

Cisco IOS XR Software Release 4.2.1 for Cisco ASR 9000 Series Routers

Product Overview

The Cisco® ASR 9000 Series Aggregation Services Routers deliver unprecedented 10-Gb and 100-Gb port density, scale, service flexibility, and high availability into Carrier Ethernet, Broadband Network Gateway (BNG), Data Center Interconnect (DCI), Data Center WAN, mobile backhaul transport, video on demand (VoD) and business VPN services transport networks. The routers are powered by Cisco IOS® XR Software, an innovative, self-healing, distributed operating system designed for always-on operation.

Cisco IOS XR Software Release 4.2.1 provides new software and hardware feature support for Cisco ASR 9000 Series routers. This release further enhances the role of the Cisco ASR 9000 Series in the 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 with high-scale Ethernet subscriber and session awareness, Internet Protocol Television (IPTV) and VoD, Layer 2 (L2) and Layer 3 (L3) business-VPN services, DCI, and next-generation mobile backhaul transport.

New Hardware Features

Cisco IOS XR Software Release 4.2.1 introduces support for the following new hardware.

- **Cisco ASR 9001 Router:** Part of the Cisco ASR 9000 Series, the Cisco ASR 9001 Router is a compact high-capacity Provider Edge (PE) router that delivers 120 Gbps of nonblocking, full-duplex fabric capacity in a two-rack-unit (2RU) form factor. Based on the same Cisco IOS XR software image as the rest of the ASR 9000 family, the Cisco ASR 9001 delivers the same features and services found on the ASR 9000 Series platforms, allowing customers to standardize on one Cisco IOS XR image. Equipped with an architecture based on the Cisco ASR 9000 next generation network processor, the ASR 9001 delivers intelligence, scale, and service flexibility that match the latest generation of route switch processors (RSPs) and line cards.
- **Cisco ASR 9000v:** The Cisco ASR 9000v is the first Cisco ASR-9000 network virtualization (nV)-Satellite. This environmentally hardened, front-access, low-power, 1 rack unit (1RU) x 23.1cm extension shelf delivers Cisco ASR 9000 services and scale at locations that are otherwise unsuitable for either an access system or an edge system. The Cisco ASR 9000v hosts 44 1-Gbps Small Form-Factor Pluggable (SFP) Ports, and 4 10-Gbps Enhanced SFP (SFP)+ ports, along with a field-replaceable fan tray. The Cisco ASR 9000v can be deployed adjacent to, or remotely from, its ASR 9000 host, allowing flexible topologies, and geographically extending the footprint of a Cisco ASR 9000 system.
- **Cisco ASR 9000 Mod160 Modular Line Card:** The Cisco ASR 9000 Series Mod160 Modular Line Cards provide customers with a flexible solution supporting multiple combinations of Ethernet ports, all in a single slot of the Cisco ASR 9000 Series Aggregation Services Routers. Each modular line card supports up to two modular port adapters. The Mod160 modular line card is available as either a Service Edge Optimized (enhanced QoS) or Packet Transport Optimized (basic QoS) line card. This modular line card can support

all shipping modular port adapters (MPAs) in any combination, including the new 2-port 40-Gigabit Ethernet and the 2-port 10-Gigabit Ethernet MPAs.

Table 1 lists the new hardware support added in Cisco IOS XR Software Release 4.2.1 for the Cisco ASR 9000 Series routers.

Table 1. New Hardware Supported on Cisco ASR 9000 Series Routers in Cisco IOS XR Software Release 4.2.1

Part Number	Description
ASR-9001	ASR 9001 Router Chassis
A9K-750W-AC	ASR 9000 Series 750W AC Power Supply for ASR 9001, spare
A9K-750W-DC	ASR 9000 Series 750W DC Power Supply for ASR 9001, spare
ASR-9001-FAN	ASR 9001 Fan Tray, spare
ASR-9001-2P-KIT	ASR 9001 19-in. two-post mounting kit, spare
ASR-9001-2P-L-KIT	ASR 9001 23-in. two-post mounting kit, spare
ASR-9001-TRAY	ASR 9000 Cable Tray
A9K-9001-AIP-LIC	L3VPN license for ASR 9001
A9K-9001-VID-LIC	Advanced Video license for ASR 9001
ASR-9000V-AC	44-Port GE + 4-Port 10GE ASR 9000v, AC Power Chassis
ASR-9000V-DC-A	44-Port GE + 4-Port 10GE ASR 9000v, DC Power ANSI Chassis
ASR-9000V-DC-E	44-Port GE + 4-Port 10GE ASR 9000v, DC Power ETSI Chassis
ASR-9000V-FAN	ASR-9000V Fan Tray with Filter
A9K-NVSAT5-LIC	nV Host License for up to 5 nV clients
A9K-NVSAT20-LIC	nV Host License for up to 20 nV clients
A9K-NV-CLUSTR-LIC	nV Cluster license applicable per chassis
A9K-MPA-2X10GE	ASR 9000 2-port 10-Gigabit Ethernet Modular Port Adapter, requires 10-Gigabit Small Form-Factor Pluggable (XFP) optics
A9K-Mod160-TR	ASR 9000 Mod160 Modular Line Card, Packet Transport Optimized, requires modular port adapters
A9K-Mod160-SE	ASR 9000 Mod160 Modular Line Card, Service Edge Optimized, requires modular port adapters
A9K-MPA-2X40G	ASR 9000 2-port 40-Gigabit Ethernet Modular Port Adapter, requires Quad Small Form-Factor Pluggable (QSFP) optics

New Software Features

Cisco IOS XR Software Release 4.2.1 adds new software features for the Cisco ASR 9000 Series, including nV-Satellite, nV-Cluster, BNG, In Service Software Upgrade (ISSU), and Dual-Stack Lite (DS-Lite), and extends the network and service scale of the ASR 9000 Series.

Table 2 lists new software features in Cisco IOS XR Software Release 4.2.1 supported on the Cisco ASR 9000 Series Aggregation Services Routers.

Table 2. New Software Features Supported on Cisco ASR 9000 Series Routers in Cisco IOS XR Software Release 4.2.1

Feature	Description
nV Satellite	The nV Satellite feature extends the Cisco ASR 9000 control plane and management interface over a fabric port that integrates the ASR 9000v as a component of its ASR-9000 host. This integration dramatically simplifies the access and edge network, resulting in reduced operations costs. Installation, turn-up, Element Management System (EMS) and Network Management System (NMS) integration, and service activation can be accomplished in a matter of minutes. Because feature processing is performed on the Cisco ASR 9000 host, and managed with Cisco IOS XR as part of the ASR 9000, training, integration, and lifecycle costs will be significantly reduced relative to separately managed network elements.

Feature	Description
nV Cluster	nV Cluster enables two ASR 9000 chassis to operate as a single logical nV Cluster entity. The benefit of nV Cluster is an always-on distributed system. Superior resiliency with geographical diversity is provided while keeping the simplicity of single-node management. Dual-homing of Layer 2 or Layer 3 networks becomes greatly simplified, eliminating protocol resiliency requirements. nV Cluster provides features equivalent to a single node for L2 and L3 VPN features, unified MPLS, inline video monitoring, NetFlow, and more. Paired with nV Satellite, nV Cluster provides a distributed and resilient network infrastructure managed through a single logical node. The 4.2.1 release enables nV Cluster for Cisco ASR 9006 and ASR 9010 chassis.
BNG	With Cisco IOS XR 4.2.1, the features available as part of the BNG solution set include support for IP over Ethernet (IPoE) sessions driven by a Dynamic Host Configuration Protocol (DHCP) lifecycle, Point-to-Point Protocol over Ethernet (PPPoE) sessions, and PPPoE into L2TP tunnels (LAC). These session constructs authenticate with an authentication, authorization, and accounting (AAA) server where individualized profiles and session attributes can be applied based on the service subscriptions for each subscriber. The username construction on the BNG is very flexible. Additionally, as service subscriptions change, a policy server and RADIUS Change of Authorization (CoA) can be used to trigger policy change based on the new subscriptions. For portal authentication and upgrade or downgrade of service, the user could be redirected to a portal using the HTTP-R feature. Customizable attributes for each subscriber include Access Control Lists (ACLs), QoS service policies, Unicast Reverse Path Forwarding (URPF), IP and MAC spoofing protection, per-subscriber control plane policing (CoPP), and multicast. This release also brings support of the cluster with BNG solution. Simple Network Management Protocol (SNMP)-based Lawful Intercept can also be enabled. BNG is supported only on the service-edge-optimized new hardware line cards, and software license A9K-BNG-LIC-8K is required to enable the feature.
ISSU	Cisco IOS XR 4.2.1 delivers the much-sought-after ISSU to the Cisco ASR 9000 Series. ISSU enables easy upgrade to new releases or applying selective patches without router reload and minimal disruption in forwarding. This release is the first "from" release in the ISSU roadmap and is designed for less than 6 seconds of impact on the forwarding plane when upgrading to a next release. Cisco IOS XR 4.2.1 also will enable ISSU Software Maintenance Upgrades (SMUs), which brings the capability for reloading SMUs to patch through the ISSU method. Most software feature sets except BNG are supported under ISSU of Cisco IOS XR 4.2.1. ISSU is supported on all Ethernet line card variants of Trident, Typhoon, and POS interfaces on Cisco SIP 700.
DS-Lite	DS-Lite is a combination of tunnel and translation (CGN) technologies. With DS-Lite, at least part of the service provider network (for example, access or aggregation network) only supports IPv6 routing. The customer premises equipment (CPE) is provisioned only and natively with IPv6. Any IPv4 traffic on its local LAN is tunneled by the CPE over the IPv6 infrastructure to the CGv6 Gateway. The CGv6 Gateway terminates the tunnel and translates the IPv4 local addressing into globally routable IPv4 (NAT44). If the subscriber network has the capability of using IPv6, the IPv6 traffic is routed natively through the service provider infrastructure. A single IPv4 NAT operation is applied in the service provider network to the subscriber traffic.
Layer 3 multiservice edge (L3 MSE) features	Cisco IOS XR 4.2.1 includes many L3 MSE enhancements. Scale is increased to 8000 Virtual Route Forwarding (VRF) instances, 5000 Open Shortest Path First (OSPF) adjacencies, and 256K MPLS labels. ATM enhancements including: ATM local switching support, ATM MPLS, ATM L2 QoS support, ATM Cell Relay VC Mode (N:1 mode where N=1), ATM MR-APS, ATM Port Cell relay. BGP Prefix Independent Convergence (PIC) is enhanced to include static and connected routes. Security is enhanced with the availability of BGP Secure Routing (RPKI with Origin AS). BFD is enhanced to support on the Cisco SIP 700. There are many other feature enhancements in QoS, Object tracking areas as well.
Multicast	Cisco IOS XR 4.2.1 Release adds enhancements to Multicast Label Distribution Protocol (MLDP), multicast VPN (mVPN) v6, static mVPN mapping over Point-to-Multipoint Traffic Engineering (P2MP-TE) MLDP can be used to build P2MP and MP2MP link-state packets (LSPs) through an MPLS network. These LSPs can be used for transporting multicast packets, either in the global table or VPN context. MLDP can also be used as inband signaling to carry the global or VRF multicast routing info. IPv6 Multicast VPNs are provided. Existing generic routing encapsulation (GRE) based mVPN implementations use Protocol Independent Multicast (PIM) as their control protocol for the provider edges (PEs) to distribute customer multicast routing information to other PEs across the core. BGP can also be used as a control protocol for the same purpose. This feature is implemented in this release and supported along with PIM for both GRE and MLDP based networks. On the Encap PE, both MPLS and IP encapsulations are supported to transmit customer multicast data packets to other PE routers thus allowing multiple encapsulations of data packets. This is called Dual-Encap in this mLDLP implementation, which can be used for MVPN migration from GRE core to mLDLP core, or also can be used as a permanent working solution. Static mVPN mapping over P2MP-TE to mVPN will be supported from this release.

Ordering Information

Table 3 lists ordering information for Cisco IOS XR Software Release 4.2.1 for Cisco ASR 9000 Series Aggregation Services Routers. Only these part numbers are orderable. When future releases of Cisco IOS Software Release 4.2.0 are available, Cisco will automatically ship the latest release if you order these part numbers.

Table 3. Ordering Information for Cisco IOS XR Software Release 4.2.1 for Cisco ASR 9000 Series Aggregation Services Routers

Part Number	Product Name
XR-A9K-PX-04.02	Cisco IOS-XR IP/MPLS Core Software for A9K-RSP440-SE or A9K-RSP440-TR based system
XR-A9K-PXK9-04.02	Cisco IOS-XR IP/MPLS Core Software 3DES for A9K-RSP440-SE or A9K-RSP440-TR based system
XR-A9K-P-04.02	Cisco IOS-XR IP/MPLS Core Software for A9K-RSP-8G or A9K-RSP-4G based system
XR-A9K-PK9-04.02	Cisco IOS-XR IP/MPLS Core Software 3DES for A9K-RSP-8G or A9K-RSP-4G based system

Release 4.2.1 Software Lifecycle

The Cisco IOS XR Software release strategy is time-based, with a fixed release date and lifecycle, rather than a feature-based release strategy with a variable release date.

For a description of the Cisco IOS-XR Software Support Guidelines, please visit

www.cisco.com/en/US/products/ps5845/prod_eol_notices_list.html or contact your local Cisco account representative.

Table 4. Major Milestones for Cisco IOS XR Software Maintenance Release 4.2.1

Milestone	Definition	Date
Availability of feature release	The date the Cisco IOS XR Software Release 4.2.0 information is published on Cisco.com and is available to the general public.	December, 2011
Availability date	The date that Cisco IOS XR Software Release 4.2.1 information is published on Cisco.com and becomes available to the general public.	May 30, 2012
End-of-life announcement date	The date when the official end-of-life document that announces the end of sale and end of life of Cisco IOS XR Software Release 4.2.x is distributed to the general public.	June 30, 2012
End-of-sale date	The last date to order Cisco IOS XR Software 4.2.x through Cisco point-of-sale mechanisms. The product is no longer for sale after this date.	June 30, 2013
End of software maintenance	The last date that Cisco Engineering may release any final software maintenance releases or bug fixes through SMU to Release 4.2.x. Beyond this date, known software problems become candidates for following software releases.	December 31, 2013
End of software maintenance Product Security Incident Response Team (PSIRT)	The last date that Cisco Engineering may release any final software maintenance releases or bug fixes for PSIRTs through SMU to Release 4.2.x. Beyond this date, PSIRT bugs become candidates for following feature releases.	December 31, 2015
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.	June 30, 2018

For official end-of-life and end-of-sale announcements for Cisco IOS XR Software, please visit

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 www.cisco.com or contact your local Cisco account representative.



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