Release Notes for Cisco ASR 9000 Series Routers, IOS XR Release 6.3.2

Revised: April 26, 2021

Release Notes for Cisco ASR 9000 Series Routers, IOS XR Release 6.3.2

Note This software release has reached end-of-life status. For more information see the End-of-Life and End-of-Sale Notices.

Note Explore the Content Hub, the all new portal that offers an enhanced product documentation experience.

- Use faceted search to locate content that is most relevant to you.
- Create customized PDFs for ready reference.
- Benefit from context-based recommendations.

Get started with the Content Hub at content.cisco.com to craft a personalized documentation experience.

Do provide feedback about your experience with the Content Hub.

Cisco IOS XR Release 6.3.2 contains all features released in Cisco IOS XR Release 6.3.1. Release 6.3.1 is a limited availability (LA) release. For more information on IOS XR Release 6.3.1 features, see Release Notes for Cisco ASR 9000 Series Routers, IOS XR Release 6.3.1

Cisco ASR 9000 Series Aggregation Services Routers (ASR 9000 Series) deliver unprecedented scale, service flexibility, and high availability for service providers' fixed and mobile networks, data centers, and transport networks. The routers are powered by Cisco IOS XR Software, an innovative, self-healing, distributed operating system designed for always-on operation while scaling system capacity into multiple terabits per second (Tbps).

For more information about ASR 9000 Series routers, see ASR 9000 Data Sheet listing page.

Cisco IOS XR Software is a distributed operating system designed for continuous system operation combined with service flexibility and higher performance.

From Release 6.1.1 onwards, Cisco introduces support for the 64 bit Linux-based IOS XR operating system. Extensive feature parity is maintained between legacy 32 bit and new 64 bit environments.

For information on operational enhancements introduced in new 64 bit IOS XR OS, refer to the Introduction to Operational Enhancements in Cisco IOS XR guide.

To migrate from legacy 32 bit and new 64 bit IOS XR OS, refer to the Migration Guide for Cisco ASR 9000 Series Routers.

This release notes describe the features provided in the Cisco IOS XR Software Release 6.3.2. See the *Software Features Introduced in Cisco IOS XR Software Release 6.3.2* section in this document for information on new software features.

Supported Packages and System Requirements

This section describes the system requirements for Cisco ASR 9000 Series Aggregation Services Router Software Release 6.3.2

Feature Set Table

Cisco IOS XR

The Cisco ASR 9000 Series Aggregation Services Router Software is packaged in *feature sets* (also called *software images*). Each feature set contains a specific set of features for Cisco ASR 9000 Series Aggregation Services Router IOS XR Release 6.3.2.

This table lists the Cisco ASR 9000 Series Aggregation Services Router Software feature set matrix (PX PIE files) and associated filenames available for the Cisco IOS XR Release 6.3.2 supported on the Cisco ASR 9000 Series Aggregation Services Router.

Table 1: Cisco IOS XR Software Release 6.3.2 PX PIE Files

Composite Package		
Feature Set	**Filename**	**Description**
Cisco IOS XR IP Unicast Routing Core Bundle	asr9k-mini-px.pie-6.3.2	Contains the required core packages, including OS, Admin, Base, Forwarding, Modular Services Card, Routing, SNMP Agent, and Alarm Correlation. The mini pie file is used for upgrading to the new release
Cisco IOS XR IP Unicast Routing Core Bundle	asr9k-mini-px.vm-6.3.2	Contains the required core packages including OS, Admin, Base, Forwarding, Routing, SNMP Agent, Diagnostic Utilities, and Alarm Correlation. The mini VM file is used for turbobooting the device.
Individually-Installable Optional Packages		
Feature Set	**Filename**	**Description**
Cisco IOS XR Manageability Package	asr9k-mgbl-px.pie-6.3.2	CORBA2 agent, XML3 Parser, and HTTP server packages. This PIE also contains some SNMP MIB infrastructure. Certain MIBs won't work if this PIE is not installed. IPSLA and environment MIBs are part of the mgbl pie.
Cisco IOS XR CGv6 VSM Package	asr9k-services-infra.pie- 6.3.2	Contains iso images and version details of System Admin Virtual Machine (VM) and Kernel-based Virtual Machine (KVM).

Cisco IOS XR MPLS Package	asr9k-mpls-px.pie-6.3.2	MPLS Traffic Engineering (MPLS-TE), Label Distribution Protocol (LDP), MPLS Forwarding, MPLS Operations, Administration, and Maintenance (OAM), Link Manager Protocol (LMP), Optical User Network Interface (OUNI), Resource Reservation Protocol (RSVP), and Layer-3 VPN.
Cisco IOS XR Multicast Package	asr9k-mcast-px.pie-6.3.2	Multicast Routing Protocols (PIM, Multicast Source Discovery Protocol [MSDP], Internet Group Management Protocol [IGMP], Auto-RP), Tools (SAP, MTrace), and Infrastructure [(Multicast Routing Information Base [MRIB], Multicast-Unicast RIB [MURIB], Multicast forwarding [MFWD]), and Bidirectional Protocol Independent Multicast (BIDIR-PIM).
Cisco IOS XR Advanced Video Package	asr9k-video-px.pie-6.3.2	Software providing the vidmon and video quality monitoring feature for Cisco ASR 9000 Series Router chassis.
Cisco IOS XR Optics Package	asr9k-optic-px.pie-6.3.2	Firmware for the optics feature for Cisco ASR 9000 Series Aggregation Services Router Chassis. It enables Transport / OTN feature under interfaces.
Cisco IOS XR FPD Package	asr9k-fpd-px.pie-6.3.2	Firmware pie for all LC and RSP FPGAs and ASICs.
Cisco IOS XR Services Package	asr9k-services.pie-6.3.2	Includes binaries to support CGv6 on VSM.
Cisco IOS XR Documentation Package	asr9k-doc-px.pie-6.3.2	.man pages for Cisco IOS XR Software on the Cisco ASR 9000 Series Aggregation Services Router Chassis.
Cisco IOS XR Satellite Package - ASR9000v	asr9000v-nV-px.pie-6.3.2	Includes binaries to support Cisco ASR9000v Series Router Software and to support Cisco ASR 9000v Series Router as a satellite for Cisco ASR 9000 Series Router.
Cisco IOS XR Satellite Package - NCS 5001 and 5002	asr9k-ncs500x-nV-px.pie-6.3.2	Includes binaries to support Cisco NCS 5001/5002 Series Router Software and to support Cisco NCS 5001/5002 Series Router as a satellite for Cisco ASR 9000 Series Router.
Cisco IOS XR BNG Package	asr9k-bng-px.pie-6.3.2	Includes binaries to support BNG features.

Cisco IOS XR Lawful Intercept (LI) Package	asr9k-li-px.pie-6.3.2	Includes LI software images.
Cisco IOS XR Security Package	asr9k-k9sec-px.pie-6.3.2	Support for Encryption, Decryption,, Secure Shell (SSH), Secure Socket Layer (SSL), and Public-key infrastructure (PKI).

This table lists the Cisco IOS XR Software feature set matrix (TAR files) and associated filenames available for the Cisco IOS XR Software Release 6.3.2 supported on the Cisco ASR 9000 Series Aggregation Services Router.

Table 2: Cisco IOS XR Software Release 6.3.2 TAR Files

Feature Set	Filename	Description
Cisco IOS XR IP/MPLS Core Software [for RSP440, RSP880 and RP systems]	ASR9K-iosxr-px-6.3.2-turboboot.tar	Contains only the mini.vm package.
Cisco IOS XR IP/MPLS Core Software [for RSP440, RSP880 and RP systems]	ASR9K-iosxr-px-6.3.2-pies.tar	• Cisco IOS XR IP Unicast Routing Core Bundle • Cisco IOS XR Manageability Package • Cisco IOS XR MPLS Package • Cisco IOS XR Multicast Package • Cisco IOS XR FPD Package • Cisco IOS XR Diagnostic Package • Cisco IOS XR Advanced Video Package • Cisco IOS XR Optics Package • Cisco IOS XR Upgrade Package • Cisco IOS XR BNG Package • Cisco IOS XR Lawful Intercept Package • Cisco IOS XR Services Package • Cisco IOS XR Satellite Package • Cisco IOS XR Documentation Package

Feature Set	Filename	Description
Cisco IOS XR IP/MPLS Core Software 3DES [for RSP-2, RSP440, RSP880 and RP systems]	ASR9K-iosxr-px-6.3.2-k9-pies.tar	• Cisco IOS XR IP Unicast Routing Core Bundle • Cisco IOS XR Manageability Package • Cisco IOS XR MPLS Package • Cisco IOS XR Multicast Package • Cisco IOS XR Security Package • Cisco IOS XR FPD Package • Cisco IOS XR Diagnostic Package • Cisco IOS XR Advanced Video Package • Cisco IOS XR Optics Package • Cisco IOS XR Upgrade Package • Cisco IOS XR BNG Package • Cisco IOS XR Lawful Intercept Package • Cisco IOS XR Services Package • Cisco IOS XR Satellite Package • Cisco IOS XR Documentation Package
Cisco IOS XR Bridge and SMUs	ASR9k-iosxr-px-6.3.2-bridge_smus.tar	Contains all bridge SMUs

Caution Before upgrading to a new release, you must install all available bridge SMUs of the current release.

Cisco IOS XR 64 bit

From Release 6.1.1 onwards, Cisco introduced support for the 64-bit IOS XR operating system.

This table lists the feature set matrix (ISO and RPM files) and associated filenames available for the Cisco IOS XR 64 bit 6.3.2 supported on the Cisco ASR 9000 Series Aggregation Services Router.

Table 3: Cisco IOS XR 64 bit Software Release 6.3.2 ISO and RPM Files

Composite Package		
Feature Set	**Filename**	**Description**

Cisco IOS XR IP Unicast Routing Core Bundle	asr9k-mini-x64-6.3.2.iso	Contains the required core packages, including OS, Admin, Base,Forwarding, Modular Services Card, Routing, SNMP Agent, and Alarm Correlation. The mini iso file is used for upgrading to the new release
Individually-Installable Optional Packages		
Feature Set	**Filename**	**Description**
Cisco IOS XR 64-bit BNG package	asr9k-bng-x64-1.0.0.0-r633.x86_64.rpm	Includes BNG support software
Cisco IOS XR 64-bit EIGRP package	asr9k-eigrp-x64-1.0.0.0-r632.x86_64.rpm	Includes EIGRP protocol support software
Cisco IOS XR 64-bit ISIS package	asr9k-isis-x64-1.1.0.0-r632.x86_64.rpm	Includes IS-IS Link state protocol support software
Cisco IOS XR 64-bit OSPF package	asr9k-ospf-x64-1.1.0.0-r632.x86_64.rpm	Includes OSPF link state protocol support software
Cisco IOS XR 64-bit M2M package	asr9k-m2m-x64-2.0.0.0-r632.x86_64.rpm	Machine to Machine communication software
Cisco IOS XR Manageability Package	asr9k-mgbl-x64-3.0.0.0-r632.x86_64.rpm	CORBA2 agent, XML3 Parser, and HTTP server packages. This PIE also contains some SNMP MIB infrastructure. Certain MIBs won't work if this RPM is not installed. IPSLA and environment MIBs are part of the mgbl rpm.
Cisco IOS XR 64-bit MPLS-TE and RSVP package	asr9k-mpls-te-rsvp-x64-1.2.0.0-r632.x86_64.rpm	MPLS Traffic Engineering (MPLS-TE), Resource Reservation Protocol (RSVP).
Cisco IOS XR 64-bit MPLS Package	asr9k-mpls-x64-2.1.0.0-r632.x86_64.rpm	Label Distribution Protocol (LDP), MPLS Forwarding, MPLS Operations, Administration, and Maintenance (OAM), Link Manager Protocol (LMP), Optical User Network Interface (OUNI) and Layer-3 VPN.
Cisco IOS XR 64-bit Multicast Package	asr9k-mcast-x64-2.0.0.0-r632.x86_64.rpm	Multicast Routing Protocols (PIM, Multicast Source Discovery Protocol [MSDP], Internet Group Management Protocol [IGMP], Auto-RP), Tools (SAP, MTrace), and Infrastructure [(Multicast Routing Information Base [MRIB], Multicast-Unicast RIB [MURIB], Multicast forwarding [MFWD]), and Bidirectional Protocol Independent Multicast (BIDIR-PIM).

Cisco IOS XR 64-bit Optics Package	asr9k-optic-x64-1.0.0.0-r632.x86_64.rpm	Firmware for the optics feature for Cisco ASR 9000 Series Aggregation Services Router Chassis. It enables Transport / OTN feature under interfaces.
Cisco IOS XR 64-bit Lawful Intercept (LI) Package	asr9k-li-x64-1.1.0.0-r632.x86_64.rpm	Includes LI software images.
Cisco IOS XR Security Package	asr9k-k9sec-x64-3.1.0.0-r632.x86_64.rpm	Support for Encryption, Decryption,, Secure Shell (SSH), Secure Socket Layer (SSL), and Public-key infrastructure (PKI).
Cisco IOS XR Satellite Package -ASR9000v	asr9k-9000v-nV-x64-1.0.0.0-r632.x86_64.rpm	Includes rpm to support Cisco ASR9000v Series Router Software and to support Cisco ASR 9000v Series Router as a satellite for Cisco ASR 9000 Series Router

Memory Requirements

Caution If you remove the media in which the software image or configuration is stored, the router may become unstable and fail.

The minimum memory requirements for Cisco ASR 9000 Series Aggregation Services Router running Cisco IOS XR Software Release 6.3.2 consist of the following:

- minimum 16 GB memory on the RSP880, RSP880-LT, RP2, A99-RSP-TR and A99-RSP-SE
- minimum 16 GB memory on the RP2 transport optimised (TR) variant and 32 GB memory on the RP2 service edge (SE) variant
- minimum 2 GB compact flash on route switch processors (RSPs)
- minimum 4 GB memory on the line cards (LCs) running Cisco IOS XR 32 bit image
- minimum 8 GB memory on the line cards (LCs) running Cisco IOS XR 64 bit image

Supported Hardware

The following table lists the supported hardware components on the Cisco ASR 9000 Series Router and the minimum required software versions. For more information, see the *Firmware Support* section.

All hardware features are supported on Cisco IOS XR Software, subject to the memory requirements specified in the "Memory Requirements, on page 8" section.

For information on the end-of-sale and end-of-life dates for the Cisco ASR 9000 Series Router hardware, refer to the End-of-Life and End-of-Sale Notices page.

Table 4: Cisco ASR 9000 Series Aggregation Services Router Supported Hardware and Minimum Software Requirements

Cisco ASR 9000 Series Aggregation Services Router Route Switch Processor Cards			
Component	**Part Number**	**Support Initially Provided in IOS XR Release**	**Support Initially Provided in IOS XR 64 bit Release**

ASR 9000 Route Switch Processor 5 for Service Edge	A9K-RSP5-SE	Not Supported	Release 6.5.15
ASR 9000 Route Switch Processor 5 for Packet Transport	A9K-RSP5-TR	Not Supported	Release 6.5.15
Cisco ASR 9000 Series Aggregation Services Router RSP880-Lite, Packet Transport Optimized	A9K-RSP880-LT-TR	Release 6.2.2	Release 6.4.1
Cisco ASR 9000 Series Aggregation Services Router RSP880-Lite, Service Edge Optimized	A9K-RSP880-LT-SE	Release 6.2.2	Release 6.4.1
Cisco ASR 9000 Series Aggregation Services Router RSP4-S, Service Edge Optimized for ASR 9910 from Release 6.0.1.	A99-RSP-SE	Release 6.0.1	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router RSP4-S, Packet Transport Optimized for ASR 9910 from Release 6.0.1.	A99-RSP-TR	Release 6.0.1	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router RSP4-S, Packet Transport Optimized for ASR 9906 supported from Release 6.3.1	A99-RSP-TR	Release 6.3.1	Release 6.3.1
Cisco ASR 9000 Series Aggregation Services Router RSP4-S, Service Edge Optimized for ASR 9906 from Release 6.3.1.	A99-RSP-SE	Release 6.3.1	Release 6.3.1
ASR9K Route Switch Processor with 880G/slot and 32 GB for Service Edge	A9K-RSP880-SE	Release 5.3.0	Release 6.1.2
ASR9K Route Switch Processor with 880G/slot and 16 GB for Packet Transport	A9K-RSP880-TR	Release 5.3.0	Release 6.1.2
ASR Route Processor 32 GB for Service Edge	A99-RP2-SE	Release 5.3.0	Release 6.1.2
ASR Route Processor 16 GB for Packet Transport	A99-RP2-TR	Release 5.3.0	Release 6.1.2
ASR 9001 Route Switch Processor 8 GB	ASR9001-RP	Release 4.2.1	Unsupported
Cisco ASR 9000 Series Aggregation Services Router Next Generation Route Switch Processor, Service Edge Optimized	A9K-RSP-440-SE	Release 4.2.0	Unsupported
Cisco ASR 9000 Series Aggregation Services Router Next Generation Route Switch Processor, Service Edge Optimized	A9K-RSP-440-TR	Release 4.2.0	Unsupported
ASR 9900 Route Processor 12 GB for Service Edge	ASR-9900-RP-SE	4.3.2	Unsupported
ASR 9900 Route Processor 6 GB for Packet Transport	ASR-9900-RP-TR	4.3.2	Unsupported
Component	**Part Number**	**Support Initially Provided in IOS XR Release**	**Support Initially Provided in IOS XR 64 bit Release**
Cisco ASR 9000 Series Aggregation Services Router 4-Slot			

Cisco ASR 9000 Series Aggregation Services Router 4-Slot 2 Line Card Slot AC Chassis w/ PEM V2	ASR-9904-AC	Release 5.1.0	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 4-Slot 2 Line Card Slot DC Chassis w/ PEM V2	ASR-9904-DC	Release 5.1.0	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 4-Slot Fan Tray	ASR-9904-FAN	Release 5.1.0	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 4-Slot Filter	ASR-9904-FILTER	Release 5.1.0	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 4-Slot Baffle	ASR-9904-BAFFLE	Release 5.1.0	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 12-Slot			
Cisco ASR 9000 Series Aggregation Services Router 12-Slot 10 Line Card Slot AC Chassis w/ PEM V2	ASR-9912-AC	Release 4.3.2	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 12-Slot 10 Line Card Slot DC Chassis w/ PEM V2	ASR-9912-DC	Release 4.3.2	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 12-Slot Fan Tray	ASR-9912-FAN	Release 4.3.2	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 22-Slot			
Component	**Part Number**	**Support Initially Provided in IOS XR Release**	**Support Initially Provided in IOS XR 64 bit Release**
Cisco ASR 9000 Fabric Card	A99-SFC2	Release 5.3.0	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 22-Slot 20 Line Card Slot AC Chassis w/ PEM V2	ASR-9922-AC	Release 4.2.2	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 22-Slot 20 Line Card Slot DC Chassis w/ PEM V2	ASR-9922-DC	Release 4.2.2	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 22-Slot Accessory Kit with grounding locks, guide rails etc	ASR-9922-ACC-KIT	NA	NA
Cisco ASR 9000 Series Aggregation Services Router 22-Slot Accessory - Cover for Power Shelves and Modules	ASR-9922-PWR-COV	NA	NA
Cisco ASR 9000 Series Aggregation Services Router 22-Slot Air Reflector	ASR-9922-AIRREF	NA	NA
Cisco ASR 9000 Series Aggregation Services Router 22-Slot Accessory - Door (with lock) and Fan Tray Covers	ASR-9922-DOOR	NA	NA
Cisco ASR 9000 Series Aggregation Services Router 22-Slot Fan Tray	ASR-9922-FAN	Release 4.2.2	Release 6.1.2

Cisco ASR 9000 Series Aggregation Services Router 22-Slot Air Filter with Media, Center	ASR-9922-FLTR-CEN	Release 4.2.2	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 22-Slot Air Filter with Media, Left & Right	ASR-9922-FLTR-LR	Release 4.2.2	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 22-Slot Route Processor Filler	ASR-9922-RP-FILR	Release 4.2.2	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 22-Slot Route Processor 12GB for Service Edge	ASR-9922-RP-SE	Release 4.2.2	Unsupported
Cisco ASR 9000 Series Aggregation Services Router 22-Slot Route Processor 6GB for Packet Transport	ASR-9922-RP-TR	Release 4.2.2	Unsupported
Cisco ASR 9000 Series Aggregation Services Router 22-Slot Switch Fabric Card Slot Filler	ASR-9922-SFC-FILR	Release 4.2.2	Unsupported
Cisco ASR 9000 Series Aggregation Services Router 22-Slot Switch Fabric Card/110G	ASR-9922-SFC110	Release 4.2.2	Unsupported
Cisco ASR 9000 Series Aggregation Services Router 22-Slot Version 2 Fan Tray	ASR-9922-FAN-V2	Release 5.2.2	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 2-RU			
Component	**Part Number**	**Support Initially Provided in IOS XR Release**	**Support Initially Provided in IOS XR 64 bit Release**
Cisco ASR 9000 Series Aggregation Services Router 2RU	ASR-9001	Release 4.2.1	Unsupported
Cisco ASR 9000 Series Aggregation Services Router 2-Slot Fan Tray	ASR-9001-FAN	Release 4.2.1	Unsupported
Cisco ASR 9000 Series Aggregation Services Router 2-Slot Line Card	ASR-9001-LC	Release 4.2.1	Unsupported
Cisco ASR 9000 Series Aggregation Services Router	ASR-9001-TRAY	Release 4.2.1	Unsupported
Cisco ASR 9000 Series Aggregation Services Router 6-Slot			
Component	**Part Number**	**Support Initially Provided in IOS XR Release**	**Support Initially Provided in IOS XR 64 bit Release**
Cisco ASR 9000 Series Aggregation Services Router 6-Slot System	ASR-9006-SYS	Release 3.7.2	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 6-Slot Fan Tray	ASR-9006-FAN	Release 3.7.2	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 6-Slot Door Kit	ASR-9006-DOOR	Release 3.7.2	Release 6.1.2

Cisco ASR 9000 Series Aggregation Services Router 6-Slot AC Chassis	ASR-9006-AC	Release 3.7.2	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 6-Slot DC Chassis	ASR-9006-DC	Release 3.7.2	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 6-Slot Air			
Component	**Part Number**	**Support Initially Provided in IOS XR Release**	**Support Initially Provided in IOS XR 64 bit Release**
Cisco ASR 9000 Series Aggregation Services Router 6-Slot Air Filter	ASR-9006-FILTER	Release 3.7.2	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 6-Slot -ASR 9906			
Cisco ASR 9000 Series Aggregation Services Router 6-Slot chassis	ASR-9906	Release 6.3.1	Release 6.3.1
Cisco ASR 9000 Series Aggregation Services Router 6-Slot Fan Tray	ASR-9906-FAN	Release 6.3.1	Release 6.3.1
Cisco ASR 9000 Series Aggregation Services Router 6-Slot Fan Filter	ASR-9906-FILTER	Release 6.3.1	Release 6.3.1
Cisco ASR 9000 Series Aggregation Services Router 10-Slot			
Cisco ASR 9000 Series Aggregation Services Router 10-Slot System	ASR-9010-SYS	Release 3.7.2	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 10-Slot Fan Tray	ASR-9010-FAN	Release 3.7.2	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 10-Slot Door Kit	ASR-9010-DOOR	Release 3.7.2	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 10-Slot AC Chassis	ASR-9010-AC	Release 3.7.2	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 10-Slot DC Chassis	ASR-9010-DC	Release 3.7.2	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 2 Post Mounting Kit	ASR-9010-2P-KIT	Release 3.7.2	Release 6.1.2
Cisco ASR 9000 Series Aggregration Services Router 4 Post Mounting Kit	ASR-9010-2P-KIT	Release 3.7.2	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 10-Slot Air			
Component	**Part Number**	**Support Initially Provided in IOS XR Release**	**Support Initially Provided in IOS XR 64 bit Release**

Cisco ASR 9000 Series Aggregation Services Router 10-Slot Air Filter	ASR-9010-FILTER	Release 3.7.2	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 10-Slot External Exhaust Air Shaper	ASR-9010-AIRSHPR	NA	NA
Cisco ASR 9000 Series Aggregation Services Router 10-Slot Air Inlet Grill	ASR-9010-GRL	NA	NA
Cisco ASR 9000 Series Aggregation Services Router 10-Slot 21 RU			
Cisco ASR 9000 Series Aggregation Services Router 10-Slot (9910) System	ASR-9910	Release 6.0.1	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router 10-Slot(9910) Fan Tray	ASR-9910-FAN	Release 6.0.1	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router 10-Slot (9910) Accessory Kit	ASR-9910-ACC-KIT	Release 6.0.1	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router 10-Slot (9910) 4 Post Rack Mounting Kit	ASR-9910-4P-KIT	Release 6.0.1	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router 10-Slot (9910) 2 Post Rack Mounting Kit	ASR-9910-2P-KIT	Release 6.0.1	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router 10-Slot (9910) Air Reflector	ASR-9910-AIRREF	Release 6.0.1	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router 10-Slot (9910) Air Filter	ASR-9910-FILTER	Release 6.0.1	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router 10-Slot (9910) Switch Fabric Card	A99-SFC-S	Release 6.0.1	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router Power			
Component	**Part Number**	**Support Initially Provided in IOS XR Release**	**Support Initially Provided in IOS XR 64 bit Release**
Cisco ASR 9000 Series Aggregation Services Router 2KW DC Power Module, version 2	PWR-2KW-DC-V2	Release 4.2.0	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 3KW AC Power Module, version 2	PWR-3KW-AC-V2	Release 4.2.0	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router AC Power Entry Module Version 2	A9K-AC-PEM-V2	Release 4.2.0	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router DC Power Entry Module Version 2	A9K-DC-PEM-V2	Release 4.2.0	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router Power Entry Module Version 2 Filler	A9K-PEM-V2-FILR	Release 4.2.0	Release 6.1.2

Cisco ASR 9000 Series Aggregation Services Router 1.5kW DC Power Module	A9K-1.5KW-DC	Release 3.7.2	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router 2kW DC Power Module	A9K-2KW-DC	Release 3.7.2	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router 3kW AC Power Module	A9K-3KW-AC	Release 3.7.2	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router AC Power Enclosure Module Version 3	A9K-AC-PEM-V3	Release 5.3.0	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router DC Power Enclosure Module Version 3	A9K-DC-PEM-V3	Release 5.3.0	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 6kW AC Power Module Version 3	PWR-6KW-AC-V3	Release 5.3.0	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 4.4kW DC Power Module Version 3	PWR-4.4KW-DC-V3	Release 5.3.0	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router Line Cards			
Component	**Part Number**	**Support Initially Provided in IOS XR Release**	**Support Initially Provided in IOS XR 64 bit Release**
ASR 9000 4-port 100-Gigabit Ethernet Line Card	A9K-4X100GE	Release 6.2.3	Release 6.4.1
ASR9000 48-port dual-rate 10G/1G service edge–optimized line card	A9K-48X10GE-1G-SE	Release 6.2.1	Release 6.3.2
ASR9000 48-port dual-rate 10G/1G packet transport–optimized line card	A9K-48X10GE-1G-TR	Release 6.2.1	Release 6.3.2
ASR9000 24-port dual-rate 10G/1G service edge–optimized line card	A9K-24X10GE-1G-SE	Release 6.2.1	Release 6.3.2
ASR9000 24-port dual-rate 10G/1G packet transport–optimized line card	A9K-24X10GE-1G-TR	Release 6.2.1	Release 6.3.2
ASR 9900 8-port 100GE Service Edge optimized	A99-8X100GE-SE	Release 6.0.1	Release 6.1.2
ASR 9900 8-port 100GE Packet Transport optimized	A99-8X100GE-TR	Release 6.0.1	Release 6.1.2
ASR 9900 8-port 100GE Consumption Model	A99-8X100GE-CM	Release 6.0.1	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 12-Port 100-Gigabit Ethernet Line Card	A99-12X100GE	Release 6.0.1	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 12-port 100GE Ethernet Line card CM	A99-12X100GE-CM	Release 6.0.1	Release 6.1.2

Cisco ASR 9000 Series Aggregation Services Router 8-Port 100- Gigabit Ethernet, Consumption Model Optimized with CPAK	A9K-8X100GE-CM	Release 5.3.2	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 8-Port 100- Gigabit Ethernet, Service Edge Optimized	A9K-8X100GE-SE	Release 5.3.1	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 8-Port 100-Gigabit Ethernet, Packet Transport Optimized	A9K-8X100GE-TR	Release 5.3.1	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 4--Port 100-Gigabit Ethernet, Service Edge Optimized	A9K-4X100GE-SE	Release 5.3.1	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 4-Port 100- Gigabit Ethernet, Packet Transport Optimized	A9K-4X100GE-TR	Release 5.3.1	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 8-port High Density 100GE Ethernet Line Card, Service Edge Optimized	A9K-8X100GE-L-SE	Release 5.3.0	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 4-Port Ten Gigabit Ethernet + Cisco ASR 9000 Series Aggregation Services Router 16-Port Gigabit Ethernet, Packet Transport Optimized	A9K-4T16GE-TR	Release 5.3.0	Unsupported
Cisco ASR 9000 Series Aggregation Services Router 4-Port Ten Gigabit Ethernet + Cisco ASR 9000 Series Aggregation Services Router 16-Port Gigabit Ethernet, Service Edge Optimized	A9k-4T16GE-SE	Release 5.3.0	Unsupported
Cisco ASR 9000 Series Aggregation Services Router Virtualized Services Module (VSM) line card	A9K-VSM-500	Release 5.1.2	Unsupported
Cisco ASR 9000 Series Aggregation Services Router 1-port 100GE, Service Edge Optimized	A9K-1X100GE-SE	Release 4.2.2	Unsupported
Cisco ASR 9000 Series Aggregation Services Router 1-port 100GE, Packet Transport Optimized	A9K-1X100GE-TR	Release 4.2.2	Unsupported
Cisco ASR 9000 Series Aggregation Services Router 36-port 10GE, Service Edge Optimized	A9K-36X10GE-SE	Release 4.2.2	Unsupported
Cisco ASR 9000 Series Aggregation Services Router 36-port 10GE, Packet Transport Optimized LC	A9K-36X10GE-TR	Release 4.2.2	Unsupported
Cisco ASR 9000 Series Aggregation Services Router Line Card Filler	A9K-LC-FILR	Release 3.7.2	Unsupported
Cisco ASR 9000 Series Aggregation Services Router 2-Port Hundred Gigabit Ethernet, Service Edge Optimized	A9K-2X100GE-SE	Release 4.2.0	Unsupported
Cisco ASR 9000 Series Aggregation Services Router 2-Port Hundred Gigabit Ethernet, Packet Transport Optimized	A9K-2X100GE-TR	Release 4.2.0	Unsupported

Cisco ASR 9000 Series Aggregation Services Router 24-Port Ten Gigabit Ethernet, Service Edge Optimized	A9K-24X10GE-SE	Release 4.2.0	Unsupported
Cisco ASR 9000 Series Aggregation Services Router 24-Port Ten Gigabit Ethernet, Packet Transport Optimized	A9K-24X10GE-TR	Release 4.2.0	Unsupported
Cisco ASR 9000 Series Aggregation Services Router 40-Port Ten Gigabit Ethernet, Packet Transport Optimized	A9K-40GE-TR	Release 5.2.2	Unsupported
Cisco ASR 9000 Series Aggregation Services Router 40-Port Ten Gigabit Ethernet, Service Edge Optimized	A9K-40GE-SE	Release 5.2.2	Unsupported
2-Port 100G + 20-Port 10 GE Combination IPoDWDM Line Card with CFP2 and SFP+, Packet Transport Optimized	A9K-400GE-DWDM-TR	Release 5.3.2	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router Modular Line Cards			
Component	**Part Number**	**Support Initially Provided in IOS XR Release**	**Support Initially Provided in IOS XR 64 bit Release**
Cisco ASR 9000 Series Aggregation Services Router 200 Gigabit Modular Line Card, Packet Transport Optimized Cisco ASR 9000 Series Aggregation Services Router 200 Gigabit Modular Line Card, Service Edge Optimized	A9K-MOD200-TR A9K-MOD200-SE	Release 6.0.1	Release 6.3.1
Cisco ASR 9000 Modular 400G Consumption Model Line Card Bundle	A9K-MOD400-CM-BUN	Release 6.1.2	Release 6.2.1
Cisco ASR 9000 Modular 400G Consumption Model Line Card	A9K-MOD400-CM	Release 6.1.2	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router 400 Gigabyte Modular Line Card, Service Edge Optimized	A9K-MOD400-SE	Release 5.3.2	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router 400 Gigabyte Modular Line Card, Packet Transport Optimized	A9K-MOD400-TR	Release 5.3.2	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router 80 Gig Modular Line Card, Service Edge Optimized	A9K-MOD80-SE	Release 4.2.0	Unsupported
Cisco ASR 9000 Series Aggregation Services Router 80 Gig Modular Line Card, Packet Transport Optimized	A9K-MOD80-TR	Release 4.2.0	Unsupported
Cisco ASR 9000 Series Aggregation Services Router 160 Gig Modular Line Card, Service Edge Optimized	A9K-MOD160-SE	Release 4.2.1	Unsupported
Cisco ASR 9000 Series Aggregation Services Router 160 Gig Modular Line Card, Packet Transport Optimized	A9K-MOD160-TR	Release 4.2.1	Unsupported
Cisco ASR 9000 Series Aggregation Services Router Modular Port Adapters (MPAs)			

Component	Part Number	Support Initially Provided in IOS XR Release	Support Initially Provided in IOS XR 64 bit Release
Cisco ASR 9000 20x10GE Consumption Model MPA	A9K-MPA20X10GE-CM	Release 6.1.2	Release 6.5.1
Cisco ASR 9000 2x100GE Consumption Model MPA	A9K-MPA2X100GE-CM	Release 6.1.2	Release 6.5.1
Cisco ASR 9000 Series Aggregation Services Router 1-port 100-Gigabit Modular Port Adapter	A9K-MPA-1X100GE	Release 6.0.1	Release 6.3.1
Cisco ASR 9000 Series Aggregation Services Router 2-port 100-Gigabit Modular Port Adapter	A9K-MPA-2X100GE	Release 6.0.1	Release 6.2.2
20-Port 10-Gigabit Ethernet Modular Port Adapter with SFP+	A9K-MPA-20x10GE	Release 5.3.2	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router 8-port 10GE Modular Port Adapter	A9K-MPA-8X10GE	Release 4.3.1	Release 6.3.2
Cisco ASR 9000 Series Aggregation Services Router 1-port 40GE Modular Port Adapter	A9K-MPA-1X40GE	Release 4.2.3	Release 6.3.1
Cisco ASR 9000 Series Aggregation Services Router 4-port 10GE Modular Port Adapter	A9K-MPA-4X10GE	Release 4.2.0	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router 20-port 1GE Modular Port Adapter	A9K-MPA-20X1GE	Release 4.2.0	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router 2-port 10GE Modular Port Adapter	A9K-MPA-2X10GE	Release 4.2.1	Release 6.3.2
Cisco ASR 9000 Series Aggregation Services Router 2-port 40GE Modular Port Adapter	A9K-MPA-2X40GE	Release 4.2.1	Release 6.3.1
Cisco ASR 9000v Satellite Shelf			
Component	**Part Number**	**Support Initially Provided in IOS XR Release**	**Support Initially Provided in IOS XR 64 bit Release**
Cisco ASR 9000v Satellite Shelf Version 2 DC power ANSI chassis	A9KV-V2-DC-A=	Release 5.2.2	Release 6.2.1
Cisco ASR 9000v Satellite Shelf Version 2 DC power chassis	A9KV-V2-DC-E=	Release 5.2.2	Release 6.2.1
Cisco ASR 9000v Satellite Shelf AC power chassis	A9KV-V2-AC=	Release 5.2.2	Release 6.2.1
Cisco ASR 9000v Satellite Shelf Version 2 Fan Tray	A9KV-V2-FAN=	Release 5.2.2	Release 6.2.1
Cisco NCS 5000 Satellite Shelf			
Cisco NCS 5001 Series Router	NCS-5001	Release 6.0.1	Release 6.2.1

Cisco NCS 5002 Series Router	NCS-5002	Release 6.0.1	Release 6.2.1
Cisco NCS 5001 Router Accessory Kit	NCS-5001-ACSR	Release 6.0.1	Release 6.2.1
Cisco NCS 5002 Router Accessory Kit	NCS-5002-ACSR	Release 6.0.1	Release 6.2.1
Cisco NCS 5001 Router Fan Back to Front AirFlow	NCS-5001-FN-BK	Release 6.0.1	Release 6.2.1
Cisco NCS 5002 Router Fan Back to Front AirFlow	NCS-5002-FN-BK	Release 6.0.1	Release 6.2.1
Cisco NCS 5001 Air Filter Back to Front Airflow	NCS-5001-FLT-BK	Release 6.0.1	Release 6.2.1
Cisco NCS 5002 Air Filter Back to Front Airflow	NCS-5002-FLT-BK	Release 6.0.1	Release 6.2.1
Cisco NCS 5001 Fan Front to Back Airflow	NCS-5001-FN-FR	Release 6.0.1	Release 6.2.1
Cisco NCS 5002 Fan Front to Back Airflow	NCS-5002-FN-FR	Release 6.0.1	Release 6.2.1
Cisco NCS 5001 Air Filter Front to Back Airflow	NCS-5001-FLT-FR	Release 6.0.1	Release 6.2.1
Cisco NCS 5002 Air Filter Front to Back Airflow	NCS-5002-FLT-FR	Release 6.0.1	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router SIP and SPA Cards			
Component	**Part Number**	**Support Initially Provided in IOS XR Release**	**Support Initially Provided in IOS XR 64 bit Release**
Cisco ASR 9000 SIP-700 SPA interface processor	A9K-SIP-700	Release 3.9.0	Unsupported
2-Port Channelized OC-12/DS0 SPA	SPA-2XCHOC12/DS0	Release 3.9.0	Unsupported
1-Port Channelized OC48/STM16 DS3 SPA	SPA-1XCHOC48/DS3	Release 4.0.1	Unsupported
2-Port OC-48/STM16 SPA	SPA-2XOC48POS/RPR	Release 4.0.1	Unsupported
Cisco 4-Port OC-12c/STM-4 POS SPA	SPA-4XOC12-POS	Release 6.4.2	Unsupported
8-Port OC12/STM4 SPA	SPA-8XOC12-POS	Release 4.0.1	Unsupported
1-Port OC-192/STM-64 POS/RPR SPA	SPA-OC192POS-XFP	Release 4.0.1	Unsupported
4-Port Clear Channel T3/E3 SPA	SPA-4XT3E3	Release 4.0.1	Unsupported
2-Port Clear Channel T3/E3 SPA	SPA-2XT3E3	Release 4.0.1	Unsupported
1-Port Channelized OC-3/STM-1 SPA	SPA-1XCHSTM1/OC3	Release 4.0.1	Unsupported
4-Port OC-3/STM-1 POS SPA	SPA-4XOC3	Release 4.0.1	Unsupported
8-Port OC-3/STM-1 POS SPA	SPA-8XOC3	Release 4.0.1	Unsupported
4-Port Channelized T3 to DS0 SPA	SPA-4XCT3/DS0	Release 4.1.0	Unsupported
8-Port Channelized T1/E1 SPA	SPA-8XCHT1/E1	Release 4.1.0	Unsupported
1-Port and 3-Port Clear Channel OC-3 ATM SPA	SPA-1/3XOC3ATM	Release 4.2.0	Unsupported

1-Port Clear Channel OC-12 ATM SPA	SPA-1XOC12ATM	Release 4.2.0	Unsupported
1-Port Channelized OC-3 ATM CEoP SPA	SPA-1XOC3-CE-ATM	Release 4.2.0	Unsupported
1000BASE-BX40-D for Single-Fiber Bidirectional Applications	GLC-BX40-DA-I GLC-BX40-D-I	Release 5.1.2	Release 6.3.2
1000BASE-BX40-U for Single-Fiber Bidirectional Applications	GLC-BX40-U-I	Release 5.1.2	Unsupported
1000BASE-BX80-D for Single-Fiber Bidirectional Applications	GLC-BX80-D-I	Release 5.1.2	Unsupported
1000BASE-BX80-U for Single-Fiber Bidirectional Applications	GLC-BX80-U-I	Release 5.1.2	Unsupported
The Cisco 10GBASE Coarse Wavelength-Division Multiplexing (CWDM) Small Form-Factor Pluggable (SFP+)	CWDM-SFP10G-1470 CWDM-SFP10G-1490 CWDM-SFP10G-1510 CWDM-SFP10G-1530 CWDM-SFP10G-1550 CWDM-SFP10G-1570 CWDM-SFP10G-1590 CWDM-SFP10G-1610	Release 5.2.2	Unsupported
The Cisco Dense Wavelength-Division Multiplexing (DWDM) Tunable SFP+ 10 Gigabit Ethernet Transceiver Module	DWDM-SFP10G-C	Release 5.2.2	Unsupported
1000BASE-TX Extended Temperature SFP	GLC-TE	Release 5.2.2	Release 7.0.1
10GBASE-DWDM single wavelength Edge Performance XFP , dual LC connector, individual wavelength pluggable module	ONS-XC-10G-EPXX.Y	Release 5.2.2	Unsupported
10GBASE-DWDM single wavelength Edge Performance SFP+ pluggable module	ONS-SC-10G-EPXX.Y	Release 5.2.2	Unsupported
Dual Rate SFP	GLC-GE-DR-LX Dual Rate 100M/1G)	Release 5.2.2	Unsupported
1-Port 40G CPAK adapter module	CVR-CPAK-QSFP40	Release 5.3.2	Unsupported

Software Compatibility

Cisco IOS XR Software Release 6.3.2 is compatible with the following Cisco ASR 9000 Series Aggregation Services Router systems.

- Cisco ASR 9900 Series Chassis
  - 22-Slot (ASR-9922) Line Card Chassis

- 12-Slot (ASR-9912) Line Card Chassis
- 10-Slot (ASR-9910) Line Card Chassis
- 6-Slot (ASR-9906) Line Card Chassis
- 4-slot (ASR-9904) Line Card Chassis
- 1-Slot (ASR-9901) Line Card Chassis

- Cisco ASR 9000 Series Chassis
  - 10-Slot (ASR-9010) Line Card Chassis
  - 6-Slot (ASR-9006) Line Card Chassis
  - 1-Slot (ASR-9001) Line Card Chassis

For Cisco license support, please contact your Cisco Sales Representative or Customer Service at 800- 553-NETS (6387) or 408-526-4000. For questions on the program other than ordering, please send e-mail to: cwm-license@cisco.com.

Determining Installed Packages

To determine the version of Cisco IOS XR Software packages installed on your router, log in to the router and enter the **show install committed summary** command:

Cisco IOS XR

```
RP/0/RSP0/CPU0:router# show install committed summary
Default Profile:
  SDRs:
    Owner
  Committed Packages:
    disk0:asr9k-bng-px-6.3.2
    disk0:asr9k-fpd-px-6.3.2
    disk0:asr9k-k9sec-px-6.3.2
    disk0:asr9k-li-px-6.3.2
    disk0:asr9k-mcast-px-6.3.2
    disk0:asr9k-mgbl-px-6.3.2
    disk0:asr9k-mini-px-6.3.2
    disk0:asr9k-mpls-px-6.3.2
    disk0:asr9k-ncs500x-nV-px-6.3.2
```

Cisco IOS XR 64 bit

```
RP/0/RSP0/CPU0:router# show install committed summary
    Committed Packages: 10
        asr9k-xr-6.3.2 version=6.3.2 [Boot image]
        asr9k-9000v-nV-x64-1.0.0.0-r632
        asr9k-optic-x64-1.0.0.0-r632
        asr9k-mpls-te-rsvp-x64-1.2.0.0-r632
        asr9k-isis-x64-1.2.0.0-r632
        asr9k-mcast-x64-2.0.0.0-r632
        asr9k-k9sec-x64-3.1.0.0-r632
        asr9k-mpls-x64-2.0.0.0-r632
        asr9k-mgbl-x64-3.0.0.0-r632
        asr9k-ospf-x64-1.0.0.0-r632
```

Software Features Introduced in Cisco IOS XR Software Release 6.3.2

Explicit Binding Segment Identifier (BSID)

A binding segment is a local segment that identifies an SR-TE policy. Each SR-TE policy is associated with a binding segment ID (BSID). By default, a BSID is allocated automatically for each SR-TE policy when the SR-TE policy is instantiated.

The Explicit BSID feature allows you to request that the SR-TE policy uses a BSID value that you provide. Explicit BSIDs are allocated from the segment routing local block (SRLB) or the dynamic range of labels. You can also specify how the BSID allocation behaves if the BSID value is not available.

For more information on this feature, see the Configure SR-TE Policies chapter in the Segment Routing Configuration Guide for Cisco ASR 9000 Series Aggregation Services Routers.

BGP Large Community String

BGP communities provides a way to group destinations and apply routing decisions such as acceptance, rejection, preference, or redistribution on a group of destinations using community attributes. BGP community attributes are variable length attributes consisting of a set of one or more 4-byte values which are split into two parts of 16 bits to represent AS number and a locally defined value. BGP large community is a 12 byte optional attribute which can accommodate 4 byte ASNs which cannot be accommodated by the BGP community or the BGP extended community.

For more information about configuring BGP large community feature, see *Routing Configuration Guide for Cisco ASR 9000 Series Routers*.

EVPN Support for V6 Hosts with Mobility

EVPN Support for V6 Hosts with Mobility feature enables you to provide EVPN IPv6 service over IPv4-MPLS core network. This feature supports all-active multihoming and virtual machine (VM) or host move.

For more information on this feature, see the *Configure EVPN IRB* chapter in the *L2VPN and Ethernet Services Configuration Guide for Cisco ASR 9000 Series Routers, IOS XR Release 6.3.2*.

EVPN VPWS On-Demand Next Hop with SR-TE

The EVPN VPWS On-Demand Next Hop with SR-TE feature enables you to fetch the best path to send traffic from the source to destination in a point-to-point service using IOS XR Traffic Controller (XTC).

For more information on this feature, see the *L2VPN Preferred Path over Segment Routing for Traffic Engineering Policy* chapter in the *L2VPN and Ethernet Services Configuration Guide for Cisco ASR 9000 Series Routers, IOS XR Release 6.3.2*.

EVPN Multiple Services per Ethernet Segment

EVPN Multiple Services per Ethernet Segment feature allows you to configure multiple services over single Ethernet Segment (ES). Instead of configuring multiple services over multiple ES, you can configure multiple services over a single ES. With this feature you can optimize the use of resources, especially bandwidth and reduce the cost of hardware.

For more information on this feature, see the *EVPN Features* chapter in the *L2VPN and Ethernet Services Configuration Guide for Cisco ASR 9000 Series Routers, IOS XR Release 6.3.2*.

EVPN VPWS over SR-TE Preferred Path

EVPN VPWS over SR-TE Preferred Path feature allows you to set the preferred path between the two end-points for EVPN VPWS pseudowire (PW) using SR-TE policy.

For more information on this feature, see the *L2VPN Preferred Path over Segment Routing for Traffic Engineering Policy* chapter in the *L2VPN and Ethernet Services Configuration Guide for Cisco ASR 9000 Series Routers, IOS XR Release 6.3.2*.

L2VPN VPLS or VPWS over SR-TE Preferred Path

L2VPN VPLS or VPWS over SR-TE Preferred Path feature allows you to set the preferred path between the two end-points for L2VPN Virtual Private LAN Service (VPLS) or Virtual Private Wire Service (VPWS) using SR-TE policy.

For more information on this feature, see the *L2VPN Preferred Path over Segment Routing for Traffic Engineering Policy* chapter in the *L2VPN and Ethernet Services Configuration Guide for Cisco ASR 9000 Series Routers, IOS XR Release 6.3.2*.

LLDP Model Local System Information

The LLDP model local system information feature provides Open-Config (OC) Model support for LLDP. With this model, you can perform the create, modify, delete operations by using the YANG model through RPC request. For more information, see the Using Data Models chapter in *Programmability Configuration Guide for Cisco ASR 9000 Series Routers*.

Management Plane Protection for Third-Party Applications

Management Plane Protection (MPP) provides a mechanism for securing management traffic on the router. Without MPP, if the service is enabled, the Cisco IOS XR allows the service traffic to pass through any interface with a network address.

MPP configuration for third-party application (TPA) enables to filter the traffic of TPA component, for example, gRPC component. The addition of gRPC component controls the management protocol traffic and supports the management protocols for the TPA, for example, gRPC. It also helps to control the gRPC application and filter the gRPC traffic through MPP configuration.

For more information, see *MPP for Third Party Applications* chapter of the *System Security Configuration Guide for Cisco ASR 9000 Series Routers, IOS XR Release 6.3.x*.

IS-IS VRF Aware Lite

The feature adds the possibility to run an Integrated Intermediate System-to-Intermediate System (IS-IS) process in the context of a non-default VPN routing and forwarding (VRF). Both IPv4 and IPv6 are supported. The implementation is more suitable for VRF-lite scenarios.

For more information, see the *Routing Configuration Guide for Cisco NCS 5000 Series Routers, IOS XR Release 6.3.x*.

Layer 2 Adjacency SID

An adjacency SID is typically associated with a Layer 3 adjacency to a neighboring node. If you have Layer 2 bundle interfaces, where multiple physical interfaces form a bundle interface, the individual Layer 2 bundle members are not visible to IGP; only the bundle interface is visible.

The Layer 2 Adjacency SID feature provides adjacency SID functionality for individual bundle members. This feature allows you to track the availability of individual bundle member links and to verify the segment routing forwarding over the individual bundle member links, for Operational Administration and Maintenance (OAM) purposes. A Layer 2 adjacency SID can be allocated dynamically or configured manually.

For more information on this feature, see the Configure Segment Routing for IS-IS Protocol chapter in the Segment Routing Configuration Guide for Cisco ASR 9000 Series Aggregation Services Routers.

IP-MIB Support for IPv4

IOS-XR implementation of IP-MIB now supports IPv4 statistics as per RFC4293. Refer to the SNMP OID Navigator for a list of new OIDs added for iPv4 statistics.

PBB EVPN Support for nV System

PBB EVPN support for nV System feature enables the user to configure PBB EVPN over an nV system which is in single homed topology or a multi-chassis system with access-port bundles along with ICL bundles.

For more information on this feature, see the *Configuring the Satellite Network Virtualization (nV) System* chapter in the *nV System Configuration Guide for Cisco ASR 9000 Series Routers, IOS XR Release 6.3.x*

Command Accounting

This feature enables the logging of the configuration commands executed by the users as syslog messages. Hence all the commands that were executed can be viewed from the output of the **show logging** command. This feature is supported on both Cisco IOS XR 32 bit and 64 bit operating systems.

For more information on this feature, see the *Configuring AAA Services* chapter in the *System Security Configuration Guide for Cisco ASR 9000 Series Routers, IOS XR Release 6.3.x*

ISSU Support for Cisco ASR 9910 Chassis

In-Service Software Upgrade (ISSU) for Cisco IOS-XR 64 bit is supported on Cisco ASR 9910 router chassis. For more information about ISSU, see *System Management Configuration Guide for Cisco ASR 9000 Series Routers*.

EVPN VXLAN Ingress Replication

The EVPN VXLAN Ingress Replication feature enables the VXLAN tunnel endpoint (VTEP) to exchange local and remote VTEP IP addresses on the Virtual Network Identifier (VNI) in order to create the ingress replication list. This enables to send and receive broadcast, unknown unicast and multicast (BUM) traffic for the VNI. These IP addresses are exchanged between VTEPs through the BGP EVPN control plane using EVPN Route Type 3.

This feature helps in reduced traffic flooding, increased load sharing at VTEP, faster convergence during link and device failures, and simplified data center automation.

For more information on this feature, see the *EVPN Features* chapter in the *L2VPN and Ethernet Services Configuration Guide for Cisco ASR 9000 Series Routers, IOS XR Release 6.3.2*.

MACSec Using EAP-TLS Authentication

The MACSec encryption between two ASR 9000 Routers is achieved using the 802.1x Port-based authentication with Extensible Authentication Protocol-Transport Layer Security (EAP-TLS). EAP-TLS allows mutual authentication using certificates, between the authentication server and the client, and generates the Master Session Key (MSK). This MSK is used to derive the Connectivity Association Key (CAK), and the corresponding Connectivity Association Key Name (CKN) is derived from the EAP session ID.

For more information, see *MACSec Using EAP-TLS Authentication* chapter of the *System Security Configuration Guide for Cisco ASR 9000 Series Routers, IOS XR Release 6.3.x*.

EVPN IRB: DHCP Relay Version 4/Version 6

EVPN IRB: DHCP Relay Version 4/Version 6 feature provides DHCP support for the end users in EVPN multi-homing Active-Active (MH-AA) deployment scenario. This feature helps in reduced traffic flooding, increased load sharing at VTEP, faster convergence during link and device failures, and simplified data center automation.

DHCP v4/v6 Relay agent relays request packets that come over access interface towards external DHCPv4/v6 server to request address (/32) and IANA (::/128) allocation for the end user.

For more information on this feature, see the *EVPN Features* chapter in the *L2VPN and Ethernet Services Configuration Guide for Cisco ASR 9000 Series Routers, IOS XR Release 6.3.2*.

Subscriber QoS on Main Interface

From Cisco IOS XR Software Release 6.3.2 and later, Cisco ASR 9000 Series BNG routers support subscriber QoS on main interface. Prior to this, subscriber QoS was supported only on VLAN sub-interfaces. This feature offers a better QoS resource management, which in turn provides an increased subscriber scale support (along with QoS shaper for each traffic manager) over physical line card-based interfaces. This feature is available on Cisco ASR 9000 High Density 100GE Ethernet line cards, and is supported only on Cisco IOS XR 64-bit operating system.

For more information about this feature, see the *Deploying the Quality of Service (QoS)* chapter in the *Cisco ASR 9000 Series Aggregation Services Router Broadband Network Gateway Configuration Guide*. For complete command reference, see the *QoS Commands* chapter in *Cisco ASR 9000 Series Aggregation Services Router Broadband Network Gateway Command Reference*.

DHCP L3 Routed Subscriber Snooping

From Cisco IOS XR Software Release 6.3.2 and later, the Cisco ASR 9000 BNG router supports DHCPv4 and DHCPv6 L3 routed subscriber snooping on Cisco ASR 9000 High Density 100GE Ethernet line cards. This feature introduces the support for DHCP L3 snoop mode in addition to the existing DHCPv4 and DHCPv6 proxy and server modes in BNG. This feature helps you to create DHCP-initiated routed subscriber sessions on main (that is, non-VLAN) interfaces. This feature is supported only on Cisco IOS XR 64-bit operating system.

The DHCP L3 routed subscriber snooping feature brings in the support for these functionalities as well in BNG:

- Subscriber session creation on untagged or main line card (LC) interfaces.
- MAC-gateway address combination-based authentication for IPv4 address family interface (AFI) for BNG in proxy mode.
- DHCP unique identifier (DUID)-based authentication for IPv6 AFI for BNG in proxy mode.
- Delayed authentication for BNG in proxy mode. That is, ACCESS-REQUEST message to the AAA server is based on the DHCP REQUEST message, rather than the DHCP DISCOVER message, from the client.
- Support for multiple sessions based on the same MAC address, but with different gateway addresses. The duplicate MAC feature in BNG is extended to support gateway address as the key for allowing duplicate MAC-based session. Prior to this, VLAN and access-interfaces were part of the client key.

For more information about this feature, see the *Establishing Subscriber Sessions* chapter in the *Cisco ASR 9000 Series Aggregation Services Router Broadband Network Gateway Configuration Guide*. For complete command reference, see the *BNG DHCP Commands* chapter in the *Cisco ASR 9000 Series Aggregation Services Router Broadband Network Gateway Command Reference*.

In-line Modification of Netflow Configuration

The In-line modification of Netflow configuration enables to add or remove flow attributes of a flow entity that is already applied to an interface.

Note The In-line modification of Netflow configuration is supported on Cisco IOS XR 64 bit software.

For information on configuring In-line modification, see *Netflow Configuration Guide for Cisco ASR 9000 Series Routers, IOS XR Release 6.3.x*.

RPM Signing and Verification

Cisco IOS XR supports RPM signing and signature verification for Cisco IOS XR RPM packages in the ISO and upgrade images. All RPM packages in the Cisco IOS XR ISO and upgrade images are signed to ensure cryptographic integrity and authenticity. This guarantees that the RPM packages have not been tampered with and the RPM packages are from Cisco IOS XR. The private key, used for signing the RPM packages, is created and securely maintained by Cisco.

Enhancements to Programmability

Cisco IOS XR supports `Network-Instance`, `LLDP`, and `ISIS` Open Config Models. These models have YANG models defined for configuration and operational data.

For more information about YANG data models and configuration, see *Using Data Models* chapter in Programmability Configuration Guide for Cisco ASR 9000 Series Routers .

Increase in Throttle Memory Range

The high range of memory usage per session by the XML agent is increased from 600 MB to 1024 MB. Supported only on IOS XR 64-bit OS.

For more Information about configuring the XML agent, see *Configuring Manageability* chapter in System Management Configuration Guide for Cisco ASR 9000 Series Routers .

LLDP YANG Models

Link Layer Discovery Protocol (LLDP) YANG model supports configuring event-driven telemetry.

For an example about configuring event-driven telemetry for LLDP, see *Configure Model-driven Telemetry* chapter in Telemetry Configuration Guide for Cisco ASR 9000 Series Routers.

NETCONF Transport for Event-Driven Telemetry

Support for NETCONF as a transport for event-driven telemetry.

For information about NETCONF notifications, see *Configure Model-driven Telemetry* chapter in Telemetry Configuration Guide for Cisco ASR 9000 Series Routers.

Behavior Change Introduced in Cisco IOS XR Release 6.3.2

From this release onwards **address-family** is a mandatory keyword for the **show tech-support multicast** command. The command syntax is:

```
show tech multicast address-family <ipv4/ipv6>.
```

For more information, refer the *show tech-support multicast* command in the *Tech-Support Commands* chapter of the *Advance System Command Reference for Cisco ASR 9000 Series Routers.*

New Hardware Introduced in Cisco IOS XR Software Release 6.3.2

This release introduces following new hardware:

- 24-Port and 48-Port 10-Gigabit Ethernet/1-Gigabit Ethernet Line Cards, Consumption Model (A9K-24X10GE-1G-CM, A9K-48X10GE-1G-CM)—These line cards have 24 or 48 dual-rate ports that accept 10GE SFP+ or 1GE SFP modules. The -CM variant is the same as the -SE variant except that the -CM variant functions on Consumption Based Pricing Model supported with Smart Licensing.

  For more information on the 24-port and 48-port dual-rate 10GE/1GE line cards, see the Cisco ASR 9000 Series Aggregation Services Router Ethernet Line Card Installation Guide.

  For details related to the Consumption Based Pricing Model, see the Software Entitlement chapter in the Cisco ASR 9000 Series Aggregation Services Router System Management Configuration Guide.

Hardware Enhancements Introduced in Cisco IOS XR Software 6.3.2

This release introduces following hardware enhancements:

- The RSP880-LT is supported on the Cisco ASR 9906 Router.
- The 24-Port and 48-Port Dual-Rate 10GE/1GE Line Cards (A9K-24X10GE-1G-SE, A9K-24X10GE-1G-TR, A9K-48X10GE-1G-SE, A9K-48X10GE-1G-TR) are supported on the IOS XR 64-bit platform.
- The MOD-400 modular line card (A9K-MOD400-TR, A9K-MOD400-SE) is supported on the IOS XR 64-bit platform with the following MPAs:
  - A9K-MPA-8X10GE
  - A9K-MPA-2X10GE
- The 4-Port 100-Gigabit Ethernet Line Card with QSFP28 (A9K-4X100GE) is supported on the ASR 9000 Series Routers.
- CPAK optical modules, CPAK-100G-CWDM4, CPAK-10X10G-ERL and CPAK-100G-ER4L are now supported on A9K-MOD400-SE/TR, A9K-MOD200-SE/TR, and A9K-8X100GE-SE/TR cards.

For more information see, Ethernet Line Card Installation Guide.

Firmware Support on Cisco IOS XR

To check the firmware code running on the Cisco ASR 9000 Series Router, run the **show fpd package** command in admin mode.

```
RP/0/RSP0/CPU0:router(admin)#show fpd package

================================ ================================================
                                        Field Programmable Device Package
                                 ================================================
                                                              SW      Min Req   Min Req
Card Type                 FPD Description            Type Subtype   Version   SW Ver    HW Vers
========================= ========================== ==== ======= =========== ========  =========
ASR-9906-BPID2            Can Bus Ctrl (CBC) BP2     bp   cbc         7.105       0.00      0.1
-------------------------------------------------------------------------------------------------
ASR-9910-BPID2            Can Bus Ctrl (CBC) BP2     bp   cbc         7.105       0.00      0.1
                          Can Bus Ctrl (CBC) BP2     lc   cbc         7.105       0.00      0.1
```

ASR-9904-BPID2	Can Bus Ctrl (CBC) BP2	bp	cbc	7.105	0.00	0.1
ASR-9912-BPID2	Can Bus Ctrl (CBC) BP2	bp	cbc	7.105	0.00	0.1
	Can Bus Ctrl (CBC) BP2	lc	cbc	7.105	0.00	0.1
ASR-9922-BPID2	Can Bus Ctrl (CBC) BP2	bp	cbc	7.105	0.00	0.1
	Can Bus Ctrl (CBC) BP2	lc	cbc	7.105	0.00	0.1
A9K-BPID2-E-10-SLOT	Can Bus Ctrl (CBC) BP2	bp	cbc	7.105	0.00	0.1
A9K-BPID2-E-6-SLOT	Can Bus Ctrl (CBC) BP2	bp	cbc	7.105	0.00	0.1
A9K-BPID2-10-SLOT	Can Bus Ctrl (CBC) BP2	bp	cbc	7.105	0.00	0.1
	Can Bus Ctrl (CBC) BP2	lc	cbc	7.105	0.00	0.1
A9K-BPID2-6-SLOT	Can Bus Ctrl (CBC) BP2	bp	cbc	7.105	0.00	0.1
	Can Bus Ctrl (CBC) BP2	lc	cbc	7.105	0.00	0.1
ASR-9922-SFC110	Can Bus Ctrl (CBC) MTFC	fc	cbc	28.06	0.00	0.1
	Fabric Ctrl0 MTFC	fc	fpga7	1.03	0.00	0.1
	Can Bus Ctrl (CBC) MTFC	lc	cbc	28.06	0.00	0.1
ASR-9912-SFC110	Can Bus Ctrl (CBC) SSFC	fc	cbc	32.05	0.00	0.1
	Fabric Ctrl0 MTFC	fc	fpga7	1.03	0.00	0.1
A99-SFC2	Can Bus Ctrl (CBC) MTFC	fc	cbc	37.20	0.00	0.1
	Fabric Ctrl0 MTFC	fc	fcfsbl	1.100	0.00	0.1
	Fabric Ctrl0 MTFC	fc	fclnxfw	1.100	0.00	0.1
	Fabric Ctrl0 MTFC	fc	fpga8	0.37	0.00	0.1
ASR-9912-SFC220	Can Bus Ctrl (CBC) MTFC	fc	cbc	37.20	0.00	0.1
	Fabric Ctrl0 MTFC	fc	fcfsbl	1.100	0.00	0.1
	Fabric Ctrl0 MTFC	fc	fclnxfw	1.100	0.00	0.1
	Fabric Ctrl0 MTFC	fc	fpga8	0.37	0.00	0.1
A99-SFC-S	Can Bus Ctrl (CBC) SHFC	fc	cbc	44.02	0.00	0.1
	Fabric Ctrl0 SHFC	fc	fcfsbl	1.100	0.00	0.1
	Fabric Ctrl0 SHFC	fc	fclnxfw	1.100	0.00	0.1
	Fabric Ctrl0 SHFC	fc	fpga8	0.37	0.00	0.1
A99-SFC-T	Can Bus Ctrl (CBC) TWFC	fc	cbc	44.02	0.00	0.1
	Fabric Ctrl0 TWFC	fc	fcfsbl	1.100	0.00	0.1
	Fabric Ctrl0 TWFC	fc	fclnxfw	1.100	0.00	0.1
	Fabric Ctrl0 TWFC	fc	fpga8	0.37	0.00	0.1
ASR-9010-FAN	Can Bus Ctrl (CBC) FAN	ft	cbc	4.03	0.00	0.1
	Can Bus Ctrl (CBC) FAN	lc	cbc	4.03	0.00	0.1
ASR-9006-FAN	Can Bus Ctrl (CBC) FAN	ft	cbc	5.04	0.00	0.1
	Can Bus Ctrl (CBC) FAN	lc	cbc	5.04	0.00	0.1
ASR-9922-FAN	Can Bus Ctrl (CBC) MFAN	ft	cbc	29.12	0.00	0.1
	Can Bus Ctrl (CBC) MFAN	lc	cbc	29.12	0.00	0.1
ASR-9912-FAN	Can Bus Ctrl (CBC) SFAN	ft	cbc	31.05	0.00	0.1
ASR-9010-FAN-V2	Can Bus Ctrl (CBC) FAN	ft	cbc	29.12	0.00	0.1
	Can Bus Ctrl (CBC) FAN	lc	cbc	29.12	0.00	0.1
ASR-9904-FAN	Can Bus Ctrl (CBC) SFAN	ft	cbc	31.05	0.00	0.1
ASR-9922-FAN-V2	Can Bus Ctrl (CBC) MFAN	ft	cbc	40.07	0.00	0.1
	Fan Controller MFAN	ft	fpga9	2.06	0.00	0.1

ASR-9006-FAN-V2	Can Bus Ctrl (CBC) FAN	ft	cbc	5.04	0.00	0.1
	Can Bus Ctrl (CBC) FAN	lc	cbc	5.04	0.00	0.1
ASR-9910-FAN	Can Bus Ctrl (CBC) SHFAN	ft	cbc	45.02	0.00	0.1
	Fan Controller SHFAN	ft	fpga9	2.06	0.00	0.1
ASR-9906-FAN	Can Bus Ctrl (CBC) TWFAN	ft	cbc	56.01	0.00	0.1
	Fan Controller TWFAN	ft	fpga9	2.06	0.00	0.1
ASR-9001-FAN	Can Bus Ctrl (CBC) FAN	ft	cbc	24.115	0.00	0.1
	Can Bus Ctrl (CBC) FAN	lc	cbc	24.115	0.00	0.1
ASR-9001-FAN-V2	Can Bus Ctrl (CBC) FAN	ft	cbc	24.115	0.00	0.1
A9K-SIP-700	Can Bus Ctrl (CBC) LC5	lc	cbc	3.06	0.00	0.1
	CPUCtrl LC5	lc	cpld1	0.15	0.00	0.1
	QFPCPUBridge LC5	lc	fpga2	5.14	0.00	0.1
	NPUXBarBridge LC5	lc	fpga1	0.24	0.00	0.1
	ROMMONB LC5	lc	rommon	1.04	0.00	0.1
A9K-SIP-500	Can Bus Ctrl (CBC) LC5	lc	cbc	3.06	0.00	0.1
	CPUCtrl LC5	lc	cpld1	0.15	0.00	0.1
	QFPCPUBridge LC5	lc	fpga2	5.14	0.00	0.1
	NPUXBarBridge LC5	lc	fpga1	0.24	0.00	0.1
	ROMMONB LC5	lc	rommon	1.04	0.00	0.1
A9K-SIP-700-8G	Can Bus Ctrl (CBC) LC5	lc	cbc	3.06	0.00	0.1
	CPUCtrl LC5	lc	cpld1	0.15	0.00	0.1
	QFPCPUBridge LC5	lc	fpga2	5.14	0.00	0.1
	NPUXBarBridge LC5	lc	fpga1	0.24	0.00	0.1
	ROMMONB LC5	lc	rommon	1.35	0.00	0.1
A9K-RSP440-TR	Can Bus Ctrl (CBC) RSP3	lc	cbc	16.117	0.00	0.1
	ClockCtrl0 RSP3	lc	fpga2	1.10	0.00	0.1
	UTI RSP3	lc	fpga3	4.09	0.00	0.1
	CPUCtrl RSP3	lc	fpga1	0.11	0.00	0.1
	ROMMONB RSP3	lc	rommon	0.76	0.00	0.1
A9K-RSP440-SE	Can Bus Ctrl (CBC) RSP3	lc	cbc	16.117	0.00	0.1
	ClockCtrl0 RSP3	lc	fpga2	1.10	0.00	0.1
	UTI RSP3	lc	fpga3	4.09	0.00	0.1
	CPUCtrl RSP3	lc	fpga1	0.11	0.00	0.1
	ROMMONB RSP3	lc	rommon	0.76	0.00	0.1
ASR-9922-RP-TR	Can Bus Ctrl (CBC) MTRP	lc	cbc	25.03	0.00	0.1
	Fabric Ctrl3 MTFC	lc	fpga10	1.03	0.00	0.1
	Fabric Ctrl4 MTFC	lc	fpga11	1.03	0.00	0.1
	Fabric Ctrl5 MTFC	lc	fpga12	1.03	0.00	0.1
	Fabric Ctrl6 MTFC	lc	fpga13	1.03	0.00	0.1
	CPUCtrl1	lc	fpga2	1.03	0.00	0.1
	ClkCtrl	lc	fpga3	1.05	0.00	0.1
	IntCtrl	lc	fpga4	1.04	0.00	0.1
	UTI	lc	fpga5	4.09	0.00	0.1
	Timex	lc	fpga6	0.02	0.00	0.1
	Fabric Ctrl0 MTFC	lc	fpga7	1.03	0.00	0.1
	Fabric Ctrl1 MTFC	lc	fpga8	1.03	0.00	0.1
	Fabric Ctrl2 MTFC	lc	fpga9	1.03	0.00	0.1
	CPUCtrl0	lc	fpga1	1.05	0.00	0.1
	ROMMONB MTRP	lc	rommon	5.16	0.00	0.1
ASR-9922-RP-SE	Can Bus Ctrl (CBC) MTRP	lc	cbc	25.03	0.00	0.1
	Fabric Ctrl3 MTFC	lc	fpga10	1.03	0.00	0.1
	Fabric Ctrl4 MTFC	lc	fpga11	1.03	0.00	0.1

	Fabric Ctrl5 MTFC	lc	fpga12	1.03	0.00	0.1
	Fabric Ctrl6 MTFC	lc	fpga13	1.03	0.00	0.1
	CPUCtrl1	lc	fpga2	1.03	0.00	0.1
	ClkCtrl	lc	fpga3	1.05	0.00	0.1
	IntCtrl	lc	fpga4	1.04	0.00	0.1
	UTI	lc	fpga5	4.09	0.00	0.1
	Timex	lc	fpga6	0.02	0.00	0.1
	Fabric Ctrl0 MTFC	lc	fpga7	1.03	0.00	0.1
	Fabric Ctrl1 MTFC	lc	fpga8	1.03	0.00	0.1
	Fabric Ctrl2 MTFC	lc	fpga9	1.03	0.00	0.1
	CPUCtrl0	lc	fpga1	1.05	0.00	0.1
	ROMMONB MTRP	lc	rommon	5.16	0.00	0.1
ASR-9900-RP-TR	Can Bus Ctrl (CBC) MTRP	lc	cbc	25.03	0.00	0.1
	Fabric Ctrl3 MTFC	lc	fpga10	1.03	0.00	0.1
	Fabric Ctrl4 MTFC	lc	fpga11	1.03	0.00	0.1
	Fabric Ctrl5 MTFC	lc	fpga12	1.03	0.00	0.1
	Fabric Ctrl6 MTFC	lc	fpga13	1.03	0.00	0.1
	CPUCtrl1	lc	fpga2	1.03	0.00	0.1
	ClkCtrl	lc	fpga3	1.05	0.00	0.1
	IntCtrl	lc	fpga4	1.04	0.00	0.1
	UTI	lc	fpga5	4.09	0.00	0.1
	Timex	lc	fpga6	0.02	0.00	0.1
	Fabric Ctrl0 MTFC	lc	fpga7	1.03	0.00	0.1
	Fabric Ctrl1 MTFC	lc	fpga8	1.03	0.00	0.1
	Fabric Ctrl2 MTFC	lc	fpga9	1.03	0.00	0.1
	CPUCtrl0	lc	fpga1	1.05	0.00	0.1
	ROMMONB MTRP	lc	rommon	5.16	0.00	0.1
ASR-9900-RP-SE	Can Bus Ctrl (CBC) MTRP	lc	cbc	25.03	0.00	0.1
	Fabric Ctrl3 MTFC	lc	fpga10	1.03	0.00	0.1
	Fabric Ctrl4 MTFC	lc	fpga11	1.03	0.00	0.1
	Fabric Ctrl5 MTFC	lc	fpga12	1.03	0.00	0.1
	Fabric Ctrl6 MTFC	lc	fpga13	1.03	0.00	0.1
	CPUCtrl1	lc	fpga2	1.03	0.00	0.1
	ClkCtrl	lc	fpga3	1.05	0.00	0.1
	IntCtrl	lc	fpga4	1.04	0.00	0.1
	UTI	lc	fpga5	4.09	0.00	0.1
	Timex	lc	fpga6	0.02	0.00	0.1
	Fabric Ctrl0 MTFC	lc	fpga7	1.03	0.00	0.1
	Fabric Ctrl1 MTFC	lc	fpga8	1.03	0.00	0.1
	Fabric Ctrl2 MTFC	lc	fpga9	1.03	0.00	0.1
	CPUCtrl0	lc	fpga1	1.05	0.00	0.1
	ROMMONB MTRP	lc	rommon	5.16	0.00	0.1
A9K-RSP440-LT	Can Bus Ctrl (CBC) RSP3	lc	cbc	16.117	0.00	0.1
	ClockCtrl0 RSP3	lc	fpga2	1.11	0.00	0.1
	UTI RSP3	lc	fpga3	4.09	0.00	0.1
	CPUCtrl RSP3	lc	fpga1	0.11	0.00	0.1
	ROMMONB RSP3	lc	rommon	0.76	0.00	0.1
A9K-RSP880-TR	Can Bus Ctrl (CBC) RSP4	lc	cbc	34.38	0.00	0.0
	MB CPUCtrl	lc	fpga2	0.57	0.00	0.0
	DBCtrl	lc	fpga3	0.16	0.00	0.0
	DBCtrl	lc	fpga4	0.16	0.00	0.0
	DBCtrl	lc	fpga5	0.12	0.00	0.0
	PUNT FPGA	lc	fpga6	0.06	0.00	0.0
	Fsbl	lc	fsbl	1.103	0.00	0.0
	LinuxFW	lc	lnxfw	1.103	0.00	0.0
	ROMMONB RSP4	lc	rommon	10.59	0.00	0.0
A9K-RSP880-SE	Can Bus Ctrl (CBC) RSP4	lc	cbc	34.38	0.00	0.0
	MB CPUCtrl	lc	fpga2	0.57	0.00	0.0
	DBCtrl	lc	fpga3	0.16	0.00	0.0

```
                       DBCtrl                     lc   fpga4       0.16        0.00      0.0
                       DBCtrl                     lc   fpga5       0.12        0.00      0.0
                       PUNT FPGA                  lc   fpga6       0.06        0.00      0.0
                       Fsbl                       lc   fsbl        1.103       0.00      0.0
                       LinuxFW                    lc   lnxfw       1.103       0.00      0.0
                       ROMMONB RSP4               lc   rommon     10.59        0.00      0.0
--------------------------------------------------------------------------------------------
A9K-RSP880-LT-TR       Can Bus Ctrl (CBC) RSP4L   lc   cbc        50.01        0.00      0.0
                       MB CPUCtrl                 lc   fpga2       0.14        0.00      0.0
                       DBCtrl                     lc   fpga3       0.05        0.00      0.0
                       DBCtrl                     lc   fpga4       0.04        0.00      0.0
                       DBCtrl                     lc   fpga5       0.04        0.00      0.0
                       EOBCSwicthCtrl             lc   fpga6       1.11        0.00      0.0
                       Fsbl                       lc   fsbl        1.104       0.00      0.0
                       LinuxFW                    lc   lnxfw       1.104       0.00      0.0
                       ROMMONB RSP4L              lc   rommon     17.30        0.00      0.0
--------------------------------------------------------------------------------------------
A9K-RSP880-LT-SE       Can Bus Ctrl (CBC) RSP4L   lc   cbc        50.01        0.00      0.0
                       MB CPUCtrl                 lc   fpga2       0.14        0.00      0.0
                       DBCtrl                     lc   fpga3       0.05        0.00      0.0
                       DBCtrl                     lc   fpga4       0.04        0.00      0.0
                       DBCtrl                     lc   fpga5       0.04        0.00      0.0
                       EOBCSwicthCtrl             lc   fpga6       1.11        0.00      0.0
                       Fsbl                       lc   fsbl        1.104       0.00      0.0
                       LinuxFW                    lc   lnxfw       1.104       0.00      0.0
                       ROMMONB RSP4L              lc   rommon     17.30        0.00      0.0
--------------------------------------------------------------------------------------------
A99-RSP-TR             Can Bus Ctrl (CBC) RSP4S   lc   cbc        43.02        0.00      0.1
                       MB CPUCtrl                 lc   fpga2       0.57        0.00      0.0
                       DBCtrl                     lc   fpga3       0.16        0.00      0.0
                       DBCtrl                     lc   fpga4       0.16        0.00      0.0
                       DBCtrl                     lc   fpga5       0.12        0.00      0.0
                       PUNT FPGA                  lc   fpga6       0.06        0.00      0.0
                       Fsbl                       lc   fsbl        1.103       0.00      0.0
                       LinuxFW                    lc   lnxfw       1.103       0.00      0.0
                       ROMMONB RSP4SHW            lc   rommon     16.08        0.00      0.0
--------------------------------------------------------------------------------------------
A99-RSP-SE             Can Bus Ctrl (CBC) RSP4S   lc   cbc        43.02        0.00      0.1
                       MB CPUCtrl                 lc   fpga2       0.57        0.00      0.0
                       DBCtrl                     lc   fpga3       0.16        0.00      0.0
                       DBCtrl                     lc   fpga4       0.16        0.00      0.0
                       DBCtrl                     lc   fpga5       0.12        0.00      0.0
                       PUNT FPGA                  lc   fpga6       0.06        0.00      0.0
                       Fsbl                       lc   fsbl        1.103       0.00      0.0
                       LinuxFW                    lc   lnxfw       1.103       0.00      0.0
                       ROMMONB RSP4SHW            lc   rommon     16.08        0.00      0.0
--------------------------------------------------------------------------------------------
A99-RP2-TR             Can Bus Ctrl (CBC) MTRP    lc   cbc        35.12        0.00      0.1
                       MB CPUCtrl                 lc   fpga2       0.57        0.00      0.0
                       DBCtrl                     lc   fpga3       0.16        0.00      0.0
                       DBCtrl                     lc   fpga4       0.16        0.00      0.0
                       DBCtrl                     lc   fpga5       0.12        0.00      0.0
                       PUNT FPGA                  lc   fpga6       0.06        0.00      0.0
                       Fsbl                       lc   fsbl        1.103       0.00      0.0
                       LinuxFW                    lc   lnxfw       1.103       0.00      0.0
                       ROMMONB RP2                lc   rommon     14.29        0.00      0.0
--------------------------------------------------------------------------------------------
A99-RP2-SE             Can Bus Ctrl (CBC) MTRP    lc   cbc        35.12        0.00      0.1
                       MB CPUCtrl                 lc   fpga2       0.57        0.00      0.0
                       DBCtrl                     lc   fpga3       0.16        0.00      0.0
                       DBCtrl                     lc   fpga4       0.16        0.00      0.0
                       DBCtrl                     lc   fpga5       0.12        0.00      0.0
                       PUNT FPGA                  lc   fpga6       0.06        0.00      0.0
                       Fsbl                       lc   fsbl        1.103       0.00      0.0
```

	LinuxFW	lc	lnxfw	1.103	0.00	0.0
	ROMMONB RP2	lc	rommon	14.29	0.00	0.0
ASR9001-RP	Can Bus Ctrl (CBC) IMRP	lc	cbc	22.114	0.00	0.1
	MB CPUCtrl	lc	fpga2	1.15	0.00	0.0
	ROMMONB IM RP	lc	rommon	3.04	0.00	0.1
A9K-24x10GE-SE	Can Bus Ctrl (CBC) LC6	lc	cbc	19.112	0.00	0.0
	DBCtrl LC6	lc	fpga2	1.03	0.00	0.0
	LinkCtrl LC6	lc	fpga3	1.01	0.00	0.0
	LCCPUCtrl LC6	lc	fpga4	1.07	0.00	0.0
	ROMMONB LC6	lc	rommon	3.03	0.00	0.0
A9K-2x100GE-SE	Can Bus Ctrl (CBC) LC4	lc	cbc	21.111	0.00	0.1
	DB IO FPGA1	lc	cpld1	1.03	0.00	0.0
	MB CPUCtrl	lc	fpga2	1.08	0.00	0.0
	PortCtrl	lc	fpga3	1.05	0.00	0.0
	Imux	lc	fpga4	1.04	0.00	0.0
	Emux	lc	fpga5	1.04	0.00	0.0
	100GIGMAC	lc	fpga6	41.00	0.00	0.0
	ROMMONB LC4	lc	rommon	3.03	0.00	0.0
A9K-MOD80-SE	Can Bus Ctrl (CBC) LC4	lc	cbc	20.118	0.00	0.1
	DB Ctrl	lc	fpga2	1.04	0.00	0.0
	MB CPUCtrl	lc	fpga4	1.05	0.00	0.0
	ROMMONB LC4	lc	rommon	3.03	0.00	0.1
A9K-MOD160-SE	Can Bus Ctrl (CBC) LC4	lc	cbc	20.118	0.00	0.1
	DB Ctrl	lc	fpga2	1.04	0.00	0.0
	MB CPUCtrl	lc	fpga4	1.05	0.00	0.0
	ROMMONB LC4	lc	rommon	3.03	0.00	0.1
A9K-24x10GE-TR	Can Bus Ctrl (CBC) LC6	lc	cbc	19.112	0.00	0.0
	DBCtrl LC6	lc	fpga2	1.03	0.00	0.0
	LinkCtrl LC6	lc	fpga3	1.01	0.00	0.0
	LCCPUCtrl LC6	lc	fpga4	1.07	0.00	0.0
	ROMMONB LC6	lc	rommon	3.03	0.00	0.0
A9K-2x100GE-TR	Can Bus Ctrl (CBC) LC4	lc	cbc	21.111	0.00	0.1
	DB IO FPGA1	lc	cpld1	1.03	0.00	0.0
	MB CPUCtrl	lc	fpga2	1.08	0.00	0.0
	PortCtrl	lc	fpga3	1.05	0.00	0.0
	Imux	lc	fpga4	1.04	0.00	0.0
	Emux	lc	fpga5	1.04	0.00	0.0
	100GIGMAC	lc	fpga6	41.00	0.00	0.0
	ROMMONB LC4	lc	rommon	3.03	0.00	0.0
A9K-MOD80-TR	Can Bus Ctrl (CBC) LC4	lc	cbc	20.118	0.00	0.1
	DB Ctrl	lc	fpga2	1.04	0.00	0.0
	MB CPUCtrl	lc	fpga4	1.05	0.00	0.0
	ROMMONB LC4	lc	rommon	3.03	0.00	0.1
A9K-MOD160-TR	Can Bus Ctrl (CBC) LC4	lc	cbc	20.118	0.00	0.1
	DB Ctrl	lc	fpga2	1.04	0.00	0.0
	MB CPUCtrl	lc	fpga4	1.05	0.00	0.0
	ROMMONB LC4	lc	rommon	3.03	0.00	0.1
A9K-36x10GE-SE	Can Bus Ctrl (CBC) LC6	lc	cbc	15.104	0.00	0.0
	DBCtrl LC6	lc	fpga2	1.01	0.00	0.0
	LinkCtrl LC6	lc	fpga3	1.00	0.00	0.0
	LCCPUCtrl LC6	lc	fpga4	1.03	0.00	0.0
	ROMMONB LC6	lc	rommon	3.03	0.00	0.0
A9K-36x10GE_SC7-SE	Can Bus Ctrl (CBC) LC6	lc	cbc	15.104	0.00	0.0

```
                        DBCtrl LC6                lc   fpga2       1.01        0.00      0.0
                        LinkCtrl LC6              lc   fpga3       1.00        0.00      0.0
                        LCCPUCtrl LC6             lc   fpga4       1.03        0.00      0.0
                        ROMMONB LC6               lc   rommon      3.03        0.00      0.0
---------------------------------------------------------------------------------------------
A9K-36x10GE-TR          Can Bus Ctrl (CBC) LC6    lc   cbc        15.104       0.00      0.0
                        DBCtrl LC6                lc   fpga2       1.01        0.00      0.0
                        LinkCtrl LC6              lc   fpga3       1.00        0.00      0.0
                        LCCPUCtrl LC6             lc   fpga4       1.03        0.00      0.0
                        ROMMONB LC6               lc   rommon      3.03        0.00      0.0
---------------------------------------------------------------------------------------------
A9K-36x10GE_SC7-TR      Can Bus Ctrl (CBC) LC6    lc   cbc        15.104       0.00      0.0
                        DBCtrl LC6                lc   fpga2       1.01        0.00      0.0
                        LinkCtrl LC6              lc   fpga3       1.00        0.00      0.0
                        LCCPUCtrl LC6             lc   fpga4       1.03        0.00      0.0
                        ROMMONB LC6               lc   rommon      3.03        0.00      0.0
---------------------------------------------------------------------------------------------
A9K-1x100GE-SE          Can Bus Ctrl (CBC) LC4    lc   cbc        21.111       0.00      0.1
                        DB IO FPGA1               lc   cpld1       1.03        0.00      0.0
                        MB CPUCtrl                lc   fpga2       1.08        0.00      0.0
                        PortCtrl                  lc   fpga3       1.05        0.00      0.0
                        Imux                      lc   fpga4       1.04        0.00      0.0
                        Emux                      lc   fpga5       1.04        0.00      0.0
                        100GIGMAC                 lc   fpga6      41.00        0.00      0.0
                        ROMMONB LC4               lc   rommon      3.03        0.00      0.0
---------------------------------------------------------------------------------------------
A9K-1x100GE-TR          Can Bus Ctrl (CBC) LC4    lc   cbc        21.111       0.00      0.1
                        DB IO FPGA1               lc   cpld1       1.03        0.00      0.0
                        MB CPUCtrl                lc   fpga2       1.08        0.00      0.0
                        PortCtrl                  lc   fpga3       1.05        0.00      0.0
                        Imux                      lc   fpga4       1.04        0.00      0.0
                        Emux                      lc   fpga5       1.04        0.00      0.0
                        100GIGMAC                 lc   fpga6      41.00        0.00      0.0
                        ROMMONB LC4               lc   rommon      3.03        0.00      0.0
---------------------------------------------------------------------------------------------
A9K-VSM-500             CPUCtrl Forge             lc   cbc        33.05        0.00      0.1
                        CPUCtrl Forge             lc   fpga1       1.26        0.00      0.1
                        CPUCtrl Forge             lc   ibmc        5.08        0.00      0.1
                        CPUCtrl Forge             lc   rommon      3.07        0.00      0.1
---------------------------------------------------------------------------------------------
A99-8X100GE-SE          Can Bus Ctrl (CBC) LC4    lc   cbc        38.23        0.00      0.0
                        MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                        DBCtrl                    lc   fpga3       1.07        0.00      0.0
                        PortCtrl                  lc   fpga4       1.09        0.00      0.0
                        CPAK LR4                  lc   fpga5       1.16        0.00      0.0
                        CPAK SR10                 lc   fpga6       2.02        0.00      0.0
                        Fsbl                      lc   fsbl        1.100       0.00      0.0
                        LinuxFW                   lc   lnxfw       1.100       0.00      0.0
                        ROMMONB LC1               lc   rommon      8.43        0.00      0.0
---------------------------------------------------------------------------------------------
A99-8X100GE-TR          Can Bus Ctrl (CBC) LC4    lc   cbc        38.23        0.00      0.0
                        MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                        DBCtrl                    lc   fpga3       1.07        0.00      0.0
                        PortCtrl                  lc   fpga4       1.09        0.00      0.0
                        CPAK LR4                  lc   fpga5       1.16        0.00      0.0
                        CPAK SR10                 lc   fpga6       2.02        0.00      0.0
                        Fsbl                      lc   fsbl        1.100       0.00      0.0
                        LinuxFW                   lc   lnxfw       1.100       0.00      0.0
                        ROMMONB LC1               lc   rommon      8.43        0.00      0.0
---------------------------------------------------------------------------------------------
A99-4X100GE-SE          Can Bus Ctrl (CBC) LC4    lc   cbc        38.23        0.00      0.0
                        MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                        DBCtrl                    lc   fpga3       1.07        0.00      0.0
                        PortCtrl                  lc   fpga4       1.09        0.00      0.0
```

```
                        CPAK LR4                  lc   fpga5       1.16        0.00      0.0
                        CPAK SR10                 lc   fpga6       2.02        0.00      0.0
                        Fsbl                      lc   fsbl        1.100       0.00      0.0
                        LinuxFW                   lc   lnxfw       1.100       0.00      0.0
                        ROMMONB LC1               lc   rommon      8.43        0.00      0.0
--------------------------------------------------------------------------------------------
A99-4X100GE-SE-TAA      Can Bus Ctrl (CBC) LC4    lc   cbc        38.23        0.00      0.0
                        MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                        DBCtrl                    lc   fpga3       1.07        0.00      0.0
                        PortCtrl                  lc   fpga4       1.09        0.00      0.0
                        CPAK LR4                  lc   fpga5       1.16        0.00      0.0
                        CPAK SR10                 lc   fpga6       2.02        0.00      0.0
                        Fsbl                      lc   fsbl        1.100       0.00      0.0
                        LinuxFW                   lc   lnxfw       1.100       0.00      0.0
                        ROMMONB LC1               lc   rommon      8.43        0.00      0.0
--------------------------------------------------------------------------------------------
A99-4X100GE-TR          Can Bus Ctrl (CBC) LC4    lc   cbc        38.23        0.00      0.0
                        MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                        DBCtrl                    lc   fpga3       1.07        0.00      0.0
                        PortCtrl                  lc   fpga4       1.09        0.00      0.0
                        CPAK LR4                  lc   fpga5       1.16        0.00      0.0
                        CPAK SR10                 lc   fpga6       2.02        0.00      0.0
                        Fsbl                      lc   fsbl        1.100       0.00      0.0
                        LinuxFW                   lc   lnxfw       1.100       0.00      0.0
                        ROMMONB LC1               lc   rommon      8.43        0.00      0.0
--------------------------------------------------------------------------------------------
A99-4X100GE-TR-TAA      Can Bus Ctrl (CBC) LC4    lc   cbc        38.23        0.00      0.0
                        MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                        DBCtrl                    lc   fpga3       1.07        0.00      0.0
                        PortCtrl                  lc   fpga4       1.09        0.00      0.0
                        CPAK LR4                  lc   fpga5       1.16        0.00      0.0
                        CPAK SR10                 lc   fpga6       2.02        0.00      0.0
                        Fsbl                      lc   fsbl        1.100       0.00      0.0
                        LinuxFW                   lc   lnxfw       1.100       0.00      0.0
                        ROMMONB LC1               lc   rommon      8.43        0.00      0.0
--------------------------------------------------------------------------------------------
A99-4X100GE-TAA         Can Bus Ctrl (CBC) LC4    lc   cbc        38.23        0.00      0.0
                        MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                        DBCtrl                    lc   fpga3       1.07        0.00      0.0
                        PortCtrl                  lc   fpga4       1.09        0.00      0.0
                        CPAK LR4                  lc   fpga5       1.16        0.00      0.0
                        CPAK SR10                 lc   fpga6       2.02        0.00      0.0
                        Fsbl                      lc   fsbl        1.100       0.00      0.0
                        LinuxFW                   lc   lnxfw       1.100       0.00      0.0
                        ROMMONB LC1               lc   rommon      8.43        0.00      0.0
--------------------------------------------------------------------------------------------
A9K-4X100GE-SE          Can Bus Ctrl (CBC) LC4    lc   cbc        38.23        0.00      0.0
                        MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                        DBCtrl                    lc   fpga3       1.07        0.00      0.0
                        PortCtrl                  lc   fpga4       1.09        0.00      0.0
                        CPAK LR4                  lc   fpga5       1.16        0.00      0.0
                        CPAK SR10                 lc   fpga6       2.02        0.00      0.0
                        Fsbl                      lc   fsbl        1.100       0.00      0.0
                        LinuxFW                   lc   lnxfw       1.100       0.00      0.0
                        ROMMONB LC1               lc   rommon      8.43        0.00      0.0
--------------------------------------------------------------------------------------------
A9K-4X100GE-SE-TAA      Can Bus Ctrl (CBC) LC4    lc   cbc        38.23        0.00      0.0
                        MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                        DBCtrl                    lc   fpga3       1.07        0.00      0.0
                        PortCtrl                  lc   fpga4       1.09        0.00      0.0
                        CPAK LR4                  lc   fpga5       1.16        0.00      0.0
                        CPAK SR10                 lc   fpga6       2.02        0.00      0.0
                        Fsbl                      lc   fsbl        1.100       0.00      0.0
                        LinuxFW                   lc   lnxfw       1.100       0.00      0.0
```

```
                         ROMMONB LC1               lc   rommon      8.43        0.00      0.0
-------------------------------------------------------------------------------------------------
A9K-4X100GE-TR           Can Bus Ctrl (CBC) LC4    lc   cbc        38.23        0.00      0.0
                         MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                         DBCtrl                    lc   fpga3       1.07        0.00      0.0
                         PortCtrl                  lc   fpga4       1.09        0.00      0.0
                         CPAK LR4                  lc   fpga5       1.16        0.00      0.0
                         CPAK SR10                 lc   fpga6       2.02        0.00      0.0
                         Fsbl                      lc   fsbl        1.100       0.00      0.0
                         LinuxFW                   lc   lnxfw       1.100       0.00      0.0
                         ROMMONB LC1               lc   rommon      8.43        0.00      0.0
-------------------------------------------------------------------------------------------------
A9K-4X100GE-TR-TAA       Can Bus Ctrl (CBC) LC4    lc   cbc        38.23        0.00      0.0
                         MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                         DBCtrl                    lc   fpga3       1.07        0.00      0.0
                         PortCtrl                  lc   fpga4       1.09        0.00      0.0
                         CPAK LR4                  lc   fpga5       1.16        0.00      0.0
                         CPAK SR10                 lc   fpga6       2.02        0.00      0.0
                         Fsbl                      lc   fsbl        1.100       0.00      0.0
                         LinuxFW                   lc   lnxfw       1.100       0.00      0.0
                         ROMMONB LC1               lc   rommon      8.43        0.00      0.0
-------------------------------------------------------------------------------------------------
A9K-4X100GE-TAA          Can Bus Ctrl (CBC) LC4    lc   cbc        38.23        0.00      0.0
                         MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                         DBCtrl                    lc   fpga3       1.07        0.00      0.0
                         PortCtrl                  lc   fpga4       1.09        0.00      0.0
                         CPAK LR4                  lc   fpga5       1.16        0.00      0.0
                         CPAK SR10                 lc   fpga6       2.02        0.00      0.0
                         Fsbl                      lc   fsbl        1.100       0.00      0.0
                         LinuxFW                   lc   lnxfw       1.100       0.00      0.0
                         ROMMONB LC1               lc   rommon      8.43        0.00      0.0
-------------------------------------------------------------------------------------------------
A99K-MOD200-SE           Can Bus Ctrl (CBC) LC4    lc   cbc        39.07        0.00      0.0
                         DBCtrl                    lc   fpga10      1.19        0.00      0.0
                         MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                         Fsbl                      lc   fsbl        1.100       0.00      0.0
                         LinuxFW                   lc   lnxfw       1.100       0.00      0.0
                         ROMMONB LC1               lc   rommon      8.43        0.00      0.0
-------------------------------------------------------------------------------------------------
A99K-200MOD-SE-TAA       Can Bus Ctrl (CBC) LC4    lc   cbc        39.07        0.00      0.0
                         DBCtrl                    lc   fpga10      1.19        0.00      0.0
                         MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                         Fsbl                      lc   fsbl        1.100       0.00      0.0
                         LinuxFW                   lc   lnxfw       1.100       0.00      0.0
                         ROMMONB LC1               lc   rommon      8.43        0.00      0.0
-------------------------------------------------------------------------------------------------
A99K-MOD200-TR           Can Bus Ctrl (CBC) LC4    lc   cbc        39.07        0.00      0.0
                         DBCtrl                    lc   fpga10      1.19        0.00      0.0
                         MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                         Fsbl                      lc   fsbl        1.100       0.00      0.0
                         LinuxFW                   lc   lnxfw       1.100       0.00      0.0
                         ROMMONB LC1               lc   rommon      8.43        0.00      0.0
-------------------------------------------------------------------------------------------------
A99K-MOD200-TR-TAA       Can Bus Ctrl (CBC) LC4    lc   cbc        39.07        0.00      0.0
                         DBCtrl                    lc   fpga10      1.19        0.00      0.0
                         MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                         Fsbl                      lc   fsbl        1.100       0.00      0.0
                         LinuxFW                   lc   lnxfw       1.100       0.00      0.0
                         ROMMONB LC1               lc   rommon      8.43        0.00      0.0
-------------------------------------------------------------------------------------------------
A9K-MOD200-SE            Can Bus Ctrl (CBC) LC4    lc   cbc        39.07        0.00      0.0
                         DBCtrl                    lc   fpga10      1.19        0.00      0.0
                         MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                         Fsbl                      lc   fsbl        1.100       0.00      0.0
```

```
                        LinuxFW                   lc   lnxfw       1.100       0.00      0.0
                        ROMMONB LC1               lc   rommon      8.43        0.00      0.0
--------------------------------------------------------------------------------------------
A9K-MOD200-SE-TAA       Can Bus Ctrl (CBC) LC4    lc   cbc        39.07        0.00      0.0
                        DBCtrl                    lc   fpga10      1.19        0.00      0.0
                        MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                        Fsbl                      lc   fsbl        1.100       0.00      0.0
                        LinuxFW                   lc   lnxfw       1.100       0.00      0.0
                        ROMMONB LC1               lc   rommon      8.43        0.00      0.0
--------------------------------------------------------------------------------------------
A9K-MOD200-TR           Can Bus Ctrl (CBC) LC4    lc   cbc        39.07        0.00      0.0
                        DBCtrl                    lc   fpga10      1.19        0.00      0.0
                        MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                        Fsbl                      lc   fsbl        1.100       0.00      0.0
                        LinuxFW                   lc   lnxfw       1.100       0.00      0.0
                        ROMMONB LC1               lc   rommon      8.43        0.00      0.0
--------------------------------------------------------------------------------------------
A9K-MOD200-TR-TAA       Can Bus Ctrl (CBC) LC4    lc   cbc        39.07        0.00      0.0
                        DBCtrl                    lc   fpga10      1.19        0.00      0.0
                        MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                        Fsbl                      lc   fsbl        1.100       0.00      0.0
                        LinuxFW                   lc   lnxfw       1.100       0.00      0.0
                        ROMMONB LC1               lc   rommon      8.43        0.00      0.0
--------------------------------------------------------------------------------------------
A9K-MOD200-TAA          Can Bus Ctrl (CBC) LC4    lc   cbc        39.07        0.00      0.0
                        DBCtrl                    lc   fpga10      1.19        0.00      0.0
                        MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                        Fsbl                      lc   fsbl        1.100       0.00      0.0
                        LinuxFW                   lc   lnxfw       1.100       0.00      0.0
                        ROMMONB LC1               lc   rommon      8.43        0.00      0.0
--------------------------------------------------------------------------------------------
A99K-MOD400-SE          Can Bus Ctrl (CBC) LC4    lc   cbc        39.07        0.00      0.0
                        DBCtrl                    lc   fpga10      1.19        0.00      0.0
                        MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                        Fsbl                      lc   fsbl        1.100       0.00      0.0
                        LinuxFW                   lc   lnxfw       1.100       0.00      0.0
                        ROMMONB LC1               lc   rommon      8.43        0.00      0.0
--------------------------------------------------------------------------------------------
A99K-MOD400-SE-TAA      Can Bus Ctrl (CBC) LC4    lc   cbc        39.07        0.00      0.0
                        DBCtrl                    lc   fpga10      1.19        0.00      0.0
                        MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                        Fsbl                      lc   fsbl        1.100       0.00      0.0
                        LinuxFW                   lc   lnxfw       1.100       0.00      0.0
                        ROMMONB LC1               lc   rommon      8.43        0.00      0.0
--------------------------------------------------------------------------------------------
A99K-MOD400-TR          Can Bus Ctrl (CBC) LC4    lc   cbc        39.07        0.00      0.0
                        DBCtrl                    lc   fpga10      1.19        0.00      0.0
                        MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                        Fsbl                      lc   fsbl        1.100       0.00      0.0
                        LinuxFW                   lc   lnxfw       1.100       0.00      0.0
                        ROMMONB LC1               lc   rommon      8.43        0.00      0.0
--------------------------------------------------------------------------------------------
A99K-MOD400-TR-TAA      Can Bus Ctrl (CBC) LC4    lc   cbc        39.07        0.00      0.0
                        DBCtrl                    lc   fpga10      1.19        0.00      0.0
                        MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                        Fsbl                      lc   fsbl        1.100       0.00      0.0
                        LinuxFW                   lc   lnxfw       1.100       0.00      0.0
                        ROMMONB LC1               lc   rommon      8.43        0.00      0.0
--------------------------------------------------------------------------------------------
A9K-MOD400-SE           Can Bus Ctrl (CBC) LC4    lc   cbc        39.07        0.00      0.0
                        DBCtrl                    lc   fpga10      1.19        0.00      0.0
                        MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                        Fsbl                      lc   fsbl        1.100       0.00      0.0
                        LinuxFW                   lc   lnxfw       1.100       0.00      0.0
```

```
                         ROMMONB LC1               lc   rommon      8.43        0.00      0.0
-------------------------------------------------------------------------------------------------
A9K-MOD400-SE-TAA        Can Bus Ctrl (CBC) LC4    lc   cbc        39.07        0.00      0.0
                         DBCtrl                    lc   fpga10      1.19        0.00      0.0
                         MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                         Fsbl                      lc   fsbl        1.100       0.00      0.0
                         LinuxFW                   lc   lnxfw       1.100       0.00      0.0
                         ROMMONB LC1               lc   rommon      8.43        0.00      0.0
-------------------------------------------------------------------------------------------------
A9K-MOD400-TR            Can Bus Ctrl (CBC) LC4    lc   cbc        39.07        0.00      0.0
                         DBCtrl                    lc   fpga10      1.19        0.00      0.0
                         MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                         Fsbl                      lc   fsbl        1.100       0.00      0.0
                         LinuxFW                   lc   lnxfw       1.100       0.00      0.0
                         ROMMONB LC1               lc   rommon      8.43        0.00      0.0
-------------------------------------------------------------------------------------------------
A9K-MOD400-TR-TAA        Can Bus Ctrl (CBC) LC4    lc   cbc        39.07        0.00      0.0
                         DBCtrl                    lc   fpga10      1.19        0.00      0.0
                         MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                         Fsbl                      lc   fsbl        1.100       0.00      0.0
                         LinuxFW                   lc   lnxfw       1.100       0.00      0.0
                         ROMMONB LC1               lc   rommon      8.43        0.00      0.0
-------------------------------------------------------------------------------------------------
A9K-MOD400-TAA           Can Bus Ctrl (CBC) LC4    lc   cbc        39.07        0.00      0.0
                         DBCtrl                    lc   fpga10      1.19        0.00      0.0
                         MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                         Fsbl                      lc   fsbl        1.100       0.00      0.0
                         LinuxFW                   lc   lnxfw       1.100       0.00      0.0
                         ROMMONB LC1               lc   rommon      8.43        0.00      0.0
-------------------------------------------------------------------------------------------------
A9K-8X100GE-L-SE         Can Bus Ctrl (CBC) LC4    lc   cbc        38.23        0.00      0.0
                         MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                         DBCtrl                    lc   fpga3       1.07        0.00      0.0
                         PortCtrl                  lc   fpga4       1.09        0.00      0.0
                         CPAK LR4                  lc   fpga5       1.16        0.00      0.0
                         CPAK SR10                 lc   fpga6       2.02        0.00      0.0
                         Fsbl                      lc   fsbl        1.100       0.00      0.0
                         LinuxFW                   lc   lnxfw       1.100       0.00      0.0
                         ROMMONB LC1               lc   rommon      8.43        0.00      0.0
-------------------------------------------------------------------------------------------------
A9K-8X100GE-L-TR         Can Bus Ctrl (CBC) LC4    lc   cbc        38.23        0.00      0.0
                         MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                         DBCtrl                    lc   fpga3       1.07        0.00      0.0
                         PortCtrl                  lc   fpga4       1.09        0.00      0.0
                         CPAK LR4                  lc   fpga5       1.16        0.00      0.0
                         CPAK SR10                 lc   fpga6       2.02        0.00      0.0
                         Fsbl                      lc   fsbl        1.100       0.00      0.0
                         LinuxFW                   lc   lnxfw       1.100       0.00      0.0
                         ROMMONB LC1               lc   rommon      8.43        0.00      0.0
-------------------------------------------------------------------------------------------------
A9K-8X100GE-SE           Can Bus Ctrl (CBC) LC4    lc   cbc        38.23        0.00      0.0
                         MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                         DBCtrl                    lc   fpga3       1.07        0.00      0.0
                         PortCtrl                  lc   fpga4       1.09        0.00      0.0
                         CPAK LR4                  lc   fpga5       1.16        0.00      0.0
                         CPAK SR10                 lc   fpga6       2.02        0.00      0.0
                         Fsbl                      lc   fsbl        1.100       0.00      0.0
                         LinuxFW                   lc   lnxfw       1.100       0.00      0.0
                         ROMMONB LC1               lc   rommon      8.43        0.00      0.0
-------------------------------------------------------------------------------------------------
A9K-8X100GE-TR           Can Bus Ctrl (CBC) LC4    lc   cbc        38.23        0.00      0.0
                         MB CPUCtrl                lc   fpga2       1.93        0.00      0.0
                         DBCtrl                    lc   fpga3       1.07        0.00      0.0
                         PortCtrl                  lc   fpga4       1.09        0.00      0.0
```

	CPAK LR4	lc	fpga5	1.16	0.00	0.0
	CPAK SR10	lc	fpga6	2.02	0.00	0.0
	Fsbl	lc	fsbl	1.100	0.00	0.0
	LinuxFW	lc	lnxfw	1.100	0.00	0.0
	ROMMONB LC1	lc	rommon	8.43	0.00	0.0
A99L-4X100GE-SE	Can Bus Ctrl (CBC) LC4	lc	cbc	38.23	0.00	0.0
	MB CPUCtrl	lc	fpga2	1.93	0.00	0.0
	DBCtrl	lc	fpga3	1.07	0.00	0.0
	PortCtrl	lc	fpga4	1.09	0.00	0.0
	CPAK LR4	lc	fpga5	1.16	0.00	0.0
	CPAK SR10	lc	fpga6	2.02	0.00	0.0
	Fsbl	lc	fsbl	1.100	0.00	0.0
	LinuxFW	lc	lnxfw	1.100	0.00	0.0
	ROMMONB LC1	lc	rommon	8.43	0.00	0.0
A99L-4X100GE-TR	Can Bus Ctrl (CBC) LC4	lc	cbc	38.23	0.00	0.0
	MB CPUCtrl	lc	fpga2	1.93	0.00	0.0
	DBCtrl	lc	fpga3	1.07	0.00	0.0
	PortCtrl	lc	fpga4	1.09	0.00	0.0
	CPAK LR4	lc	fpga5	1.16	0.00	0.0
	CPAK SR10	lc	fpga6	2.02	0.00	0.0
	Fsbl	lc	fsbl	1.100	0.00	0.0
	LinuxFW	lc	lnxfw	1.100	0.00	0.0
	ROMMONB LC1	lc	rommon	8.43	0.00	0.0
A9KL-4X100GE-SE	Can Bus Ctrl (CBC) LC4	lc	cbc	38.23	0.00	0.0
	MB CPUCtrl	lc	fpga2	1.93	0.00	0.0
	DBCtrl	lc	fpga3	1.07	0.00	0.0
	PortCtrl	lc	fpga4	1.09	0.00	0.0
	CPAK LR4	lc	fpga5	1.16	0.00	0.0
	CPAK SR10	lc	fpga6	2.02	0.00	0.0
	Fsbl	lc	fsbl	1.100	0.00	0.0
	LinuxFW	lc	lnxfw	1.100	0.00	0.0
	ROMMONB LC1	lc	rommon	8.43	0.00	0.0
A9KL-4X100GE-TR	Can Bus Ctrl (CBC) LC4	lc	cbc	38.23	0.00	0.0
	MB CPUCtrl	lc	fpga2	1.93	0.00	0.0
	DBCtrl	lc	fpga3	1.07	0.00	0.0
	PortCtrl	lc	fpga4	1.09	0.00	0.0
	CPAK LR4	lc	fpga5	1.16	0.00	0.0
	CPAK SR10	lc	fpga6	2.02	0.00	0.0
	Fsbl	lc	fsbl	1.100	0.00	0.0
	LinuxFW	lc	lnxfw	1.100	0.00	0.0
	ROMMONB LC1	lc	rommon	8.43	0.00	0.0
A9K-400G-DWDM-TR	Can Bus Ctrl (CBC) LC4	lc	cbc	42.04	0.00	0.0
	MB CPUCtrl	lc	fpga2	1.93	0.00	0.0
	DBCtrl	lc	fpga3	1.06	0.00	0.0
	DBCtrl	lc	fpga4	1.03	0.00	0.0
	DBCtrl	lc	fpga5	1.05	0.00	0.0
	DBCtrl	lc	fpga6	3.72	0.00	1.0
	DBCtrl	lc	fpga7	49.00	0.00	0.0
	CFP2 V2	lc	fpga8	5.23	0.00	2.0
	CFP2 V1	lc	fpga8	4.40	0.00	1.0
	Fsbl	lc	fsbl	1.100	0.00	0.0
	LinuxFW	lc	lnxfw	1.100	0.00	0.0
	ROMMONB LC1	lc	rommon	8.43	0.00	0.0
A9K-4X100GE	Can Bus Ctrl (CBC) LC4	lc	cbc	46.06	0.00	0.0
	MB CPUCtrl	lc	fpga2	1.85	0.00	0.0
	DBCtrl	lc	fpga3	1.02	0.00	0.0
	PortCtrl	lc	fpga4	1.02	0.00	0.0
	Fsbl	lc	fsbl	1.100	0.00	0.0

	LinuxFW	lc	lnxfw	1.100	0.00	0.0
	ROMMONB LC1	lc	rommon	9.23	0.00	0.0
A99-12X100GE	Can Bus Ctrl (CBC) LC4	lc	cbc	46.06	0.00	0.0
	MB CPUCtrl	lc	fpga2	1.85	0.00	0.0
	DBCtrl	lc	fpga3	1.02	0.00	0.0
	PortCtrl	lc	fpga4	1.02	0.00	0.0
	Fsbl	lc	fsbl	1.100	0.00	0.0
	LinuxFW	lc	lnxfw	1.100	0.00	0.0
	ROMMONB LC1	lc	rommon	9.23	0.00	0.0
A99-8X100GE-CM	Can Bus Ctrl (CBC) LC4	lc	cbc	38.23	0.00	0.0
	MB CPUCtrl	lc	fpga2	1.93	0.00	0.0
	DBCtrl	lc	fpga3	1.07	0.00	0.0
	PortCtrl	lc	fpga4	1.09	0.00	0.0
	CPAK LR4	lc	fpga5	1.16	0.00	0.0
	CPAK SR10	lc	fpga6	2.02	0.00	0.0
	Fsbl	lc	fsbl	1.100	0.00	0.0
	LinuxFW	lc	lnxfw	1.100	0.00	0.0
	ROMMONB LC1	lc	rommon	8.43	0.00	0.0
A9K-8X100GE-CM	Can Bus Ctrl (CBC) LC4	lc	cbc	38.23	0.00	0.0
	MB CPUCtrl	lc	fpga2	1.93	0.00	0.0
	DBCtrl	lc	fpga3	1.07	0.00	0.0
	PortCtrl	lc	fpga4	1.09	0.00	0.0
	CPAK LR4	lc	fpga5	1.16	0.00	0.0
	CPAK SR10	lc	fpga6	2.02	0.00	0.0
	Fsbl	lc	fsbl	1.100	0.00	0.0
	LinuxFW	lc	lnxfw	1.100	0.00	0.0
	ROMMONB LC1	lc	rommon	8.43	0.00	0.0
A99-12X100GE-CM	Can Bus Ctrl (CBC) LC4	lc	cbc	46.06	0.00	0.0
	MB CPUCtrl	lc	fpga2	1.85	0.00	0.0
	DBCtrl	lc	fpga3	1.02	0.00	0.0
	PortCtrl	lc	fpga4	1.02	0.00	0.0
	Fsbl	lc	fsbl	1.100	0.00	0.0
	LinuxFW	lc	lnxfw	1.100	0.00	0.0
	ROMMONB LC1	lc	rommon	9.23	0.00	0.0
A99-48X10GE-1G-SE	Can Bus Ctrl (CBC) LC4	lc	cbc	47.03	0.00	0.0
	MB CPUCtrl	lc	fpga2	1.87	0.00	0.0
	PortCtrl	lc	fpga3	1.00	0.00	0.0
	EOBCSwicthCtrl	lc	fpga4	1.09	0.00	0.0
	Fsbl	lc	fsbl	1.104	0.00	0.0
	LinuxFW	lc	lnxfw	1.104	0.00	0.0
	ROMMONB LC1	lc	rommon	18.24	0.00	0.0
A99-48X10GE-1G-TR	Can Bus Ctrl (CBC) LC4	lc	cbc	47.03	0.00	0.0
	MB CPUCtrl	lc	fpga2	1.87	0.00	0.0
	PortCtrl	lc	fpga3	1.00	0.00	0.0
	EOBCSwicthCtrl	lc	fpga4	1.09	0.00	0.0
	Fsbl	lc	fsbl	1.104	0.00	0.0
	LinuxFW	lc	lnxfw	1.104	0.00	0.0
	ROMMONB LC1	lc	rommon	18.24	0.00	0.0
A99-48X10GE-1G-CM	Can Bus Ctrl (CBC) LC4	lc	cbc	47.03	0.00	0.0
	MB CPUCtrl	lc	fpga2	1.87	0.00	0.0
	PortCtrl	lc	fpga3	1.00	0.00	0.0
	fpd_lc_fpga4_0x003d02ca	lc	fpga4	1.09	0.00	0.0
	Fsbl	lc	fsbl	1.104	0.00	0.0
	LinuxFW	lc	lnxfw	1.104	0.00	0.0
	ROMMONB LC1	lc	rommon	18.24	0.00	0.0
A9K-24X10GE-1G-SE	Can Bus Ctrl (CBC) LC4	lc	cbc	47.03	0.00	0.0

```
                        MB CPUCtrl                lc   fpga2       1.87        0.00      0.0
                        PortCtrl                  lc   fpga3       1.00        0.00      0.0
                        EOBCSwicthCtrl            lc   fpga4       1.09        0.00      0.0
                        Fsbl                      lc   fsbl        1.104       0.00      0.0
                        LinuxFW                   lc   lnxfw       1.104       0.00      0.0
                        ROMMONB LC1               lc   rommon     18.24        0.00      0.0
-------------------------------------------------------------------------------------------------
A9K-24X10GE-1G-TR       Can Bus Ctrl (CBC) LC4    lc   cbc        47.03        0.00      0.0
                        MB CPUCtrl                lc   fpga2       1.87        0.00      0.0
                        PortCtrl                  lc   fpga3       1.00        0.00      0.0
                        EOBCSwicthCtrl            lc   fpga4       1.09        0.00      0.0
                        Fsbl                      lc   fsbl        1.104       0.00      0.0
                        LinuxFW                   lc   lnxfw       1.104       0.00      0.0
                        ROMMONB LC1               lc   rommon     18.24        0.00      0.0
-------------------------------------------------------------------------------------------------
A9K-24X10GE-1G-CM       Can Bus Ctrl (CBC) LC4    lc   cbc        47.03        0.00      0.0
                        MB CPUCtrl                lc   fpga2       1.87        0.00      0.0
                        PortCtrl                  lc   fpga3       1.00        0.00      0.0
                        EOBCSwicthCtrl            lc   fpga4       1.09        0.00      0.0
                        Fsbl                      lc   fsbl        1.104       0.00      0.0
                        LinuxFW                   lc   lnxfw       1.104       0.00      0.0
                        ROMMONB LC1               lc   rommon     18.24        0.00      0.0
-------------------------------------------------------------------------------------------------
A9K-48X10GE-1G-SE       Can Bus Ctrl (CBC) LC4    lc   cbc        47.03        0.00      0.0
                        MB CPUCtrl                lc   fpga2       1.87        0.00      0.0
                        PortCtrl                  lc   fpga3       1.00        0.00      0.0
                        EOBCSwicthCtrl            lc   fpga4       1.09        0.00      0.0
                        Fsbl                      lc   fsbl        1.104       0.00      0.0
                        LinuxFW                   lc   lnxfw       1.104       0.00      0.0
                        ROMMONB LC1               lc   rommon     18.24        0.00      0.0
-------------------------------------------------------------------------------------------------
A9K-48X10GE-1G-TR       Can Bus Ctrl (CBC) LC4    lc   cbc        47.03        0.00      0.0
                        MB CPUCtrl                lc   fpga2       1.87        0.00      0.0
                        PortCtrl                  lc   fpga3       1.00        0.00      0.0
                        EOBCSwicthCtrl            lc   fpga4       1.09        0.00      0.0
                        Fsbl                      lc   fsbl        1.104       0.00      0.0
                        LinuxFW                   lc   lnxfw       1.104       0.00      0.0
                        ROMMONB LC1               lc   rommon     18.24        0.00      0.0
-------------------------------------------------------------------------------------------------
A9K-48X10GE-1G-CM       Can Bus Ctrl (CBC) LC4    lc   cbc        47.03        0.00      0.0
                        MB CPUCtrl                lc   fpga2       1.87        0.00      0.0
                        PortCtrl                  lc   fpga3       1.00        0.00      0.0
                        EOBCSwicthCtrl            lc   fpga4       1.09        0.00      0.0
                        Fsbl                      lc   fsbl        1.104       0.00      0.0
                        LinuxFW                   lc   lnxfw       1.104       0.00      0.0
                        ROMMONB LC1               lc   rommon     18.24        0.00      0.0
-------------------------------------------------------------------------------------------------
A99-24X10GE-1G-SE       Can Bus Ctrl (CBC) LC4    lc   cbc        47.03        0.00      0.0
                        MB CPUCtrl                lc   fpga2       1.87        0.00      0.0
                        PortCtrl                  lc   fpga3       1.00        0.00      0.0
                        EOBCSwicthCtrl            lc   fpga4       1.09        0.00      0.0
                        Fsbl                      lc   fsbl        1.104       0.00      0.0
                        LinuxFW                   lc   lnxfw       1.104       0.00      0.0
                        ROMMONB LC1               lc   rommon     18.24        0.00      0.0
-------------------------------------------------------------------------------------------------
A99-24X10GE-1G-TR       Can Bus Ctrl (CBC) LC4    lc   cbc        47.03        0.00      0.0
                        MB CPUCtrl                lc   fpga2       1.87        0.00      0.0
                        PortCtrl                  lc   fpga3       1.00        0.00      0.0
                        EOBCSwicthCtrl            lc   fpga4       1.09        0.00      0.0
                        Fsbl                      lc   fsbl        1.104       0.00      0.0
                        LinuxFW                   lc   lnxfw       1.104       0.00      0.0
                        ROMMONB LC1               lc   rommon     18.24        0.00      0.0
-------------------------------------------------------------------------------------------------
A99-24X10GE-1G-CM       Can Bus Ctrl (CBC) LC4    lc   cbc        47.03        0.00      0.0
```

	MB CPUCtrl	lc	fpga2	1.87	0.00	0.0
	PortCtrl	lc	fpga3	1.00	0.00	0.0
	EOBCSwicthCtrl	lc	fpga4	1.09	0.00	0.0
	Fsbl	lc	fsbl	1.104	0.00	0.0
	LinuxFW	lc	lnxfw	1.104	0.00	0.0
	ROMMONB LC1	lc	rommon	18.24	0.00	0.0
A9K-MOD400-CM	Can Bus Ctrl (CBC) LC4	lc	cbc	39.07	0.00	0.0
	DBCtrl	lc	fpga10	1.19	0.00	0.0
	MB CPUCtrl	lc	fpga2	1.93	0.00	0.0
	Fsbl	lc	fsbl	1.100	0.00	0.0
	LinuxFW	lc	lnxfw	1.100	0.00	0.0
	ROMMONB LC1	lc	rommon	8.43	0.00	0.0
A9K-MOD200-CM	Can Bus Ctrl (CBC) LC4	lc	cbc	39.07	0.00	0.0
	DBCtrl	lc	fpga10	1.17	0.00	0.0
	MB CPUCtrl	lc	fpga2	1.93	0.00	0.0
	Fsbl	lc	fsbl	1.100	0.00	0.0
	LinuxFW	lc	lnxfw	1.100	0.00	0.0
	ROMMONB LC1	lc	rommon	8.43	0.00	0.0
A9K-40GE-SE	Can Bus Ctrl (CBC) LC4	lc	cbc	41.104	0.00	0.1
	PortCtrl	lc	fpga2	0.08	0.00	0.0
	PortCtrl	lc	fpga3	0.08	0.00	0.0
	MB CPUCtrl	lc	fpga4	0.06	0.00	0.0
	ROMMONB LC4	lc	rommon	3.03	0.00	0.1
A9K-4T16GE-SE	Can Bus Ctrl (CBC) LC4	lc	cbc	41.104	0.00	0.1
	PortCtrl	lc	fpga2	0.08	0.00	0.0
	PortCtrl	lc	fpga3	1.00	0.00	0.0
	MB CPUCtrl	lc	fpga4	0.06	0.00	0.0
	ROMMONB LC4	lc	rommon	3.03	0.00	0.1
A9K-40GE-TR	Can Bus Ctrl (CBC) LC4	lc	cbc	41.104	0.00	0.1
	PortCtrl	lc	fpga2	0.08	0.00	0.0
	PortCtrl	lc	fpga3	0.08	0.00	0.0
	MB CPUCtrl	lc	fpga4	0.06	0.00	0.0
	ROMMONB LC4	lc	rommon	3.03	0.00	0.1
A9K-4T16GE-TR	Can Bus Ctrl (CBC) LC4	lc	cbc	41.104	0.00	0.1
	PortCtrl	lc	fpga2	0.08	0.00	0.0
	PortCtrl	lc	fpga3	1.00	0.00	0.0
	MB CPUCtrl	lc	fpga4	0.06	0.00	0.0
	ROMMONB LC4	lc	rommon	3.03	0.00	0.1
ASR9001-LC	Can Bus Ctrl (CBC) IMLC	lc	cbc	23.114	0.00	0.1
	DB CPUCtrl	lc	fpga2	1.18	0.00	0.0
	EP Gambit	lc	fpga3	1.01	0.00	0.0
	MB CPUCtrl	lc	fpga4	2.10	0.00	0.0
	EP Rogue	lc	fpga6	1.06	0.00	0.0
	EP I/O FPGA	lc	fpga7	1.02	0.00	0.0
	ROMMONB IM LC	lc	rommon	3.04	0.00	0.1
ASR9001-LC-S	Can Bus Ctrl (CBC) IMLC	lc	cbc	23.114	0.00	0.1
	DB CPUCtrl	lc	fpga2	1.18	0.00	0.0
	EP Gambit	lc	fpga3	1.01	0.00	0.0
	MB CPUCtrl	lc	fpga4	2.10	0.00	0.0
	EP Rogue	lc	fpga6	1.06	0.00	0.0
	EP I/O FPGA	lc	fpga7	1.02	0.00	0.0
	ROMMONB IM LC	lc	rommon	3.04	0.00	0.1
A9K-ISM-100	Can Bus Ctrl (CBC) LC6	lc	cbc	18.08	0.00	0.1
	CPUCtrl LC6	lc	cpld1	0.01	0.00	0.1
	Maintenance LC6	lc	fpga2	2.13	0.00	0.1

	Amistad LC6	lc	fpga1	0.33	0.00	0.20
	ROMMONB LC6	lc	rommon	1.02	0.00	0.1
PWR-3KW-AC-V2	Delta AC logic PM	pm	fpga11	6.04	0.00	0.1
	Delta AC primary PM	pm	fpga12	6.02	0.00	0.1
	Delta AC secondary PM	pm	fpga13	6.02	0.00	0.1
	Emerson AC logic PM	pm	fpga14	3.18	0.00	0.1
	Emerson AC primary PM	pm	fpga15	3.06	0.00	0.1
	Emerson AC secondary PM	pm	fpga16	3.12	0.00	0.1
PWR-2KW-DC-V2	Delta DC logic PM	pm	fpga11	6.03	0.00	0.1
	Delta DC primary PM	pm	fpga12	6.03	0.00	0.1
	Delta DC secondary PM	pm	fpga13	6.02	0.00	0.1
	Emerson DC logic PM	pm	fpga14	3.19	0.00	0.1
	Emerson DC primary PM	pm	fpga15	3.12	0.00	0.1
	Emerson DC secondary PM	pm	fpga16	3.19	0.00	0.1
PWR-6KW-AC-V3	Delta V3 AC logic PM	pm	fpga11	4.04	0.00	0.1
	Delta V3 AC primary PM	pm	fpga12	4.02	0.00	0.1
	Delta V3 AC secondary PM	pm	fpga13	4.03	0.00	0.1
	Acbel V3 AC logic PM MCU	pm	fpga14	2.05	0.00	0.1
	Acbel V3 AC primary PM	pm	fpga15	1.25	0.00	0.1
	Acbel V3 AC secondary PM	pm	fpga16	2.29	0.00	0.1
PWR-4.4KW-DC-V3	Delta V3 DC logic PM	pm	fpga11	3.00	0.00	0.1
	Delta V3 DC primary PM	pm	fpga12	3.00	0.00	0.1
	Delta V3 DC secondary PM	pm	fpga13	3.00	0.00	0.1
	Acbel V3 DC logic PM MCU	pm	fpga14	1.11	0.00	0.1
	Acbel V3 DC primary PM	pm	fpga15	1.03	0.00	0.1
	Acbel V3 DC secondary PM	pm	fpga16	2.13	0.00	0.1
PWR-3KW-HVDC	Delta HVDC logic PM	pm	fpga11	2.03	0.00	0.1
	Delta HVDC primary PM	pm	fpga12	2.02	0.00	0.1
	Delta HVDC secondary PM	pm	fpga13	2.02	0.00	0.1
SPA-4XT3/E3	SPA E3 Subrate FPGA	spa	fpga2	1.04	0.00	0.0
	SPA T3 Subrate FPGA	spa	fpga3	1.04	0.00	0.0
	SPA I/O FPGA	spa	fpga1	1.01	0.00	0.0
	SPA ROMMON	spa	rommon	2.12	0.00	0.0
SPA-2XT3/E3	SPA E3 Subrate FPGA	spa	fpga2	1.04	0.00	0.0
	SPA T3 Subrate FPGA	spa	fpga3	1.04	0.00	0.0
	SPA I/O FPGA	spa	fpga1	1.01	0.00	0.0
	SPA ROMMON	spa	rommon	2.12	0.00	0.0
SPA-4XCT3/DS0	SPA T3 Subrate FPGA	spa	fpga2	0.11	0.00	0.100
	SPA T3 Subrate FPGA	spa	fpga2	1.04	0.00	0.200
	SPA I/O FPGA	spa	fpga1	2.08	0.00	0.100
	SPA ROMMON	spa	rommon	2.12	0.00	0.100
SPA-OC192POS-XFP	SPA FPGA swv1.101 hwv3	spa	fpga2	1.101	0.00	3.0
	SPA FPGA swv1.2 hwv2	spa	fpga1	1.02	0.00	2.0
SPA-1XCHSTM1/OC3	SPA T3 Subrate FPGA	spa	fpga2	1.04	0.00	0.0
	SPA I/O FPGA	spa	fpga1	1.08	0.00	0.0
	SPA ROMMON	spa	rommon	2.12	0.00	0.0
SPA-1XOC48POS/RPR	SPA FPGA swv1.101 hwv3	spa	fpga2	1.101	0.00	3.0
	SPA FPGA swv1.2	spa	fpga1	1.02	0.00	0.0
SPA-24CHT1-CE-ATM	SPA T3 Subrate FPGA	spa	fpga2	1.10	0.00	1.0
	SPA I/O FPGA	spa	fpga1	2.32	0.00	1.0
	SPA ROMMON	spa	rommon	1.03	0.00	1.0

SPA-2CHT3-CE-ATM	SPA T3 Subrate FPGA	spa	fpga2	1.11	0.00	1.0
	SPA I/O FPGA	spa	fpga1	2.22	0.00	1.0
	SPA ROMMON	spa	rommon	1.04	0.00	1.0
SPA-1CHOC3-CE-ATM	SPA OC3 Subrate FPGA	spa	fpga2	2.23	0.00	0.0
	SPA I/O FPGA	spa	fpga1	2.23	0.00	2.0
	SPA ROMMON	spa	rommon	1.04	0.00	0.0
SPA-1XCHOC48/DS3	SPA I/O FPGA	spa	fpga2	1.00	0.00	0.49
	SPA I/O FPGA	spa	fpga3	1.00	0.00	0.52
	SPA I/O FPGA	spa	fpga1	1.36	0.00	0.49
	SPA ROMMON	spa	rommon	2.02	0.00	0.49
SPA-1XOC3-ATM-V2	SPA FPGA swv2.104 hwv2	spa	fpga2	2.104	0.00	2.8
	SPA FPGA swv1.2	spa	fpga1	2.02	0.00	0.0
SPA-3XOC3-ATM-V2	SPA FPGA swv2.104 hwv2	spa	fpga2	2.104	0.00	2.8
	SPA FPGA swv1.2	spa	fpga1	2.02	0.00	0.0
SPA-1XOC12-ATM-V2	SPA FPGA swv2.104 hwv2	spa	fpga2	2.104	0.00	2.8
	SPA FPGA swv1.2	spa	fpga1	2.02	0.00	0.0
SPA-2XCHOC12/DS0	SPA FPGA2 swv1.00	spa	fpga2	1.00	0.00	0.0
	SPA FPGA swv1.36	spa	fpga1	1.36	0.00	0.49
	SPA ROMMON swv2.2	spa	rommon	2.02	0.00	0.49
A9K-MPA-20X1GE	EP I/O FPGA	spa	fpga3	1.01	0.00	0.0
A9K-MPA-20X10GE	EP I/O FPGA	spa	fpga5	1.16	0.00	0.0
A9K-MPA20X10GE-CM	EP I/O FPGA	spa	fpga5	1.16	0.00	0.0
A9K-MPA-2X10GE	EP I/O FPGA	spa	fpga6	1.06	0.00	0.0
A9K-MPA-4X10GE	EP I/O FPGA	spa	fpga6	1.06	0.00	0.0
A9K-MPA-2X40GE	EP I/O FPGA	spa	fpga7	1.03	0.00	0.0
A9K-MPA-1X40GE	EP I/O FPGA	spa	fpga7	1.03	0.00	0.0
A9K-MPA-8X10GE	EP I/O FPGA	spa	fpga8	1.07	0.00	0.0
A9K-MPA-2X100GE	EP I/O FPGA	spa	fpga9	1.04	0.00	0.0
A9K-MPA-1X100GE	EP I/O FPGA	spa	fpga9	1.04	0.00	0.0
A9K-MPA2X100GE-CM	EP I/O FPGA	spa	fpga9	1.04	0.00	0.0
SPA-8XOC12-POS	SPA FPGA swv1.0	spa	fpga1	1.00	0.00	0.5
SPA-8XCHT1/E1	SPA I/O FPGA	spa	fpga1	2.08	0.00	0.0
	SPA ROMMON	spa	rommon	2.12	0.00	0.140
SPA-2XOC48POS/RPR	SPA FPGA swv1.0	spa	fpga1	1.00	0.00	0.0
SPA-4XOC48POS/RPR	SPA FPGA swv1.0	spa	fpga1	1.00	0.00	0.0
SPA-8XOC3-POS	SPA FPGA swv1.0	spa	fpga1	1.00	0.00	0.5
SPA-2XOC12-POS	SPA FPGA swv1.0	spa	fpga1	1.00	0.00	0.5
SPA-4XOC12-POS	SPA FPGA swv1.0	spa	fpga1	1.00	0.00	0.5
SPA-10X1GE-V2	SPA FPGA swv1.10	spa	fpga1	1.10	0.00	0.0

```
-------------------------------------------------------------------------------------------------
SPA-4XOC3-POS-V2          SPA FPGA swv1.0            spa  fpga1       1.00        0.00      0.5
-------------------------------------------------------------------------------------------------
SPA-2XOC3-ATM-V2          SPA FPGA swv1.2            spa  fpga1       2.02        0.00      0.0
-------------------------------------------------------------------------------------------------
SPA-8XCHT1/E1-V2          SPA I/O FPGA               spa  fpga1       1.02        0.00      1.0
                          SPA ROMMON                 spa  rommon      1.00        0.00      1.0
-------------------------------------------------------------------------------------------------
SPA-1CHSTM1/OC3V2         SPA I/O FPGA               spa  fpga1       1.00        0.00      0.1
                          SPA ROMMON                 spa  rommon      1.00        0.00      0.1
-------------------------------------------------------------------------------------------------
SPA-2XCT3/DS0-V2          SPA I/O FPGA               spa  fpga1       1.01        0.00      1.0
                          SPA ROMMON                 spa  rommon      1.00        0.00      1.0
-------------------------------------------------------------------------------------------------
SPA-4XCT3/DS0-V2          SPA I/O FPGA               spa  fpga1       1.01        0.00      1.0
                          SPA ROMMON                 spa  rommon      1.00        0.00      1.0
-------------------------------------------------------------------------------------------------
SPA-2XT3/E3-V2            SPA FPGA swv1.1 hwv3       spa  fpga1       1.01        0.00      1.0
                          SPA ROMMON                 spa  rommon      1.00        0.00      1.0
-------------------------------------------------------------------------------------------------
SPA-4XT3/E3-V2            SPA FPGA swv1.1 hwv3       spa  fpga1       1.01        0.00      1.0
                          SPA ROMMON                 spa  rommon      1.00        0.00      1.0
-------------------------------------------------------------------------------------------------
```

Firmware Support on Cisco IOS XR 64 bit

To check the firmware code running on the Cisco ASR 9000 Series Router, run the **show fpd package** command in admin mode:

```
RP/0/RSP0/CPU0:router(admin)#show fpd package
```

```
================================ ================================================
                                          Field Programmable Device Package
                                 ================================================
                                           Req      SW       Min Req    Min Req
Card Type            FPD Description       Reload   Ver      SW Ver     Board Ver
================== ======================== ====== ======= ========= ==========
------------------------------------------------------------------------------
A99-12X100GE         CBC(A)                 NO     46.06    46.06     0.1
                     IPU-FPGA(A)            YES     1.85     1.85     0.1
                     IPU-FSBL(A)            YES     1.100    1.100    0.1
                     IPU-Linux(A)           YES     1.100    1.100    0.1
                     Morra-0(A)             YES     1.02     1.02     0.1
                     Morra-1(A)             YES     1.02     1.02     0.1
                     Primary-BIOS(A)        YES     9.23     9.23     0.1
                     Sideswipe-0(A)         YES     1.02     1.02     0.1
                     Sideswipe-1(A)         YES     1.02     1.02     0.1
------------------------------------------------------------------------------
A99-12X100GE-CM      CBC(A)                 NO     46.06    46.06     0.1
                     IPU-FPGA(A)            YES     1.85     1.85     0.1
                     IPU-FSBL(A)            YES     1.100    1.100    0.1
                     IPU-Linux(A)           YES     1.100    1.100    0.1
                     Morra-0(A)             YES     1.02     1.02     0.1
                     Morra-1(A)             YES     1.02     1.02     0.1
                     Primary-BIOS(A)        YES     9.23     9.23     0.1
                     Sideswipe-0(A)         YES     1.02     1.02     0.1
                     Sideswipe-1(A)         YES     1.02     1.02     0.1
------------------------------------------------------------------------------
A99-30X100GE-TR      Aldrin-FPGA(A)         YES     0.01     0.01     0.0
                     CBC(A)                 NO     48.01    48.01     0.0
```

	Grapple-0(A)	YES	0.03	0.03	0.0
	Grapple-1(A)	YES	0.03	0.03	0.0
	IPU-FPGA(A)	YES	1.100	1.100	0.0
	IPU-FSBL(A)	YES	1.100	1.100	0.0
	IPU-Linux(A)	YES	1.100	1.100	0.0
	Mixmaster-0(A)	YES	0.03	0.03	0.0
	Mixmaster-1(A)	YES	0.03	0.03	0.0
	Primary-BIOS(A)	YES	21.03	21.03	0.0
	Scamper(A)	YES	0.01	0.01	0.0
	Skylynx-0(A)	YES	0.03	0.03	0.0
	Skylynx-1(A)	YES	0.03	0.03	0.0
A99-4X100GE-SE	CBC(A)	NO	38.23	38.23	0.0
	Dalla(A)	YES	1.09	1.09	0.0
	IPU-FPGA(A)	YES	1.93	1.93	0.0
	IPU-FSBL(A)	YES	1.100	1.100	0.0
	IPU-Linux(A)	YES	1.100	1.100	0.0
	Meldun-0(A)	YES	1.07	1.07	0.0
	Meldun-1(A)	YES	1.07	1.07	0.0
	Primary-BIOS(A)	YES	8.43	8.43	0.0
	CBC(A)	NO	38.23	38.23	0.0
	Dalla(A)	YES	1.09	1.09	0.0
	IPU-FPGA(A)	YES	1.93	1.93	0.0
	IPU-FSBL(A)	YES	1.100	1.100	0.0
	IPU-Linux(A)	YES	1.100	1.100	0.0
	Meldun-0(A)	YES	1.07	1.07	0.0
	Meldun-1(A)	YES	1.07	1.07	0.0
	Primary-BIOS(A)	YES	8.43	8.43	0.0
A99-4X100GE-SE-TAA	CBC(A)	NO	38.23	38.23	0.0
	Dalla(A)	YES	1.09	1.09	0.0
	IPU-FPGA(A)	YES	1.93	1.93	0.0
	IPU-FSBL(A)	YES	1.100	1.100	0.0
	IPU-Linux(A)	YES	1.100	1.100	0.0
	Meldun-0(A)	YES	1.07	1.07	0.0
	Meldun-1(A)	YES	1.07	1.07	0.0
	Primary-BIOS(A)	YES	8.43	8.43	0.0
A99-4X100GE-TAA	CBC(A)	NO	38.23	38.23	0.0
	Dalla(A)	YES	1.09	1.09	0.0
	IPU-FPGA(A)	YES	1.93	1.93	0.0
	IPU-FSBL(A)	YES	1.100	1.100	0.0
	IPU-Linux(A)	YES	1.100	1.100	0.0
	Meldun-0(A)	YES	1.07	1.07	0.0
	Meldun-1(A)	YES	1.07	1.07	0.0
	Primary-BIOS(A)	YES	8.43	8.43	0.0
A99-4X100GE-TR	CBC(A)	NO	38.23	38.23	0.0
	Dalla(A)	YES	1.09	1.09	0.0
	IPU-FPGA(A)	YES	1.93	1.93	0.0
	IPU-FSBL(A)	YES	1.100	1.100	0.0
	IPU-Linux(A)	YES	1.100	1.100	0.0
	Meldun-0(A)	YES	1.07	1.07	0.0
	Meldun-1(A)	YES	1.07	1.07	0.0
	Primary-BIOS(A)	YES	8.43	8.43	0.0
	CBC(A)	NO	38.23	38.23	0.0
	Dalla(A)	YES	1.09	1.09	0.0
	IPU-FPGA(A)	YES	1.93	1.93	0.0
	IPU-FSBL(A)	YES	1.100	1.100	0.0
	IPU-Linux(A)	YES	1.100	1.100	0.0
	Meldun-0(A)	YES	1.07	1.07	0.0
	Meldun-1(A)	YES	1.07	1.07	0.0
	Primary-BIOS(A)	YES	8.43	8.43	0.0

A99-4X100GE-TR-TAA	CBC(A)	NO	38.23	38.23	0.0
	Dalla(A)	YES	1.09	1.09	0.0
	IPU-FPGA(A)	YES	1.93	1.93	0.0
	IPU-FSBL(A)	YES	1.100	1.100	0.0
	IPU-Linux(A)	YES	1.100	1.100	0.0
	Meldun-0(A)	YES	1.07	1.07	0.0
	Meldun-1(A)	YES	1.07	1.07	0.0
	Primary-BIOS(A)	YES	8.43	8.43	0.0
A99-8X100GE-CM	CBC(A)	NO	38.23	38.23	0.0
	Dalla(A)	YES	1.09	1.09	0.0
	IPU-FPGA(A)	YES	1.93	1.93	0.0
	IPU-FSBL(A)	YES	1.100	1.100	0.0
	IPU-Linux(A)	YES	1.100	1.100	0.0
	Meldun-0(A)	YES	1.07	1.07	0.0
	Meldun-1(A)	YES	1.07	1.07	0.0
	Primary-BIOS(A)	YES	8.43	8.43	0.0
A99-8X100GE-SE	CBC(A)	NO	38.23	38.23	0.0
	Dalla(A)	YES	1.09	1.09	0.0
	IPU-FPGA(A)	YES	1.93	1.93	0.0
	IPU-FSBL(A)	YES	1.100	1.100	0.0
	IPU-Linux(A)	YES	1.100	1.100	0.0
	Meldun-0(A)	YES	1.07	1.07	0.0
	Meldun-1(A)	YES	1.07	1.07	0.0
	Primary-BIOS(A)	YES	8.43	8.43	0.0
	CBC(A)	NO	38.23	38.23	0.0
	Dalla(A)	YES	1.09	1.09	0.0
	IPU-FPGA(A)	YES	1.93	1.93	0.0
	IPU-FSBL(A)	YES	1.100	1.100	0.0
	IPU-Linux(A)	YES	1.100	1.100	0.0
	Meldun-0(A)	YES	1.07	1.07	0.0
	Meldun-1(A)	YES	1.07	1.07	0.0
	Primary-BIOS(A)	YES	8.43	8.43	0.0
A99-8X100GE-SE-TAA	CBC(A)	NO	38.23	38.23	0.0
	Dalla(A)	YES	1.09	1.09	0.0
	IPU-FPGA(A)	YES	1.93	1.93	0.0
	IPU-FSBL(A)	YES	1.100	1.100	0.0
	IPU-Linux(A)	YES	1.100	1.100	0.0
	Meldun-0(A)	YES	1.07	1.07	0.0
	Meldun-1(A)	YES	1.07	1.07	0.0
	Primary-BIOS(A)	YES	8.43	8.43	0.0
A99-8X100GE-TAA	CBC(A)	NO	38.23	38.23	0.0
	Dalla(A)	YES	1.09	1.09	0.0
	IPU-FPGA(A)	YES	1.93	1.93	0.0
	IPU-FSBL(A)	YES	1.100	1.100	0.0
	IPU-Linux(A)	YES	1.100	1.100	0.0
	Meldun-0(A)	YES	1.07	1.07	0.0
	Meldun-1(A)	YES	1.07	1.07	0.0
	Primary-BIOS(A)	YES	8.43	8.43	0.0
A99-8X100GE-TR	CBC(A)	NO	38.23	38.23	0.0
	Dalla(A)	YES	1.09	1.09	0.0
	IPU-FPGA(A)	YES	1.93	1.93	0.0
	IPU-FSBL(A)	YES	1.100	1.100	0.0
	IPU-Linux(A)	YES	1.100	1.100	0.0
	Meldun-0(A)	YES	1.07	1.07	0.0
	Meldun-1(A)	YES	1.07	1.07	0.0
	Primary-BIOS(A)	YES	8.43	8.43	0.0
A99-8X100GE-TR-TAA	CBC(A)	NO	38.23	38.23	0.0
	Dalla(A)	YES	1.09	1.09	0.0

	IPU-FPGA(A)	YES	1.93	1.93	0.0
	IPU-FSBL(A)	YES	1.100	1.100	0.0
	IPU-Linux(A)	YES	1.100	1.100	0.0
	Meldun-0(A)	YES	1.07	1.07	0.0
	Meldun-1(A)	YES	1.07	1.07	0.0
	Primary-BIOS(A)	YES	8.43	8.43	0.0
A99-RP2-SE	Alpha-FPGA(A)	YES	0.16	0.16	0.0
	CBC-0(A)	NO	35.12	35.12	0.0
	CBC-1(A)	NO	35.12	35.12	0.0
	Cha-FPGA(A)	YES	0.06	0.06	0.0
	IPU-FPGA(A)	YES	0.57	0.57	0.0
	IPU-FSBL(A)	YES	1.103	1.103	0.0
	IPU-Linux(A)	YES	1.103	1.103	0.0
	Omega-FPGA(A)	YES	0.16	0.16	0.0
	Optimus-FPGA(A)	YES	0.12	0.12	0.0
	Primary-BIOS(A)	YES	14.29	14.29	0.0
A99-RP2-TR	Alpha-FPGA(A)	YES	0.16	0.16	0.0
	CBC-0(A)	NO	35.12	35.12	0.0
	CBC-1(A)	NO	35.12	35.12	0.0
	Cha-FPGA(A)	YES	0.06	0.06	0.0
	IPU-FPGA(A)	YES	0.57	0.57	0.0
	IPU-FSBL(A)	YES	1.103	1.103	0.0
	IPU-Linux(A)	YES	1.103	1.103	0.0
	Omega-FPGA(A)	YES	0.16	0.16	0.0
	Optimus-FPGA(A)	YES	0.12	0.12	0.0
	Primary-BIOS(A)	YES	14.29	14.29	0.0
A99-RP3-SE	Beta-FPGA(A)	YES	0.01	0.01	0.0
	CBC-0(A)	NO	51.02	51.02	0.0
	CBC-1(A)	NO	51.02	51.02	0.0
	IPU-FPGA(A)	YES	0.03	0.03	0.0
	IPU-FSBL(A)	YES	1.100	1.100	0.0
	IPU-Linux(A)	YES	1.100	1.100	0.0
	Orion-FPGA(A)	YES	0.03	0.03	0.0
	Primary-BIOS(A)	YES	30.10	30.10	0.0
	Zenith-FPGA(A)	YES	0.01	0.01	0.0
A99-RP3-TR	Beta-FPGA(A)	YES	0.01	0.01	0.0
	CBC-0(A)	NO	51.02	51.02	0.0
	CBC-1(A)	NO	51.02	51.02	0.0
	IPU-FPGA(A)	YES	0.03	0.03	0.0
	IPU-FSBL(A)	YES	1.100	1.100	0.0
	IPU-Linux(A)	YES	1.100	1.100	0.0
	Orion-FPGA(A)	YES	0.03	0.03	0.0
	Primary-BIOS(A)	YES	30.10	30.10	0.0
	Zenith-FPGA(A)	YES	0.01	0.01	0.0
A99-RSP-SE	Alpha-FPGA(A)	YES	0.16	0.16	0.0
	CBC(A)	NO	43.02	43.02	0.0
	Cha-FPGA(A)	YES	0.06	0.06	0.0
	IPU-FPGA(A)	YES	0.57	0.57	0.0
	IPU-FSBL(A)	YES	1.103	1.103	0.0
	IPU-Linux(A)	YES	1.103	1.103	0.0
	Omega-FPGA(A)	YES	0.16	0.16	0.0
	Optimus-FPGA(A)	YES	0.12	0.12	0.0
	Primary-BIOS(A)	YES	16.08	16.08	0.0
A99-RSP-TR	Alpha-FPGA(A)	YES	0.16	0.16	0.0
	CBC(A)	NO	43.02	43.02	0.0
	Cha-FPGA(A)	YES	0.06	0.06	0.0
	IPU-FPGA(A)	YES	0.57	0.57	0.0
	IPU-FSBL(A)	YES	1.103	1.103	0.0

```
                    IPU-Linux(A)              YES     1.103   1.103    0.0
                    Omega-FPGA(A)             YES     0.16    0.16     0.0
                    Optimus-FPGA(A)           YES     0.12    0.12     0.0
                    Primary-BIOS(A)           YES    16.08   16.08     0.0
--------------------------------------------------------------------------------
A99-SFC-S           CBC(A)                    NO     44.02   44.02     0.0
                    IPU-FPGA(A)               YES     0.37    0.37     0.0
                    IPU-FSBL(A)               YES     1.100   1.100    0.0
                    IPU-Linux(A)              YES     1.100   1.100    0.0
--------------------------------------------------------------------------------
A99-SFC-T           CBC(A)                    NO     44.02   44.02     0.0
                    IPU-FPGA(A)               YES     0.37    0.37     0.0
                    IPU-FSBL(A)               YES     1.100   1.100    0.0
                    IPU-Linux(A)              YES     1.100   1.100    0.0
--------------------------------------------------------------------------------
A99-SFC2            CBC(A)                    NO     37.20   37.20     0.0
                    IPU-FPGA(A)               YES     0.37    0.37     0.0
                    IPU-FSBL(A)               YES     1.100   1.100    0.0
                    IPU-Linux(A)              YES     1.100   1.100    0.0
--------------------------------------------------------------------------------
A99-SFC3            CBC(A)                    NO     49.01   49.01     0.0
                    IPU-FPGA(A)               YES     0.01    0.01     0.0
                    IPU-FSBL(A)               YES     1.100   1.100    0.0
                    IPU-Linux(A)              YES     1.100   1.100    0.0
--------------------------------------------------------------------------------
A99K-24X10GE-1G-CM  CBC(A)                    NO     47.03   47.03     0.1
                    IPU-FPGA(A)               YES     1.87    1.87     0.1
                    IPU-FSBL(A)               YES     1.104   1.104    0.1
                    IPU-Linux(A)              YES     1.104   1.104    0.1
                    Leadfoot-0(A)             YES     1.00    1.00     0.1
                    Lewis(A)                  YES     1.09    1.09     0.1
                    Primary-BIOS(A)           YES    18.24   18.24     0.1
--------------------------------------------------------------------------------
A99K-24X10GE-1G-SE  CBC(A)                    NO     47.03   47.03     0.1
                    IPU-FPGA(A)               YES     1.87    1.87     0.1
                    IPU-FSBL(A)               YES     1.104   1.104    0.1
                    IPU-Linux(A)              YES     1.104   1.104    0.1
                    Leadfoot-0(A)             YES     1.00    1.00     0.1
                    Lewis(A)                  YES     1.09    1.09     0.1
                    Primary-BIOS(A)           YES    18.24   18.24     0.1
--------------------------------------------------------------------------------
A99K-24X10GE-1G-TR  CBC(A)                    NO     47.03   47.03     0.1
                    IPU-FPGA(A)               YES     1.87    1.87     0.1
                    IPU-FSBL(A)               YES     1.104   1.104    0.1
                    IPU-Linux(A)              YES     1.104   1.104    0.1
                    Leadfoot-0(A)             YES     1.00    1.00     0.1
                    Lewis(A)                  YES     1.09    1.09     0.1
                    Primary-BIOS(A)           YES    18.24   18.24     0.1
--------------------------------------------------------------------------------
A99K-48X10GE-1G-CM  CBC(A)                    NO     47.03   47.03     0.1
                    IPU-FPGA(A)               YES     1.87    1.87     0.1
                    IPU-FSBL(A)               YES     1.104   1.104    0.1
                    IPU-Linux(A)              YES     1.104   1.104    0.1
                    Leadfoot-0(A)             YES     1.00    1.00     0.1
                    Leadfoot-1(A)             YES     1.00    1.00     0.1
                    Lewis(A)                  YES     1.09    1.09     0.1
                    Primary-BIOS(A)           YES    18.24   18.24     0.1
--------------------------------------------------------------------------------
A99K-48X10GE-1G-SE  CBC(A)                    NO     47.03   47.03     0.1
                    IPU-FPGA(A)               YES     1.87    1.87     0.1
                    IPU-FSBL(A)               YES     1.104   1.104    0.1
                    IPU-Linux(A)              YES     1.104   1.104    0.1
                    Leadfoot-0(A)             YES     1.00    1.00     0.1
                    Leadfoot-1(A)             YES     1.00    1.00     0.1
```

	Lewis(A)	YES	1.09	1.09	0.1
	Primary-BIOS(A)	YES	18.24	18.24	0.1
A99K-48X10GE-1G-TR	CBC(A)	NO	47.03	47.03	0.1
	IPU-FPGA(A)	YES	1.87	1.87	0.1
	IPU-FSBL(A)	YES	1.104	1.104	0.1
	IPU-Linux(A)	YES	1.104	1.104	0.1
	Leadfoot-0(A)	YES	1.00	1.00	0.1
	Leadfoot-1(A)	YES	1.00	1.00	0.1
	Lewis(A)	YES	1.09	1.09	0.1
	Primary-BIOS(A)	YES	18.24	18.24	0.1
A99L-4X100GE-SE-TAA	CBC(A)	NO	38.23	38.23	0.0
	Dalla(A)	YES	1.09	1.09	0.0
	IPU-FPGA(A)	YES	1.93	1.93	0.0
	IPU-FSBL(A)	YES	1.100	1.100	0.0
	IPU-Linux(A)	YES	1.100	1.100	0.0
	Meldun-0(A)	YES	1.07	1.07	0.0
	Meldun-1(A)	YES	1.07	1.07	0.0
	Primary-BIOS(A)	YES	8.43	8.43	0.0
A99L-4X100GE-TAA	CBC(A)	NO	38.23	38.23	0.0
	Dalla(A)	YES	1.09	1.09	0.0
	IPU-FPGA(A)	YES	1.93	1.93	0.0
	IPU-FSBL(A)	YES	1.100	1.100	0.0
	IPU-Linux(A)	YES	1.100	1.100	0.0
	Meldun-0(A)	YES	1.07	1.07	0.0
	Meldun-1(A)	YES	1.07	1.07	0.0
	Primary-BIOS(A)	YES	8.43	8.43	0.0
A99L-4X100GE-TR-TAA	CBC(A)	NO	38.23	38.23	0.0
	Dalla(A)	YES	1.09	1.09	0.0
	IPU-FPGA(A)	YES	1.93	1.93	0.0
	IPU-FSBL(A)	YES	1.100	1.100	0.0
	IPU-Linux(A)	YES	1.100	1.100	0.0
	Meldun-0(A)	YES	1.07	1.07	0.0
	Meldun-1(A)	YES	1.07	1.07	0.0
	Primary-BIOS(A)	YES	8.43	8.43	0.0
A99L-8X100GE-SE-TAA	CBC(A)	NO	38.23	38.23	0.0
	Dalla(A)	YES	1.09	1.09	0.0
	IPU-FPGA(A)	YES	1.93	1.93	0.0
	IPU-FSBL(A)	YES	1.100	1.100	0.0
	IPU-Linux(A)	YES	1.100	1.100	0.0
	Meldun-0(A)	YES	1.07	1.07	0.0
	Meldun-1(A)	YES	1.07	1.07	0.0
	Primary-BIOS(A)	YES	8.43	8.43	0.0
A99L-8X100GE-TAA	CBC(A)	NO	38.23	38.23	0.0
	Dalla(A)	YES	1.09	1.09	0.0
	IPU-FPGA(A)	YES	1.93	1.93	0.0
	IPU-FSBL(A)	YES	1.100	1.100	0.0
	IPU-Linux(A)	YES	1.100	1.100	0.0
	Meldun-0(A)	YES	1.07	1.07	0.0
	Meldun-1(A)	YES	1.07	1.07	0.0
	Primary-BIOS(A)	YES	8.43	8.43	0.0
A99L-8X100GE-TR-TAA	CBC(A)	NO	38.23	38.23	0.0
	Dalla(A)	YES	1.09	1.09	0.0
	IPU-FPGA(A)	YES	1.93	1.93	0.0
	IPU-FSBL(A)	YES	1.100	1.100	0.0
	IPU-Linux(A)	YES	1.100	1.100	0.0
	Meldun-0(A)	YES	1.07	1.07	0.0
	Meldun-1(A)	YES	1.07	1.07	0.0

```
                    Primary-BIOS(A)           YES     8.43    8.43    0.0
--------------------------------------------------------------------------------
A9K-24X10GE-1G-CM   CBC(A)                    NO     47.03   47.03    0.1
                    IPU-FPGA(A)               YES     1.87    1.87    0.1
                    IPU-FSBL(A)               YES     1.104   1.104   0.1
                    IPU-Linux(A)              YES     1.104   1.104   0.1
                    Leadfoot-0(A)             YES     1.00    1.00    0.1
                    Lewis(A)                  YES     1.09    1.09    0.1
                    Primary-BIOS(A)           YES    18.24   18.24    0.1
--------------------------------------------------------------------------------
A9K-24X10GE-1G-SE   CBC(A)                    NO     47.03   47.03    0.1
                    IPU-FPGA(A)               YES     1.87    1.87    0.1
                    IPU-FSBL(A)               YES     1.104   1.104   0.1
                    IPU-Linux(A)              YES     1.104   1.104   0.1
                    Leadfoot-0(A)             YES     1.00    1.00    0.1
                    Lewis(A)                  YES     1.09    1.09    0.1
                    Primary-BIOS(A)           YES    18.24   18.24    0.1
--------------------------------------------------------------------------------
A9K-24X10GE-1G-TR   CBC(A)                    NO     47.03   47.03    0.1
                    IPU-FPGA(A)               YES     1.87    1.87    0.1
                    IPU-FSBL(A)               YES     1.104   1.104   0.1
                    IPU-Linux(A)              YES     1.104   1.104   0.1
                    Leadfoot-0(A)             YES     1.00    1.00    0.1
                    Lewis(A)                  YES     1.09    1.09    0.1
                    Primary-BIOS(A)           YES    18.24   18.24    0.1
--------------------------------------------------------------------------------
A9K-400G-DWDM-TR    CBC(A)                    NO     42.04   42.04    0.0
                    CFP2-0                    NO      5.23    5.23    0.1
                    CFP2-1                    NO      5.23    5.23    0.1
                    Doran(A)                  YES     1.05    1.05    0.0
                    ETNA-0                    NO      3.72    3.72    0.1
                    ETNA-1                    NO      3.72    3.72    0.1
                    Frenzy(A)                 YES    49.00   49.00    0.0
                    IPU-FPGA(A)               YES     1.93    1.93    0.1
                    IPU-FSBL(A)               YES     1.100   1.100   0.1
                    IPU-Linux(A)              YES     1.100   1.100   0.1
                    Martell(A)                YES     1.03    1.03    0.0
                    Meldun(A)                 YES     1.06    1.06    0.1
                    Primary-BIOS(A)           YES     8.43    8.43    0.1
--------------------------------------------------------------------------------
A9K-48X10GE-1G-CM   CBC(A)                    NO     47.03   47.03    0.1
                    IPU-FPGA(A)               YES     1.87    1.87    0.1
                    IPU-FSBL(A)               YES     1.104   1.104   0.1
                    IPU-Linux(A)              YES     1.104   1.104   0.1
                    Leadfoot-0(A)             YES     1.00    1.00    0.1
                    Leadfoot-1(A)             YES     1.00    1.00    0.1
                    Lewis(A)                  YES     1.09    1.09    0.1
                    Primary-BIOS(A)           YES    18.24   18.24    0.1
--------------------------------------------------------------------------------
A9K-48X10GE-1G-SE   CBC(A)                    NO     47.03   47.03    0.1
                    IPU-FPGA(A)               YES     1.87    1.87    0.1
                    IPU-FSBL(A)               YES     1.104   1.104   0.1
                    IPU-Linux(A)              YES     1.104   1.104   0.1
                    Leadfoot-0(A)             YES     1.00    1.00    0.1
                    Leadfoot-1(A)             YES     1.00    1.00    0.1
                    Lewis(A)                  YES     1.09    1.09    0.1
                    Primary-BIOS(A)           YES    18.24   18.24    0.1
--------------------------------------------------------------------------------
A9K-48X10GE-1G-TR   CBC(A)                    NO     47.03   47.03    0.1
                    IPU-FPGA(A)               YES     1.87    1.87    0.1
                    IPU-FSBL(A)               YES     1.104   1.104   0.1
                    IPU-Linux(A)              YES     1.104   1.104   0.1
                    Leadfoot-0(A)             YES     1.00    1.00    0.1
                    Leadfoot-1(A)             YES     1.00    1.00    0.1
```

```
                   Lewis(A)                  YES     1.09    1.09    0.1
                   Primary-BIOS(A)           YES    18.24   18.24    0.1
-------------------------------------------------------------------------------
A9K-4X100GE        CBC(A)                    NO     46.06   46.06    0.1
                   IPU-FPGA(A)               YES     1.85    1.85    0.1
                   IPU-FSBL(A)               YES     1.100   1.100   0.1
                   IPU-Linux(A)              YES     1.100   1.100   0.1
                   Morra-0(A)                YES     1.02    1.02    0.1
                   Morra-1(A)                YES     1.02    1.02    0.1
                   Primary-BIOS(A)           YES     9.23    9.23    0.1
                   Sideswipe-0(A)            YES     1.02    1.02    0.1
                   Sideswipe-1(A)            YES     1.02    1.02    0.1
-------------------------------------------------------------------------------
A9K-4X100GE-SE     CBC(A)                    NO     38.23   38.23    0.0
                   Dalla(A)                  YES     1.09    1.09    0.0
                   IPU-FPGA(A)               YES     1.93    1.93    0.0
                   IPU-FSBL(A)               YES     1.100   1.100   0.0
                   IPU-Linux(A)              YES     1.100   1.100   0.0
                   Meldun-0(A)               YES     1.07    1.07    0.0
                   Meldun-1(A)               YES     1.07    1.07    0.0
                   Primary-BIOS(A)           YES     8.43    8.43    0.0
                   CBC(A)                    NO     38.23   38.23    0.0
                   Dalla(A)                  YES     1.09    1.09    0.0
                   IPU-FPGA(A)               YES     1.93    1.93    0.0
                   IPU-FSBL(A)               YES     1.100   1.100   0.0
                   IPU-Linux(A)              YES     1.100   1.100   0.0
                   Meldun-0(A)               YES     1.07    1.07    0.0
                   Meldun-1(A)               YES     1.07    1.07    0.0
                   Primary-BIOS(A)           YES     8.43    8.43    0.0
-------------------------------------------------------------------------------
A9K-4X100GE-SE-TAA CBC(A)                    NO     38.23   38.23    0.0
                   Dalla(A)                  YES     1.09    1.09    0.0
                   IPU-FPGA(A)               YES     1.93    1.93    0.0
                   IPU-FSBL(A)               YES     1.100   1.100   0.0
                   IPU-Linux(A)              YES     1.100   1.100   0.0
                   Meldun-0(A)               YES     1.07    1.07    0.0
                   Meldun-1(A)               YES     1.07    1.07    0.0
                   Primary-BIOS(A)           YES     8.43    8.43    0.0
-------------------------------------------------------------------------------
A9K-4X100GE-TAA    CBC(A)                    NO     38.23   38.23    0.0
                   Dalla(A)                  YES     1.09    1.09    0.0
                   IPU-FPGA(A)               YES     1.93    1.93    0.0
                   IPU-FSBL(A)               YES     1.100   1.100   0.0
                   IPU-Linux(A)              YES     1.100   1.100   0.0
                   Meldun-0(A)               YES     1.07    1.07    0.0
                   Meldun-1(A)               YES     1.07    1.07    0.0
                   Primary-BIOS(A)           YES     8.43    8.43    0.0
-------------------------------------------------------------------------------
A9K-4X100GE-TR     CBC(A)                    NO     38.23   38.23    0.0
                   Dalla(A)                  YES     1.09    1.09    0.0
                   IPU-FPGA(A)               YES     1.93    1.93    0.0
                   IPU-FSBL(A)               YES     1.100   1.100   0.0
                   IPU-Linux(A)              YES     1.100   1.100   0.0
                   Meldun-0(A)               YES     1.07    1.07    0.0
                   Meldun-1(A)               YES     1.07    1.07    0.0
                   Primary-BIOS(A)           YES     8.43    8.43    0.0
                   CBC(A)                    NO     38.23   38.23    0.0
                   Dalla(A)                  YES     1.09    1.09    0.0
                   IPU-FPGA(A)               YES     1.93    1.93    0.0
                   IPU-FSBL(A)               YES     1.100   1.100   0.0
                   IPU-Linux(A)              YES     1.100   1.100   0.0
                   Meldun-0(A)               YES     1.07    1.07    0.0
                   Meldun-1(A)               YES     1.07    1.07    0.0
                   Primary-BIOS(A)           YES     8.43    8.43    0.0
```

```
--------------------------------------------------------------------------------
A9K-4X100GE-TR-TAA   CBC(A)                NO     38.23   38.23    0.0
                     Dalla(A)              YES     1.09    1.09    0.0
                     IPU-FPGA(A)           YES     1.93    1.93    0.0
                     IPU-FSBL(A)           YES     1.100   1.100   0.0
                     IPU-Linux(A)          YES     1.100   1.100   0.0
                     Meldun-0(A)           YES     1.07    1.07    0.0
                     Meldun-1(A)           YES     1.07    1.07    0.0
                     Primary-BIOS(A)       YES     8.43    8.43    0.0
--------------------------------------------------------------------------------
A9K-8X100GE-CM       CBC(A)                NO     38.23   38.23    0.0
                     Dalla(A)              YES     1.09    1.09    0.0
                     IPU-FPGA(A)           YES     1.93    1.93    0.0
                     IPU-FSBL(A)           YES     1.100   1.100   0.0
                     IPU-Linux(A)          YES     1.100   1.100   0.0
                     Meldun-0(A)           YES     1.07    1.07    0.0
                     Meldun-1(A)           YES     1.07    1.07    0.0
                     Primary-BIOS(A)       YES     8.43    8.43    0.0
--------------------------------------------------------------------------------
A9K-8X100GE-L-SE     CBC(A)                NO     38.23   38.23    0.0
                     Dalla(A)              YES     1.09    1.09    0.0
                     IPU-FPGA(A)           YES     1.93    1.93    0.0
                     IPU-FSBL(A)           YES     1.100   1.100   0.0
                     IPU-Linux(A)          YES     1.100   1.100   0.0
                     Meldun-0(A)           YES     1.07    1.07    0.0
                     Meldun-1(A)           YES     1.07    1.07    0.0
                     Primary-BIOS(A)       YES     8.43    8.43    0.0
--------------------------------------------------------------------------------
A9K-8X100GE-L-TAA    CBC(A)                NO     38.23   38.23    0.0
                     Dalla(A)              YES     1.09    1.09    0.0
                     IPU-FPGA(A)           YES     1.93    1.93    0.0
                     IPU-FSBL(A)           YES     1.100   1.100   0.0
                     IPU-Linux(A)          YES     1.100   1.100   0.0
                     Meldun-0(A)           YES     1.07    1.07    0.0
                     Meldun-1(A)           YES     1.07    1.07    0.0
                     Primary-BIOS(A)       YES     8.43    8.43    0.0
--------------------------------------------------------------------------------
A9K-8X100GE-L-TR     CBC(A)                NO     38.23   38.23    0.0
                     Dalla(A)              YES     1.09    1.09    0.0
                     IPU-FPGA(A)           YES     1.93    1.93    0.0
                     IPU-FSBL(A)           YES     1.100   1.100   0.0
                     IPU-Linux(A)          YES     1.100   1.100   0.0
                     Meldun-0(A)           YES     1.07    1.07    0.0
                     Meldun-1(A)           YES     1.07    1.07    0.0
                     Primary-BIOS(A)       YES     8.43    8.43    0.0
--------------------------------------------------------------------------------
A9K-8X100GE-SE       CBC(A)                NO     38.23   38.23    0.0
                     Dalla(A)              YES     1.09    1.09    0.0
                     IPU-FPGA(A)           YES     1.93    1.93    0.0
                     IPU-FSBL(A)           YES     1.100   1.100   0.0
                     IPU-Linux(A)          YES     1.100   1.100   0.0
                     Meldun-0(A)           YES     1.07    1.07    0.0
                     Meldun-1(A)           YES     1.07    1.07    0.0
                     Primary-BIOS(A)       YES     8.43    8.43    0.0
--------------------------------------------------------------------------------
A9K-8X100GE-SE-TAA   CBC(A)                NO     38.23   38.23    0.0
                     Dalla(A)              YES     1.09    1.09    0.0
                     IPU-FPGA(A)           YES     1.93    1.93    0.0
                     IPU-FSBL(A)           YES     1.100   1.100   0.0
                     IPU-Linux(A)          YES     1.100   1.100   0.0
                     Meldun-0(A)           YES     1.07    1.07    0.0
                     Meldun-1(A)           YES     1.07    1.07    0.0
                     Primary-BIOS(A)       YES     8.43    8.43    0.0
--------------------------------------------------------------------------------
```

```
A9K-8X100GE-TR       CBC(A)                  NO     38.23   38.23    0.0
                     Dalla(A)                YES     1.09    1.09    0.0
                     IPU-FPGA(A)             YES     1.93    1.93    0.0
                     IPU-FSBL(A)             YES     1.100   1.100   0.0
                     IPU-Linux(A)            YES     1.100   1.100   0.0
                     Meldun-0(A)             YES     1.07    1.07    0.0
                     Meldun-1(A)             YES     1.07    1.07    0.0
                     Primary-BIOS(A)         YES     8.43    8.43    0.0
--------------------------------------------------------------------------------
A9K-8X100GE-TR-TAA   CBC(A)                  NO     38.23   38.23    0.0
                     Dalla(A)                YES     1.09    1.09    0.0
                     IPU-FPGA(A)             YES     1.93    1.93    0.0
                     IPU-FSBL(A)             YES     1.100   1.100   0.0
                     IPU-Linux(A)            YES     1.100   1.100   0.0
                     Meldun-0(A)             YES     1.07    1.07    0.0
                     Meldun-1(A)             YES     1.07    1.07    0.0
                     Primary-BIOS(A)         YES     8.43    8.43    0.0
--------------------------------------------------------------------------------
A9K-8X100GELSE-TAA   CBC(A)                  NO     38.23   38.23    0.0
                     Dalla(A)                YES     1.09    1.09    0.0
                     IPU-FPGA(A)             YES     1.93    1.93    0.0
                     IPU-FSBL(A)             YES     1.100   1.100   0.0
                     IPU-Linux(A)            YES     1.100   1.100   0.0
                     Meldun-0(A)             YES     1.07    1.07    0.0
                     Meldun-1(A)             YES     1.07    1.07    0.0
                     Primary-BIOS(A)         YES     8.43    8.43    0.0
--------------------------------------------------------------------------------
A9K-8X100GELTR-TAA   CBC(A)                  NO     38.23   38.23    0.0
                     Dalla(A)                YES     1.09    1.09    0.0
                     IPU-FPGA(A)             YES     1.93    1.93    0.0
                     IPU-FSBL(A)             YES     1.100   1.100   0.0
                     IPU-Linux(A)            YES     1.100   1.100   0.0
                     Meldun-0(A)             YES     1.07    1.07    0.0
                     Meldun-1(A)             YES     1.07    1.07    0.0
                     Primary-BIOS(A)         YES     8.43    8.43    0.0
--------------------------------------------------------------------------------
A9K-MOD200-SE        Blaster(A)              YES     1.19    1.19    0.1
                     CBC(A)                  NO     39.07   39.07    0.1
                     IPU-FPGA(A)             YES     1.93    1.93    0.1
                     IPU-FSBL(A)             YES     1.100   1.100   0.1
                     IPU-Linux(A)            YES     1.100   1.100   0.1
                     Primary-BIOS(A)         YES     8.43    8.43    0.1
--------------------------------------------------------------------------------
A9K-MOD200-TR        Blaster(A)              YES     1.19    1.19    0.1
                     CBC(A)                  NO     39.07   39.07    0.1
                     IPU-FPGA(A)             YES     1.93    1.93    0.1
                     IPU-FSBL(A)             YES     1.100   1.100   0.1
                     IPU-Linux(A)            YES     1.100   1.100   0.1
                     Primary-BIOS(A)         YES     8.43    8.43    0.1
--------------------------------------------------------------------------------
A9K-MOD400-CM        Blaster(A)              YES     1.19    1.19    0.1
                     CBC(A)                  NO     39.07   39.07    0.1
                     IPU-FPGA(A)             YES     1.93    1.93    0.1
                     IPU-FSBL(A)             YES     1.100   1.100   0.1
                     IPU-Linux(A)            YES     1.100   1.100   0.1
                     Primary-BIOS(A)         YES     8.43    8.43    0.1
--------------------------------------------------------------------------------
A9K-MOD400-SE        Blaster(A)              YES     1.19    1.19    0.1
                     CBC(A)                  NO     39.07   39.07    0.1
                     IPU-FPGA(A)             YES     1.93    1.93    0.1
                     IPU-FSBL(A)             YES     1.100   1.100   0.1
                     IPU-Linux(A)            YES     1.100   1.100   0.1
                     Primary-BIOS(A)         YES     8.43    8.43    0.1
--------------------------------------------------------------------------------
```

```
A9K-MPA-1X100GE      Springer                  YES     1.04    1.04    0.1
-------------------------------------------------------------------------------
A9K-MPA-1X40GE       Sage                      YES     1.03    1.03    0.1
-------------------------------------------------------------------------------
A9K-MPA-20X10GE      Skyquake                  YES     1.16    1.16    0.1
-------------------------------------------------------------------------------
A9K-MPA-20X1GE       Gambit                    YES     1.01    1.01    0.1
-------------------------------------------------------------------------------
A9K-MPA-2X100GE      Springer                  YES     1.04    1.04    0.1
-------------------------------------------------------------------------------
A9K-MPA-2X10GE       Rogue                     YES     1.06    1.06    0.1
-------------------------------------------------------------------------------
A9K-MPA-2X40GE       Sage                      YES     1.03    1.03    0.1
-------------------------------------------------------------------------------
A9K-MPA-4X10GE       Rogue                     YES     1.06    1.06    0.1
-------------------------------------------------------------------------------
A9K-MPA-8X10GE       Pixie                     YES     1.07    1.07    0.1
-------------------------------------------------------------------------------
A9K-MPA20X10GE-CM    Skyquake                  YES     1.16    1.16    0.1
-------------------------------------------------------------------------------
A9K-MPA2X100GE-CM    Springer                  YES     1.04    1.04    0.1
-------------------------------------------------------------------------------
A9K-RP2-64G          Alpha-FPGA(A)             YES     0.16    0.16    0.0
                     CBC-0(A)                  NO     35.12   35.12    0.0
                     CBC-1(A)                  NO     35.12   35.12    0.0
                     Cha-FPGA(A)               YES     0.06    0.06    0.0
                     IPU-FPGA(A)               YES     0.57    0.57    0.0
                     IPU-FSBL(A)               YES     1.103   1.103   0.0
                     IPU-Linux(A)              YES     1.103   1.103   0.0
                     Omega-FPGA(A)             YES     0.16    0.16    0.0
                     Optimus-FPGA(A)           YES     0.12    0.12    0.0
                     Primary-BIOS(A)           YES    14.29   14.29    0.0
-------------------------------------------------------------------------------
A9K-RP3-64G          Beta-FPGA(A)              YES     0.01    0.01    0.0
                     CBC-0(A)                  NO     51.02   51.02    0.0
                     CBC-1(A)                  NO     51.02   51.02    0.0
                     IPU-FPGA(A)               YES     0.03    0.03    0.0
                     IPU-FSBL(A)               YES     1.100   1.100   0.0
                     IPU-Linux(A)              YES     1.100   1.100   0.0
                     Orion-FPGA(A)             YES     0.03    0.03    0.0
                     Primary-BIOS(A)           YES    30.10   30.10    0.0
                     Zenith-FPGA(A)            YES     0.01    0.01    0.0
-------------------------------------------------------------------------------
A9K-RSP4-64G         Alpha-FPGA(A)             YES     0.16    0.16    0.0
                     CBC(A)                    NO     34.38   34.38    0.0
                     Cha-FPGA(A)               YES     0.06    0.06    0.0
                     IPU-FPGA(A)               YES     0.57    0.57    0.0
                     IPU-FSBL(A)               YES     1.103   1.103   0.0
                     IPU-Linux(A)              YES     1.103   1.103   0.0
                     Omega-FPGA(A)             YES     0.16    0.16    0.0
                     Optimus-FPGA(A)           YES     0.12    0.12    0.0
                     Primary-BIOS(A)           YES    10.59   10.59    0.0
-------------------------------------------------------------------------------
A9K-RSP880-SE        Alpha-FPGA(A)             YES     0.16    0.16    0.0
                     CBC(A)                    NO     34.38   34.38    0.0
                     Cha-FPGA(A)               YES     0.06    0.06    0.0
                     IPU-FPGA(A)               YES     0.57    0.57    0.0
                     IPU-FSBL(A)               YES     1.103   1.103   0.0
                     IPU-Linux(A)              YES     1.103   1.103   0.0
                     Omega-FPGA(A)             YES     0.16    0.16    0.0
                     Optimus-FPGA(A)           YES     0.12    0.12    0.0
                     Primary-BIOS(A)           YES    10.59   10.59    0.0
-------------------------------------------------------------------------------
A9K-RSP880-TR        Alpha-FPGA(A)             YES     0.16    0.16    0.0
```

```
                    CBC(A)                    NO     34.38   34.38    0.0
                    Cha-FPGA(A)               YES     0.06    0.06    0.0
                    IPU-FPGA(A)               YES     0.57    0.57    0.0
                    IPU-FSBL(A)               YES     1.103   1.103   0.0
                    IPU-Linux(A)              YES     1.103   1.103   0.0
                    Omega-FPGA(A)             YES     0.16    0.16    0.0
                    Optimus-FPGA(A)           YES     0.12    0.12    0.0
                    Primary-BIOS(A)           YES    10.59   10.59    0.0
--------------------------------------------------------------------------------
A9KL-4X100GE-SE-TAA CBC(A)                    NO     38.23   38.23    0.0
                    Dalla(A)                  YES     1.09    1.09    0.0
                    IPU-FPGA(A)               YES     1.93    1.93    0.0
                    IPU-FSBL(A)               YES     1.100   1.100   0.0
                    IPU-Linux(A)              YES     1.100   1.100   0.0
                    Meldun-0(A)               YES     1.07    1.07    0.0
                    Meldun-1(A)               YES     1.07    1.07    0.0
                    Primary-BIOS(A)           YES     8.43    8.43    0.0
--------------------------------------------------------------------------------
A9KL-4X100GE-TAA    CBC(A)                    NO     38.23   38.23    0.0
                    Dalla(A)                  YES     1.09    1.09    0.0
                    IPU-FPGA(A)               YES     1.93    1.93    0.0
                    IPU-FSBL(A)               YES     1.100   1.100   0.0
                    IPU-Linux(A)              YES     1.100   1.100   0.0
                    Meldun-0(A)               YES     1.07    1.07    0.0
                    Meldun-1(A)               YES     1.07    1.07    0.0
                    Primary-BIOS(A)           YES     8.43    8.43    0.0
--------------------------------------------------------------------------------
A9KL-4X100GE-TR-TAA CBC(A)                    NO     38.23   38.23    0.0
                    Dalla(A)                  YES     1.09    1.09    0.0
                    IPU-FPGA(A)               YES     1.93    1.93    0.0
                    IPU-FSBL(A)               YES     1.100   1.100   0.0
                    IPU-Linux(A)              YES     1.100   1.100   0.0
                    Meldun-0(A)               YES     1.07    1.07    0.0
                    Meldun-1(A)               YES     1.07    1.07    0.0
                    Primary-BIOS(A)           YES     8.43    8.43    0.0
--------------------------------------------------------------------------------
ASR-9006-AC         CBC(A)                    NO      7.105   7.105   0.0
--------------------------------------------------------------------------------
ASR-9006-AC-V2      CBC(A)                    NO      7.105   7.105   0.0
--------------------------------------------------------------------------------
ASR-9006-FAN        CBC(A)                    NO      5.04    5.04    0.0
--------------------------------------------------------------------------------
ASR-9006-FAN-V2     CBC(A)                    NO      5.04    5.04    0.0
--------------------------------------------------------------------------------
ASR-9010-AC         CBC(A)                    NO      7.105   7.105   0.0
--------------------------------------------------------------------------------
ASR-9010-AC-V2      CBC(A)                    NO      7.105   7.105   0.0
--------------------------------------------------------------------------------
ASR-9010-FAN        CBC(A)                    NO      4.03    4.03    0.0
--------------------------------------------------------------------------------
ASR-9010-FAN-V2     CBC(A)                    NO     29.12   29.12    0.0
--------------------------------------------------------------------------------
ASR-9904-AC         CBC(A)                    NO      7.105   7.105   0.0
--------------------------------------------------------------------------------
ASR-9904-FAN        CBC(A)                    NO     31.05   31.05    0.0
--------------------------------------------------------------------------------
ASR-9906            CBC(A)                    NO      7.105   7.105   0.0
--------------------------------------------------------------------------------
ASR-9906-FAN        CBC(A)                    NO     56.01   56.01    0.0
                    PSOC(A)                   NO      2.06    2.06    0.0
--------------------------------------------------------------------------------
ASR-9910            CBC(A)                    NO      7.105   7.105   0.0
--------------------------------------------------------------------------------
ASR-9910-FAN        CBC(A)                    NO     45.02   45.02    0.0
```

```
                    PSOC(A)                   NO      2.06    2.06    0.0
--------------------------------------------------------------------------------
ASR-9912-AC         CBC(A)                    NO      7.105   7.105   0.0
--------------------------------------------------------------------------------
ASR-9912-FAN        CBC(A)                    NO     31.05   31.05    0.0
--------------------------------------------------------------------------------
ASR-9912-SFC220     CBC(A)                    NO     37.20   37.20    0.0
                    IPU-FPGA(A)               YES     0.37    0.37    0.0
                    IPU-FSBL(A)               YES     1.100   1.100   0.0
                    IPU-Linux(A)              YES     1.100   1.100   0.0
--------------------------------------------------------------------------------
ASR-9922-AC         CBC-0(A)                  NO      7.105   7.105   0.0
                    CBC-1(A)                  NO      7.105   7.105   0.0
--------------------------------------------------------------------------------
ASR-9922-FAN        CBC(A)                    NO     29.12   29.12    0.0
--------------------------------------------------------------------------------
ASR-9922-FAN-V2     CBC(A)                    NO     40.07   40.07    0.0
                    PSOC(A)                   NO      2.06    2.06    0.0
--------------------------------------------------------------------------------
PWR-2KW-DC-V2       DT-PriMCU(A)              NO      6.03    6.03    0.12
                    DT-Sec54vMCU(A)           NO      6.02    6.02    0.12
                    DT-Sec5vMCU(A)            NO      6.03    6.03    0.12
                    EM-PriMCU(A)              NO      3.12    3.12    0.12
                    EM-Sec54vMCU(A)           NO      3.19    3.19    0.12
                    EM-Sec5vMCU(A)            NO      3.19    3.19    0.12
--------------------------------------------------------------------------------
PWR-3KW-AC-V2       DT-PriMCU(A)              NO      6.02    6.02    1.0
                    DT-Sec54vMCU(A)           NO      6.02    6.02    1.0
                    DT-Sec5vMCU(A)            NO      6.04    6.04    1.0
                    EM-Sec54vMCU(A)           NO      3.12    3.12    0.21
                    EM-Sec5vMCU(A)            NO      3.18    3.18    0.21
--------------------------------------------------------------------------------
PWR-4.4KW-DC-V3     DT-Pri0MCU(A)             NO      3.00    3.00    0.1
                    DT-Pri1MCU(A)             NO      3.00    3.00    0.1
                    DT-Sec054vMCU(A)          NO      3.00    3.00    0.1
                    DT-Sec154vMCU(A)          NO      3.00    3.00    0.1
                    DT-Sec5vMCU(A)            NO      3.00    3.00    0.1
--------------------------------------------------------------------------------
PWR-6KW-AC-V3       DT-Pri0MCU(A)             NO      4.02    4.02    0.1
                    DT-Pri1MCU(A)             NO      4.02    4.02    0.1
                    DT-Sec054vMCU(A)          NO      4.03    4.03    0.1
                    DT-Sec154vMCU(A)          NO      4.03    4.03    0.1
                    DT-Sec5vMCU(A)            NO      4.04    4.04    0.1
```

Other Important Information

- Cisco IOS XR Release 5.3.0 and later does not support combination of Cisco ASR 9000 High Density 100GE Ethernet Line Card and Cisco ASR 9000 Ethernet Line Card in a single chassis.

  For the list of ASR 9000 Series line card types, see:
  http://www.cisco.com/c/en/us/support/docs/routers/asr-9000-series-aggregation-services-routers/116726-qanda-product-00.html#anc2

- From Release 6.0, A9K-RSP-4G, A9K-RSP-8G and the ASR 9000 Ethernet Line Cards also known as the first generation ASR 9000 LCs are not supported. For a detailed listing, see End-of-Life and End-of-Sale Notices

- From Release 6.0, the onePK toolkit is not supported.

- Country-specific laws, regulations, and licenses—In certain countries, use of these products may be prohibited and subject to laws, regulations, or licenses, including requirements applicable to the use of the products under telecommunications and other

laws and regulations; customers must comply with all such applicable laws in the countries in which they intend to use the products.

- **Card fan controller, and RSP removal**—For all card removal and replacement (including fabric cards, line cards, fan controller, and RSP) follow the instructions provided by Cisco to avoid impact to traffic. See the *Cisco ASR 9000 Series Aggregation Services Router Getting Started Guide* for procedures.
- Exceeding Cisco testing—If you intend to test beyond the combined maximum configuration tested and published by Cisco, contact your Cisco Technical Support representative to discuss how to engineer a large-scale configuration for your purpose.
- Installing a Line Card—For a fully populated 40-port high density Line Card with cable optics, maintenance time required for card replacement is higher. For more information about Line Card installation and removal, refer to the *Cisco ASR 9000 Aggregation Services Router Ethernet Line Card Installation Guide*.
- Serial Interfaces Out of Order in **`show ipv4 interface brief`** or **`show ipv6 interface brief`**command—The show ip interface brief command might display interfaces out of order if different types of serialization are used on the SPA cards.

  The serial interfaces are displayed in the show ip interface brief command output in the order shown in the example below:

  The ordering is based on:

  1. Slot
  2. SPA
  3. Type
  4. T3
  5. T3/T1
  6. vt15-T1
  7. multilink

  This may be different from the usual order (as the interfaces appear out of order) for the user who is accustomed to IOS.

  Example output:

  With multiple cards:

```
Serial0/2/0/1/1/1:0  (t3/t1)
Serial0/2/0/1/2/1:0
Serial0/2/0/1/3/1:0
Serial0/2/0/1/4/1:0
Serial0/2/0/1/5/1:0
Serial0/2/0/1/6/1:0
Serial0/2/0/1/7/1:0
Serial0/2/0/1/8/1:0
Serial0/2/0/1/9/1:0
Serial0/2/0/1/10/1:0
Serial0/2/0/1/11/1:0
Serial0/2/0/1/12/1:0
Serial0/2/0/0/1/1/1:0  (vt15)
Serial0/2/0/0/2/1/1:0
Serial0/2/0/0/3/1/1:0
Serial0/2/0/0/4/1/1:0
```

Serial0/2/0/0/5/1/1:0
Serial0/2/0/0/6/1/1:0
Serial0/2/0/0/7/1/1:0
Serial0/2/0/0/8/1/1:0
Serial0/2/0/0/9/1/1:0
Serial0/2/0/0/10/1/1:0
Serial0/2/0/0/11/1/1:0
Serial0/2/0/0/12/1/1:0
Multilink 0/2/0/0/1
Serial0/2/1/0/1 (t3)
Serial0/2/1/1/1/1:0 (t3/t1)
Serial0/2/1/1/2/1:0
Serial0/2/1/1/3/1:0
Serial0/2/1/1/4/1:0
Serial0/2/1/1/5/1:0
Serial0/2/1/1/6/1:0
Serial0/2/1/1/7/1:0
Serial0/2/1/1/8/1:0
Serial0/2/1/1/9/1:0
Serial0/2/1/1/10/1:0
Serial0/2/1/1/11/1:0
Serial0/2/1/1/12/1:0
Serial0/6/0/1/1/1:0
Serial0/6/0/1/2/1:0
Serial0/6/0/1/3/1:0
Serial0/6/0/1/4/1:0
Serial0/6/0/1/5/1:0
Serial0/6/0/1/6/1:0
Serial0/6/0/1/7/1:0
Serial0/6/0/1/8/1:0
Serial0/6/0/1/9/1:0
Serial0/6/0/1/10/1:0
Serial0/6/0/1/11/1:0
Serial0/6/0/1/12/1:0
Serial0/6/0/0/1/1/1:0
Serial0/6/0/0/2/1/1:0
Serial0/6/0/0/3/1/1:0
Serial0/6/0/0/4/1/1:0
Serial0/6/0/0/5/1/1:0
Serial0/6/0/0/6/1/1:0
Serial0/6/0/0/7/1/1:0
Serial0/6/0/0/8/1/1:0
Serial0/6/0/0/9/1/1:0
Serial0/6/0/0/10/1/1:0
Serial0/6/0/0/11/1/1:0
Serial0/6/0/0/12/1/1:0
Multilink 0/6/0/0/1
Serial0/6/1/0/1
Serial0/6/1/1/1/1:0
Serial0/6/1/1/2/1:0
Serial0/6/1/1/3/1:0
Serial0/6/1/1/4/1:0
Serial0/6/1/1/5/1:0
Serial0/6/1/1/6/1:0
Serial0/6/1/1/7/1:0
Serial0/6/1/1/8/1:0
Serial0/6/1/1/9/1:0

```
Serial0/6/1/1/10/1:0
Serial0/6/1/1/11/1:0
Serial0/6/1/1/12/1:0
```

Caveats

Caveats describe unexpected behavior in Cisco IOS XR Software releases. Severity-1 caveats are the most critical caveats; severity-2 caveats are less critical.

This section contains the caveats for Cisco ASR 9000 Series Aggregation Services Router Software Release and the Cisco ASR 9000 Series Aggregation Services Router platform.

Cisco IOS XR Caveats

Bug ID	Headline
CSCvh18580	Convergence delay of upto 15sec with main/sub interface shutdown
CSCvh69102	FRR shutdown notification not processed on sub-interface

Caveats Specific to the Cisco ASR 9000 Series Router

Caveats describe unexpected behavior in Cisco IOS XR Software releases.

Bug ID	Headline
CSCvh65270	ECMP for EVPN VPWS (possibly L3VPN as well) on ASR9K is broken in 6.3.1
CSCvg31449	OSPF dynamic adj-SID over link path changed after LC OIR
CSCvg34941	SR lists with OSPF dynamic adj-SID should not be at ACTIVE state after router reload.

Caveats Specific to the ASR 9001 Router

There are no caveats for ASR 9001 in this release.

Upgrading Cisco IOS XR Software

Cisco IOS XR Software is installed and activated from modular packages, allowing specific features or software patches to be installed, upgraded, or downgraded without affecting unrelated processes. Software packages can be upgraded or downgraded on all supported card types, or on a single card (node).

Software packages are installed from package installation envelope (PIE) files that contain one or more software components.

Caution Before upgrading to a new release, you must install all available bridge SMUs of the current release. For information on the bridge SMUs, refer the upgrade document.

Note The software upgrade to a release 6.7.x and later versions fails due to unresolved software API dependencies. The issue is seen on the ASR 9000 router series running Cisco IOS XR 32-bit release 6.4.1 or lower than release 6.3.3.

To resolve the issue, you should first upgrade to any of these versions:

- Release 6.6.3
- Release 6.6.2
- Release 6.5.3
- Release 6.5.2
- Release 6.4.2, or
- Release 6.5.1

Later, upgrade to a release 6.7.x.

Alternatively, you can directly upgrade by performing a turboboot to 6.7.x.

We recommend you to upgrade all FPGAs on a given node using the **upgrade hw-module fpd all location** command. Do not upgrade a card using the **upgrade hw-module fpd** *fpga-type* **location** command as this results in FPGA inconsistencies therefore causes card boot failure.

Troubleshooting

For information on troubleshooting Cisco IOS XR Software, see the *Cisco ASR 9000 Series Aggregation Services Routers Getting Started Guide* and the *Cisco ASR 9000 Series Router Troubleshooting Feature Module*

Resolving Upgrade File Issues

Note In some very rare cases inconsistencies in the content of the internal configuration files can appear. In such situations, to avoid configuration loss during upgrade, the following steps can be optionally done before activating packages:

1. Clear the NVGEN cache:

```
RP/0/RSP0/CPU0:router# run nvgen -F 1
```

2. Create a dummy config commit:

```
RP/0/RSP0/CPU0:router# config
```

```
RP/0/RSP0/CPU0:router(config)# hostname <hostname>

RP/0/RSP0/CPU0:rotuer(config)# commit

RP/0/RSP0/CPU0:router(config)# end
```

3. Force a commit update by using the **reload** command. Press **n** when the confirmation prompt appears:

```
RP/0/RSP0/CPU0:router# reload

Updating Commit Database. Please wait...[OK]

Proceed with reload? [confirm]
```

4. Press **n**

In some cases other activity may preclude a reload. The following message may display:

```
RP/0/RSP0/CPU0:router# reload

Preparing system for backup. This may take a few minutes .....System
configuration backup in progress [Retry later]
```

If you receive this message wait and then retry the command after some time.

Related Documentation

The most current Cisco ASR 9000 router hardware documentation is located at the following URL:

https://www.cisco.com/c/en/us/support/routers/asr-9000-series-aggregation-services-routers/products-installation-guides-list.html

The Cisco IOS XR Software documentation set includes the Cisco IOS XR software configuration guides and command references.

- The configuration guides are located at this URL:

  https://www.cisco.com/c/en/us/support/routers/asr-9000-series-aggregation-services-routers/products-installation-and-configuration-guides-list.html
- The command reference guides are located at this URL:

  https://www.cisco.com/c/en/us/support/routers/asr-9000-series-aggregation-services-routers/products-command-reference-list.html

The document containing Cisco IOS XR System Error Messages (SEM) is located at this URL:

https://www.cisco.com/c/en/us/td/docs/ios_xr_sw/error/message/ios-xr-sem-guide.html

Production Software Maintenance Updates (SMUs)

A production SMU is a SMU that is formally requested, developed, tested, and released. Production SMUs are intended for use in a live network environment and are formally supported by the Cisco TAC and the relevant development teams. Software bugs identified through software recommendations or Bug Search Tools are not a basis for production SMU requests.

For information on production SMU types, refer the Production SMU Types section of the IOS XR Software Maintenance Updates (SMUs) guide.

Communications, Services, and Additional Information

- To receive timely, relevant information from Cisco, sign up at Cisco Profile Manager.
- To get the business impact you're looking for with the technologies that matter, visit Cisco Services.
- To submit a service request, visit Cisco Support.
- To discover and browse secure, validated enterprise-class apps, products, solutions and services, visit Cisco Marketplace.
- To obtain general networking, training, and certification titles, visit Cisco Press.
- To find warranty information for a specific product or product family, access Cisco Warranty Finder.

Cisco Bug Search Tool

Cisco Bug Search Tool (BST) is a web-based tool that acts as a gateway to the Cisco bug tracking system that maintains a comprehensive list of defects and vulnerabilities in Cisco products and software. BST provides you with detailed defect information about your products and software.

Full Cisco Trademarks with Software License

THE SPECIFICATIONS AND INFORMATION REGARDING THE PRODUCTS IN THIS MANUAL ARE SUBJECT TO CHANGE WITHOUT NOTICE. ALL STATEMENTS, INFORMATION, AND RECOMMENDATIONS IN THIS MANUAL ARE BELIEVED TO BE ACCURATE BUT ARE PRESENTED WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED. USERS MUST TAKE FULL RESPONSIBILITY FOR THEIR APPLICATION OF ANY PRODUCTS.

THE SOFTWARE LICENSE AND LIMITED WARRANTY FOR THE ACCOMPANYING PRODUCT ARE SET FORTH IN THE INFORMATION PACKET THAT SHIPPED WITH THE PRODUCT AND ARE INCORPORATED HEREIN BY THIS REFERENCE. IF YOU ARE UNABLE TO LOCATE THE SOFTWARE LICENSE OR LIMITED WARRANTY, CONTACT YOUR CISCO REPRESENTATIVE FOR A COPY.

The Cisco implementation of TCP header compression is an adaptation of a program developed by the University of California, Berkeley (UCB) as part of UCB's public domain version of the UNIX operating system. All rights reserved. Copyright © 1981, Regents of the University of California.

NOTWITHSTANDING ANY OTHER WARRANTY HEREIN, ALL DOCUMENT FILES AND SOFTWARE OF THESE SUPPLIERS ARE PROVIDED “AS IS" WITH ALL FAULTS. CISCO AND THE ABOVE-NAMED SUPPLIERS DISCLAIM ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, WITHOUT LIMITATION, THOSE OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT OR ARISING FROM A COURSE OF DEALING, USAGE, OR TRADE PRACTICE.

IN NO EVENT SHALL CISCO OR ITS SUPPLIERS BE LIABLE FOR ANY INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES, INCLUDING, WITHOUT LIMITATION, LOST PROFITS OR LOSS OR DAMAGE TO DATA ARISING OUT OF THE USE OR INABILITY TO USE THIS MANUAL, EVEN IF CISCO OR ITS SUPPLIERS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Any Internet Protocol (IP) addresses and phone numbers used in this document are not intended to be actual addresses and phone numbers. Any examples, command display output, network topology diagrams, and other figures included in the document are shown for illustrative purposes only. Any use of actual IP addresses or phone numbers in illustrative content is unintentional and coincidental.

All printed copies and duplicate soft copies of this document are considered uncontrolled. See the current online version for the latest version.

Cisco has more than 200 offices worldwide. Addresses and phone numbers are listed on the Cisco website at www.cisco.com/go/offices.

Cisco and the Cisco logo are trademarks or registered trademarks of Cisco and/or its affiliates in the U.S. and other countries. To view a list of Cisco trademarks, go to this URL: https://www.cisco.com/c/en/us/about/legal/trademarks.html. Third-party trademarks mentioned are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (1721R)

Americas Headquarters
Cisco Systems, Inc.
San Jose, CA 95134-1706
USA

Asia Pacific Headquarters
CiscoSystems(USA)Pte.Ltd.
Singapore

Europe Headquarters
CiscoSystemsInternationalBV
Amsterdam,TheNetherlands

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at www.cisco.com/go/offices.