4 addressed and using Multiprotocol Label Switching (MPLS) to encapsulate the IPv6 packets at the provider edge router.</li> </ul>
Multicast VPN	<ul style="list-style-type: none"> <li>MVPN is a standards-based feature that transmits IPv4 multicast traffic across an MPLS VPN cloud. MVPN on Cisco ASR 9000 Series routers uses the existing hardware support for IPv4 multicast traffic to forward multicast traffic over VPNs at wire speeds. MVPN adds support for IPv4 multicast traffic over Layer 3 IPv4 VPNs to the existing IPv4 unicast support.</li> <li>MVPN routes and forwards multicast packets for each individual VPN routing and forwarding (VRF) instance, as well as transmitting the multicast packets through VPN tunnels across the service provider backbone.</li> </ul>
NetFlow Version 9	<ul style="list-style-type: none"> <li>Cisco IOS XR NetFlow efficiently provides a key set of services for IP applications, including network traffic accounting, usage-based network billing, network planning, security, denial-of-service (DoS) monitoring capabilities, and network monitoring. NetFlow provides valuable information about network users and applications, peak usage times, and traffic routing. Cisco invented NetFlow and is the leader in IP traffic flow technology.</li> <li>NetFlow Version 9, the latest Cisco IOS XR NetFlow innovation, is a flexible and extensible method to record network performance data.</li> </ul>

Feature	Description
Uncompressed Video Monitoring (VidMon)	<ul style="list-style-type: none"> <li>The existing integrated Video Monitoring support on the Cisco ASR 9000 Series line cards has been enhanced to include support for higher-bandwidth video streams. This most notably includes support for providing Video Monitoring on uncompressed video streams.</li> </ul>
Layer 3 load balancing on Layer 2 Link Aggregation Groups	<ul style="list-style-type: none"> <li>This enhancement allows for a new load-balancing option when using Link Aggregation Groups (LAGs). The hash calculation is typically dictated by the services configured on the LAG, this feature allows this to be explicitly controlled. In the case where a Layer 2 LAG is defined but the traffic is easily polarized due to a small disparity of Layer 2 information in the flows, the LAG can be configured to use the embedded Layer 3 information in calculation of the hash.</li> </ul>
MPLS-TE auto-bandwidth	<ul style="list-style-type: none"> <li>MPLS-TE automatic bandwidth is configured on individual Label Switched Paths (LSPs) at every head end. MPLS-TE monitors the traffic rate on a tunnel interface. Periodically, MPLS-TE resizes the bandwidth on the tunnel interface to align closely with traffic in the tunnel. This function reduces the tax on the network operator and can lead to better use of network resources.</li> </ul>
Border Gateway Protocol (BGP)-based auto-discovery for Label Distribution Protocol (LDP) signaled Virtual Private LAN Service (VPLS)	<ul style="list-style-type: none"> <li>VPLS auto-discovery enables each VPLS provider edge (PE) router to discover the other PE routers that are part of the same VPLS domain. VPLS auto-discovery also tracks when PE routers are added to or removed from the VPLS domain. The auto-discovery and signaling functions use BGP to find and track the PE routers.</li> <li>The BGP-based auto-discovery mechanism facilitates the configuration of L2VPN services using VPLS. VPLS enables flexibility in deploying services by connecting geographically dispersed sites as a large LAN over high-speed Ethernet in a robust and scalable IP MPLS network.</li> </ul>

## Ordering Information

Table 3 lists ordering information for Cisco IOS XR Software Release 3.9.1 for Cisco ASR 9000 Series Aggregation Services Routers. Only these part numbers are orderable. When future releases of Cisco IOS Software Release 3.9.1 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 3.9.1 for Cisco ASR 9000 Series

Product Name	Part Number
A9K-03.09	Cisco IOS-XR IP/MPLS Core Software
A9K-K9-03.09	Cisco IOS-XR IP/MPLS Core Software 3DES

## Release 3.9 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 3.9.1 and later.

**Table 4.** Major Milestones for Cisco IOS XR Software Release 3.9.1 and Later

Milestone	Definition	Date
<b>Availability date</b>	The date that the Cisco IOS XR Software Release 3.9.1 information is published on Cisco.com and becomes available to the general public.	May 07, 2010
<b>End-of-life announcement date</b>	The official end-of-life document that announces the end of sale and end of life of Cisco IOS XR Software 3.9 is distributed to the general public.	September 18, 2010
<b>End-of-sale date and end-of-maintenance date</b>	The last date to order Cisco IOS XR Software 3.9 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 3.9.x. After this date, maintenance rebuilds and software-fix support will be provided only through rebuilds of Cisco IOS XR Software 4.0.x or later.	June 18, 2011
<b>End of software maintenance releases through migration: OS software</b>	The last date that Cisco Engineering may release any final software maintenance releases or bug fixes via SMU. From June 18, 2011 until June 18, 2012, maintenance rebuilds and software fix via SMU support for Cisco IOS XR Software 3.9.x will be provided only through migration to rebuilds of Cisco IOS XR Software 4.0.x. After June 19, 2012, Cisco Engineering will no longer develop, repair, maintain, or test Cisco IOS XR Software 3.9.x.	June 18, 2012
<b>Last date of support</b>	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.	June 18, 2016

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](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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