Release Notes for Cisco ASR 9000 Series Routers, IOS XR Release 7.3.2

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IOS XR 64 bit on Cisco ASR 9000 Series is the next generation IOS XR running in virtualized environment with underlying 64 bit Linux kernel. Cisco IOS XR operating system delivers greater agility, automation and simplicity, while reducing the cost of operating the networks.

Note Cisco IOS XR Release 7.3.2 is an Extended Maintenance Release of Cisco IOS XR Release 7.3.1 for Cisco ASR 9000 Series routers. For more details on the Cisco IOS XR release model and associated support, see Guidelines for Cisco IOS XR Software.

References

For more information about Cisco ASR 9000 Series, see:

- Cisco ASR 9000 Data Sheet listing page
- Migration Guide for Cisco ASR 9000 Series Routers
- Cisco Software Manager User Guide

What's New in Cisco IOS XR Release 7.3.2

Cisco is continuously enhancing the product with every release and this section covers a brief description of key features and enhancements. It also includes links to detailed documentation, where available.

Software Introduced and Enhanced

To learn about features introduced in other Cisco IOS XR releases, select the release from the What's new page.

Feature	Description
System Error Messages	
System Error Messages	An intuitive interface to view, search, compare, and download Cisco IOS XR Error Messages.
Broadband Network Gateway	

Feature	Description
BNG feature support extension	This release extends the support of certain BNG functionalities on these Cisco ASR 9000 5th generation High Density Ethernet line cards: • A99-32X100GE-X-SE • A9K-20HG-FLEX-SE • A9K-8HG-FLEX-SE Features now available on these line cards are: • Provisioning PPP LAC Session • PPPoE keep alive offload. See Provisioning PPP PTA Session. • BNG over Pseudowire Headend This enhancement enables BNG features to leverage the higher throughput that the 5th generation of line cards provide.
BNG on Cisco ASR 9903 Router	BNG, which is the access point for subscribers through which they connect to the broadband network, is now supported on the Cisco ASR 9903 Router. This is a compact, high-performance router that delivers up to 3.6 Tbps of nonblocking, full-duplex capacity in a Three-Rack-Unit (3RU) form factor. All features supported on the Cisco ASR 9000 5th Generation High Density Ethernet Line Cards are supported on Cisco ASR 9903 Router from this release. See *BNG Support on Cisco ASR 9000 5th Generation High Density Ethernet Line Cards* for details.

BNG support on satellites hosted on Cisco ASR 9000 Series routers and line cards	This release enables you to configure BNG services on satellite interfaces hosted on the following hardware:
	• Cisco ASR 9000 5th Generation High Density Ethernet line cards with the following PIDs:
	  • A99-32X100GE-X-SE
	  • A9K-20HG-FLEX-SE
	  • A9K-8HG-FLEX-SE
	• Cisco ASR 9903 Routers
	This feature provides you with extended port scalability and density as each port of the line card/router can host a satellite device.

Store Accounting Stop Records	During link failure between BNG and the RADIUS server, this feature helps prevent data and revenue loss by allowing you to store the final accounting record (also known as accounting Stop record) in the local hard disk until the link is up. In earlier releases, a link failure would delete the accounting Stop record.
Programmability	

Feature	Description
Achieving Operational Simplicity Using Automation Scripts	This feature lets you host and execute your automation scripts directly on a router running IOS XR software, instead of managing them on external controllers. The scripts available on-box can now leverage Python libraries, access the underlying router information to execute CLI commands, and monitor router configurations continuously. This results in setting up a seamless automation workflow by improving connectivity, access to resources, and speed of script execution. The following categories of on-box scripts are used to achieve operational simplicity: • Config scripts • Exec scripts • Process scripts • EEM scripts
Contextual Script Infrastructure	When you create and run Python scripts on the router, this feature enables a contextual interaction between the scripts, the IOS XR software, and the external servers. This context, programmed in the script, uses Cisco IOS XR Python packages, modules, and libraries to: • obtain operational data from the router • set configurations and conditions • detect events in the network and trigger an appropriate action
Enhancements to Cisco-IOS-XR-mpls-ping-act and Cisco-IOS-XR-mpls-traceroute-act YANG data model	This feature delivers enhancements to the Cisco-IOS-XR-mpls-ping-act and Cisco-IOS-XR-mpls-traceroute-act YANG data models to accommodate OAM RPCs for MPLS and SR-MPLS. You can access these Cisco IOS XR native data models from the Github repository.
Enhancements to oc-platform YANG data model	The openconfig-platform YANG data model provides a structure for querying hardware and software router components via the NETCONF protocol. This release delivers an enhanced openconfig-platform YANG data model to provide information about: • software version • golden ISO (GISO) label • committed IOS XR packages You can access this data model from the Github repository.
Manage Automation Scripts Using YANG RPCs	This feature enables you to use remote procedure calls (RPCs) on YANG data models to perform the same automated operations as CLIs, such as edit configurations or retrieve router information.
Model-driven CLI to Display Running Configuration in XML and JSON Formats	This feature enables you to display the configuration data for Cisco IOS XR platforms in both JSON and XML formats. This feature introduces the **show run | [xml | json]** command.

Feature	Description
Model-driven CLI to Show YANG Operational Data	This feature enables you to use a traditional CLI command to display YANG data model structures on the router console and also obtain operational data from the router in JSON or XML formats. The functionality helps you transition smoothly between CLI and YANG models, easing data retrieval from your router and network. This feature introduces the **show yang operational** command.
IP Addresses and Services	
Monitor LPTS host path drops via YANG data model	This feature allows you to use the `Cisco-IOS-XR-lpts-pre-ifib-oper.yang` data model to monitor the policer action for Local Packet Transport Services (LPTS) flow type for all IOS XR platforms. To access this data model, see the Github repository.
MPLS	
Encapsulation: RSVP-TE: Backoff Timer Enhancement	When an LSP path error occurs on a head-end router, you can guide the incoming traffic for the LSP in these ways - Update the initial and total time duration for which the head-end router retries sending traffic over the LSP, or instruct MPLS-TE to send traffic over a different LSP, without a waiting period. The feature provides flexibility to choose different actions when an LSP path error occurs. New commands: • **mpls traffic-eng timers backoff-timer**
Segment Routing	
BGP-LU Inter-AS Option-C Interworking with LDP and IGP SR-MPLS using Proxy BGP-SR	This feature extends the current Proxy BGP-SR functionality by allowing the BGP-LU ASBR router with Proxy BGP-SR configured to also interconnect attached LDP domains. The Proxy BGP-SR feature allows interconnection of IGP SR-MPLS domains and legacy domains via BGP-LU Inter-AS option-C. It provides a prefix-to-SID mapping for BGP-LU prefixes that are learned without a Prefix-SID.
Dual-Stack L3VPN Services (IPv4, IPv6) (SRv6 Base)	This feature introduces support for Dual-stack (VPNv4/VPNv6) VRFs. VPNv4/VPNv6 Dual-stack supports both IPv4 (End.DT4) and IPv6 (End.DT6) based SRv6 L3VPN service on the same interface, sub-interface, or VRF.
Dual-Stack L3VPN Services (IPv4, IPv6) (SRv6 Micro-SID)	This feature introduces support for Dual-stack (VPNv4/VPNv6) VRFs. VPNv4/VPNv6 Dual-stack supports both IPv4 (uDT4) and IPv6 (uDT6) based SRv6 L3VPN service on the same interface, sub-interface, or VRF.
IP Endpoint Delay Measurement and Liveness Monitoring	This feature measures the end-to-end delay and monitors liveness of a specified IP endpoint node. This feature is supported on IPv4, IPv6, and MPLS data planes.
L3VPN BGP PIC over SR-TE	This feature provides BGP PIC support for L3VPN over SR policies. BGP PIC provides fast convergence when traffic switches from a primary path to a backup path. BGP PIC over SR-TE is supported when primary and backup paths are of the same or different resolution types.

Feature	Description
OSPF: Microloop Avoidance for Flexible Algorithm	This feature extends the current OSPF Flexible Algorithm functionality to support Microloop Avoidance.
SR-TE BGP Soft Next-Hop Validation For ODN Policies	This feature addresses BGP Next-Hop reachability issues through BGP Next-Hop *soft* validation, and also enhances BGP best path selection. New commands: • **nexthop validation color-extcomm disable** • **nexthop validation color-extcomm sr-policy** • **bgp bestpath igp-metric sr-policy**
SR-TE PCE Groups	This feature allows an SR policy to be delegated to a set of PCE servers configured under a PCE group. Multiple PCE groups can be configured to allow SR policies on the same head-end to be delegated to different sets of PCEs. With this functionality, an operator can designate sets of PCEs for various purposes, such as PCE-per-service-type or PCE-per-wholesale-customers.
SRv6 Services: EVPN VPWS — All-Active Multi-Homing (SRv6 Base)	This feature provides an ELINE (P2P) service with all-active multihoming capability over an SRv6 network. This features is supported on ASR 9000 3rd, 4th, and 5th generation line cards. All-Active Multi-Homing enables an operator to connect a customer edge (CE) device to two or more provider edge (PE) devices to provide load balancing and redundant connectivity. With All-Active Multi-Homing, all the PEs can forward traffic to and from the multi-homed device.
SRv6 Services: EVPN VPWS — All-Active Multi-Homing (SRv6 Micro SID)	This feature provides an ELINE (P2P) service with all-active multihoming capability over an SRv6 network. All-Active Multi-Homing enables an operator to connect a customer edge (CE) device to two or more provider edge (PE) devices to provide load balancing and redundant connectivity. With All-Active Multi-Homing, all the PEs can forward traffic to and from the multi-homed device.

Feature	Description
SRv6 Traffic Engineering	This feature introduces Segment Routing over IPv6 (SRv6) Traffic Engineering. This release supports the following features: • SRv6-TE with SRv6 micro-SIDs (uSIDs) • SRv6 policies • Manual SRv6 policies • On-Demand SRv6 policies - SR On-Demand Next-Hop (SR-ODN) • Automated steering for Layer 3-based BGP services (IPv4 L3VPN, IPv6 L3VPN, IPv4 BGP global, IPv6 BGP global) • SRv6-aware Path Computation Element (PCE) • PCEPv6 • Path computation optimization objectives (TE, IGP, latency) • Path computation constraints (affinity, disjointness)
SRv6/MPLS Dual-Connected PE (SRv6 Full-Length SID)	This feature allows a PE router to support IPv4 L3VPN services for a given VRF with both MPLS and SRv6. This is MPLS and SRv6 L3VPNv4 co-existence scenario and is sometimes referred to as dual-connected PE.
SRv6/MPLS Dual-Connected PE (SRv6 Micro SID)	This feature allows a PE router to support IPv4 L3VPN services for a given VRF with both MPLS and SRv6. This is MPLS and SRv6 L3VPNv4 co-existence scenario and is sometimes referred to as dual-connected PE.
SRv6/MPLS L3 Service Interworking Gateway (SRv6 Micro-SID)	This feature enables you to extend L3 services between MPLS and SRv6 domains by providing service continuity on the control plane and data plane. This feature allows for SRv6 L3VPN domains to interwork with existing MPLS L3VPN domains. The feature also allows a way to migrate from MPLS L3VPN to SRv6 L3VPN.
Segment Routing Treetrace Enhancements	The OAM Treetrace operation provides enhanced traceroute functionality to validate ECMP paths between two endpoints. This feature augments the Treetrace operation to support SR policies, SR NIL FEC, SR Flex Algo, or a custom list of labels.
System Security	
SSH Port Forwarding	With this feature enabled, the SSH client on a local host forwards the traffic coming on a given port to the specified host and port on a remote server, through an encrypted SSH channel. Legacy applications that do not otherwise support data encryption can leverage this functionality to ensure network security and confidentiality to the traffic that is sent to remote application servers. This feature introduces the ssh server port-forwarding local command.

Feature	Description

MACSec Support Extension on Sub-Interfaces	This release extends MACSec support to the sub-interfaces of the following ASR 9000 hardware products:
	• Cisco ASR 9903 High-Performance Compact Router:
	  • ASR-9903 (1.6 Fixed Board)
	  • A9903-20HG-PEC
	• 5th Generation High-Density Ethernet line cards:
	  • A9K-20HG-FLEX-SE
	  • A9K-20HG-FLEX-TR
	  • A9K-8HG-FLEX-SE
	  • A9K-8HG-FLEX-TR
	  • A99-10X400GE-X-SE
	  • A99-10X400GE-X-TR
	This enhancement enables these line cards and chassis to have individual MACSec session running on each sub-interface with its own pre-shared configuration key. It results in increased scale of encrypted traffic flow per sub-interface or VLAN.

System Management	
PTP support on 5th Generation 10-Port 400 Gigabit Ethernet Line Cards	Support for IEEE-1588 PTP is extended to the following line cards: • A99-10X400GE-X-SE • A99-10X400GE-X-TR
SyncE Support on 5th Generation 10-Port 400 Gigabit Ethernet Line Cards	Frequency Synchronization is used to distribute precision frequency around a network. Frequency is synchronized accurately using Synchronized Ethernet (SyncE) in devices connected by Ethernet in a network. SyncE is now supported on the line cards: • A99-10X400GE-X-SE • A99-10X400GE-X-TR

Hardware Introduced

This release introduces the following new hardware:

Hardware	Description
QDD-400G-ZR-S and QDD-400G-ZRP-S	The QDD-400G-ZR-S and QDD-400G-ZRP-S pluggable Digital Coherent Optic (DCO) transceivers combined with routers optimized for 400G port bandwidth, offer customers significantly higher router scales and capacities at lower cost. For configuration details, see the Configuring 400G Digital Coherent Optics. For command details, see the Coherent Optics Commands. For more information about the optic module portfolio, see the Cisco 400G Digital Coherent Optics QSFP-DD Optical Modules Data Sheet.
Supported Optical Modules on A99-10X400GE-X-SE and A99-10X400GE-X-TR Line Cards	The A99-10X400GE-X-SE and A99-10X400GE-X-TR line cards now support the following optical modules: • QSFP-100G-LR4-S – this optical module supports link lengths of up to 10km over a standard pair of G.652 single-mode fiber with duplex LC connectors. QSFP-100G-LR4-S supports 100GBase Ethernet rate. • QSFP-100G-CWDM4-S – this optical module supports link lengths of up to 2 km over a standard pair of G.652 Single-Mode Fiber (SMF) with duplex LC connectors. The 100 Gigabit Ethernet signal is carried over four wavelengths. Multiplexing and demultiplexing of the four wavelengths are managed within the optical module. See the Data Sheet for more information on these optical modules.

Caveats

These caveats are applicable for Cisco IOS XR Software:

Bug ID	Headline
CSCvy13197	Telemetry Syslog events are not received by telemetry client

Supported Packages and System Requirements

Feature Set (Software Images)

Visit the Cisco Software Download page to download the Cisco IOS XR software.

Cisco IOS XR 64 bit

This table lists the feature set matrix (ISO and RPM files) and associated filenames available for the Cisco IOS XR 64 bit 7.3.2 Release supported on the Cisco ASR 9000 Series Aggregation Services Router.

Table 1: Cisco IOS XR 64 bit Software Release 7.3.2 TAR Files

Feature Set	Filename	Description
Cisco IOS XR IP/MPLS Core Software [for RSP and RP systems]	ASR9K-x64-iosxr-px-7.3.2.tar	• Cisco IOS XR Manageability Package • Cisco IOS XR MPLS Package • Cisco IOS XR MPLS -TE and RSVP Package • Cisco IOS XR Multicast Package • Cisco IOS XR Optics Package • Cisco IOS XR BNG Package • Cisco IOS XR Lawful Intercept Package • Cisco IOS XR Satellite Package • Cisco IOS XR EIGRP Package • Cisco IOS XR ISIS Package • Cisco IOS XR OSPF Package • Cisco IOS XR M2M Package • Cisco IOS XR Service Package
Cisco IOS XR IP/MPLS Core Software 3DES [for RSP and RP systems]	ASR9K-x64-iosxr-px-k9-7.3.2.tar	• Cisco IOS XR Manageability Package • Cisco IOS XR MPLS Package • Cisco IOS XR MPLS -TE and RSVP Package • Cisco IOS XR Multicast Package • Cisco IOS XR Optics Package • Cisco IOS XR BNG Package • Cisco IOS XR Lawful Intercept Package • Cisco IOS XR Satellite Package • Cisco IOS XR Security Package • Cisco IOS XR EIGRP Package • Cisco IOS XR ISIS Package • Cisco IOS XR OSPF Package • Cisco IOS XR M2M Package • Cisco IOS XR Service Package

Feature Set	Filename	Description
Cisco IOS XR IP Unicast Routing Core Bundle and Migration to IOS XR 64 bit tar image	asr9k-mini-x64-migrate_to_eXR.tar-7.3.2	Contains the required core packages, including OS, Admin, Base,Forwarding, Modular Services Card, Routing, FPD, SNMP Agent, and Alarm Correlation. Contains mini.iso file for XR 64 bit 7.3.1 and additional software for migration to 64 bit.

Table 2: Cisco IOS XR 64 bit Software Release 7.3.2 ISO and RPM Files

Composite Package		
Feature Set	**Filename**	**Description**
Cisco IOS XR IP Unicast Routing Core Bundle	asr9k-mini-x64-7.3.2.iso	Contains the required core packages, including OS, Admin, Base,Forwarding, Modular Services Card, Routing, FPD, 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 EIGRP package	asr9k-eigrp-x64-1.0.0.0-r732.x86_64.rpm	Includes EIGRP protocol support software
Cisco IOS XR BNG Package	asr9k-bng-x64-1.1.0.0-r732.x86_64.rpm	Includes binaries to support BNG features.
Cisco IOS XR 64 bit ISIS package	asr9k-isis-x64-1.1.0.0-r732.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-r732.x86_64.rpm	Includes OSPF link state protocol support software
Cisco IOS XR 64 bit M2M package	asr9k-m2m-x64-2.0.0.0-r732.x86_64.rpm	Machine to Machine communication software
Cisco IOS XR Manageability Package	asr9k-mgbl-x64-3.0.0.0-r732.x86_64.rpm	CORBA2 agent, XML3 Parser, and HTTP server packages. This RPM 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-r732.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-r732.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-r732.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-r732.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-r732.x86_64.rpm	Includes LI software images.
Cisco IOS XR Security Package	asr9k-k9sec-x64-3.1.0.0-r732.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-r732.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
Cisco IOS XR 64 bit Services Package	asr9k-services-x64-1.0.0.0-r732.x86_64.rpm	Includes rpm to support Cisco IOS XR 64-bit inline MAP-T function

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 7.3.2 consist of the following:

- minimum 32 GB memory on the A99-RP-F
- 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 16 GB memory on the RP3 transport optimised (TR) variant and 40 GB memory on the RP3 service edge (SE) variant
- minimum 16 GB memory on the RSP5 transport optimised (TR) variant and 40 GB memory on the RSP5 service edge (SE) variant
- minimum 2 GB compact flash on route switch processors (RSPs)
- minimum 8 GB memory on the line cards (LCs) running Cisco IOS XR 64 bit image

Software Compatibility

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

- Cisco ASR 9900 Series Chassis
  - Cisco ASR 9922 (ASR-9922) Chassis
  - Cisco ASR 9912 (ASR-9912) Chassis
  - Cisco ASR 9910 (ASR-9910) Chassis
  - Cisco ASR 9906 (ASR-9906) Chassis
  - Cisco ASR 9904 (ASR-9904) Chassis
  - Cisco ASR 9903 (ASR-9903) Chassis
  - Cisco ASR 9901 (ASR-9901) Chassis
- Cisco ASR 9000 Series Chassis
  - Cisco ASR 9010 (ASR-9010) Chassis
  - Cisco ASR 9006 (ASR-9006) 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 active summary** command:

Cisco IOS XR

```
RP/0/RSP0/CPU0:router# show install active summary
Label : 7.3.2
    Active Packages: 16
        asr9k-xr-7.3.2 version=7.3.2 [Boot image]
        asr9k-mpls-x64-2.0.0.0-r732
        asr9k-mpls-te-rsvp-x64-2.1.0.0-r732
        asr9k-mgbl-x64-2.0.0.0-r732
        asr9k-mcast-x64-2.0.0.0-r732
        asr9k-ospf-x64-2.0.0.0-r732
        asr9k-services-x64-1.0.0.0-r732
        asr9k-k9sec-x64-2.2.0.0-r732
        asr9k-optic-x64-1.0.0.0-r732
        asr9k-bng-supp-x64-1.0.0.0-r732
```

```
asr9k-li-x64-1.1.0.0-r732
asr9k-9000v-nV-x64-1.0.0.0-r732
asr9k-eigrp-x64-1.0.0.0-r732
asr9k-isis-x64-1.1.0.0-r732
asr9k-m2m-x64-2.0.0.0-r732
asr9k-bng-x64-1.0.0.0-r732
```

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:

Note The show command output lists supported and EOL hardware PIDs. To know the PIDs that are supported in this release, see the Supported Hardware section in this Release Notes.

```
(sysadmin-vm)#show fpd package

================================ ================================================
                                          Field Programmable Device Package
                                 ================================================
                                           Req      SW          Min Req     Min Req
Card Type            FPD Description       Reload   Ver         SW Ver      Board Ver
================== ========================= ====== ========  ==========  =========
A99-10X400GE-X-CM    Aldrin-FPGA             YES      1.05        1.05       0.0
                     Beachcomber-0           YES      0.01        0.01       0.0
                     Beachcomber-1           YES      0.01        0.01       0.0
                     CBC                     NO      62.05       62.05       0.0
                     IPU-DDR4                YES      1.06        1.06       0.0
                     Primary-BIOS            YES     25.28       25.28       0.0
                     Sunstreaker             YES      0.14        0.14       0.0
                     TAMFW-Sunstreaker       YES      2.65        2.65       0.0
                     Trailbreaker-0          YES      0.23        0.23       0.0
                     Trailbreaker-1          YES      0.23        0.23       0.0
--------------------------------------------------------------------------------
A99-10X400GE-X-SE    Aldrin-FPGA             YES      1.05        1.05       0.0
                     Beachcomber-0           YES      0.01        0.01       0.0
                     Beachcomber-1           YES      0.01        0.01       0.0
                     CBC                     NO      62.05       62.05       0.0
                     IPU-DDR4                YES      1.06        1.06       0.0
                     Primary-BIOS            YES     25.28       25.28       0.0
                     Sunstreaker             YES      0.14        0.14       0.0
                     TAMFW-Sunstreaker       YES      2.65        2.65       0.0
                     Trailbreaker-0          YES      0.23        0.23       0.0
                     Trailbreaker-1          YES      0.23        0.23       0.0
--------------------------------------------------------------------------------
A99-10X400GE-X-TR    Aldrin-FPGA             YES      1.05        1.05       0.0
                     Beachcomber-0           YES      0.01        0.01       0.0
                     Beachcomber-1           YES      0.01        0.01       0.0
                     CBC                     NO      62.05       62.05       0.0
                     IPU-DDR4                YES      1.06        1.06       0.0
                     Primary-BIOS            YES     25.28       25.28       0.0
                     Sunstreaker             YES      0.14        0.14       0.0
                     TAMFW-Sunstreaker       YES      2.65        2.65       0.0
                     Trailbreaker-0          YES      0.23        0.23       0.0
                     Trailbreaker-1          YES      0.23        0.23       0.0
--------------------------------------------------------------------------------
A99-12X100GE         CBC                     NO      46.06       46.06       0.1
                     IPU-FPGA                YES      1.89        1.89       0.1
                     IPU-FSBL                YES      1.113       1.113      0.1
                     IPU-Linux               YES      1.113       1.113      0.1
                     Morra-0                 YES      1.02        1.02       0.1
```

	Morra-1	YES	1.02	1.02	0.1
	Primary-BIOS	YES	9.33	9.33	0.1
	Sideswipe-0	YES	1.02	1.02	0.1
	Sideswipe-1	YES	1.02	1.02	0.1
A99-12X100GE-CM	CBC	NO	46.06	46.06	0.1
	IPU-FPGA	YES	1.89	1.89	0.1
	IPU-FSBL	YES	1.113	1.113	0.1
	IPU-Linux	YES	1.113	1.113	0.1
	Morra-0	YES	1.02	1.02	0.1
	Morra-1	YES	1.02	1.02	0.1
	Primary-BIOS	YES	9.33	9.33	0.1
	Sideswipe-0	YES	1.02	1.02	0.1
	Sideswipe-1	YES	1.02	1.02	0.1
A99-16X100GE-CM	Aldrin-FPGA	YES	1.05	1.05	0.0
	CBC	NO	48.09	48.09	0.0
	Grapple-0	YES	0.15	0.15	0.0
	IPU-DDR4	YES	1.09	1.09	0.0
	Mixmaster-0	YES	0.13	0.13	0.0
	Primary-BIOS	YES	21.42	21.42	0.0
	Scamper	YES	0.23	0.23	0.0
	Skylynx-0	YES	0.12	0.12	0.0
A99-16X100GE-SE	Aldrin-FPGA	YES	1.05	1.05	0.0
	CBC	NO	48.09	48.09	0.0
	Grapple-0	YES	0.15	0.15	0.0
	IPU-DDR4	YES	1.09	1.09	0.0
	Mixmaster-0	YES	0.13	0.13	0.0
	Primary-BIOS	YES	21.42	21.42	0.0
	Scamper	YES	0.23	0.23	0.0
	Skylynx-0	YES	0.12	0.12	0.0
A99-16X100GE-TR	Aldrin-FPGA	YES	1.05	1.05	0.0
	CBC	NO	48.09	48.09	0.0
	Grapple-0	YES	0.15	0.15	0.0
	IPU-DDR4	YES	1.09	1.09	0.0
	Mixmaster-0	YES	0.13	0.13	0.0
	Primary-BIOS	YES	21.42	21.42	0.0
	Scamper	YES	0.23	0.23	0.0
	Skylynx-0	YES	0.12	0.12	0.0
A99-16X100GE-X-SE	Aldrin-FPGA	YES	1.05	1.05	0.0
	CBC	NO	48.09	48.09	0.0
	Grapple-0	YES	0.15	0.15	0.0
	Grapple-1	YES	0.15	0.15	0.0
	IPU-DDR4	YES	1.09	1.09	0.0
	Mixmaster-0	YES	0.13	0.13	0.0
	Mixmaster-1	YES	0.13	0.13	0.0
	Primary-BIOS	YES	21.42	21.42	0.0
	Scamper	YES	0.23	0.23	0.0
	Skylynx-0	YES	0.12	0.12	0.0
	Skylynx-1	YES	0.12	0.12	0.0
A99-24HG-FLEX-CM	Aldrin-FPGA	YES	1.05	1.05	0.0
	CBC	NO	57.04	57.04	0.0
	Grapple-0	YES	0.15	0.15	0.0
	Grapple-1	YES	0.15	0.15	0.0
	IPU-DDR4	YES	1.18	1.18	0.0
	Mixmaster-0	YES	0.13	0.13	0.0
	Mixmaster-1	YES	0.13	0.13	0.0
	Primary-BIOS	YES	25.28	25.28	0.0
	Skylynx-0	YES	0.12	0.12	0.0
	Skylynx-1	YES	0.12	0.12	0.0

	Sunstreaker	YES	0.14	0.14	0.0
	TAMFW-Sunstreaker	YES	2.65	2.65	0.0
A99-24HG-FLEX-SE	Aldrin-FPGA	YES	1.05	1.05	0.0
	CBC	NO	57.04	57.04	0.0
	Grapple-0	YES	0.15	0.15	0.0
	Grapple-1	YES	0.15	0.15	0.0
	IPU-DDR4	YES	1.18	1.18	0.0
	Mixmaster-0	YES	0.13	0.13	0.0
	Mixmaster-1	YES	0.13	0.13	0.0
	Primary-BIOS	YES	25.28	25.28	0.0
	Skylynx-0	YES	0.12	0.12	0.0
	Skylynx-1	YES	0.12	0.12	0.0
	Sunstreaker	YES	0.14	0.14	0.0
	TAMFW-Sunstreaker	YES	2.65	2.65	0.0
A99-24HG-FLEX-TR	Aldrin-FPGA	YES	1.05	1.05	0.0
	CBC	NO	57.04	57.04	0.0
	Grapple-0	YES	0.15	0.15	0.0
	Grapple-1	YES	0.15	0.15	0.0
	IPU-DDR4	YES	1.18	1.18	0.0
	Mixmaster-0	YES	0.13	0.13	0.0
	Mixmaster-1	YES	0.13	0.13	0.0
	Primary-BIOS	YES	25.28	25.28	0.0
	Skylynx-0	YES	0.12	0.12	0.0
	Skylynx-1	YES	0.12	0.12	0.0
	Sunstreaker	YES	0.14	0.14	0.0
	TAMFW-Sunstreaker	YES	2.65	2.65	0.0
A99-24X10GE-1G-CM	CBC	NO	47.03	47.03	0.1
	IPU-FPGA	YES	1.89	1.89	0.1
	IPU-FSBL	YES	1.113	1.113	0.1
	IPU-Linux	YES	1.113	1.113	0.1
	Leadfoot-0	YES	1.00	1.00	0.1
	Lewis	YES	1.11	1.11	0.1
	Primary-BIOS	YES	18.33	18.33	0.1
A99-24X10GE-1G-SE	CBC	NO	47.03	47.03	0.1
	IPU-FPGA	YES	1.89	1.89	0.1
	IPU-FSBL	YES	1.113	1.113	0.1
	IPU-Linux	YES	1.113	1.113	0.1
	Leadfoot-0	YES	1.00	1.00	0.1
	Lewis	YES	1.11	1.11	0.1
	Primary-BIOS	YES	18.33	18.33	0.1
A99-24X10GE-1G-TR	CBC	NO	47.03	47.03	0.1
	IPU-FPGA	YES	1.89	1.89	0.1
	IPU-FSBL	YES	1.113	1.113	0.1
	IPU-Linux	YES	1.113	1.113	0.1
	Leadfoot-0	YES	1.00	1.00	0.1
	Lewis	YES	1.11	1.11	0.1
	Primary-BIOS	YES	18.33	18.33	0.1
A99-32X100GE-CM	Aldrin-FPGA	YES	1.05	1.05	0.0
	CBC	NO	48.09	48.09	0.0
	Grapple-0	YES	0.15	0.15	0.0
	Grapple-1	YES	0.15	0.15	0.0
	IPU-DDR4	YES	1.09	1.09	0.0
	Mixmaster-0	YES	0.13	0.13	0.0
	Mixmaster-1	YES	0.13	0.13	0.0
	Primary-BIOS	YES	21.42	21.42	0.0
	Scamper	YES	0.23	0.23	0.0
	Skylynx-0	YES	0.12	0.12	0.0
	Skylynx-1	YES	0.12	0.12	0.0

A99-32X100GE-DENS	Aldrin-FPGA	YES	1.05	1.05	0.0
	CBC	NO	57.04	57.04	0.0
	Grapple-0	YES	0.12	0.12	0.0
	Grapple-1	YES	0.12	0.12	0.0
	IPU-DDR4	YES	1.09	1.09	0.0
	Mixmaster-0	YES	0.13	0.13	0.0
	Mixmaster-1	YES	0.13	0.13	0.0
	Primary-BIOS	YES	25.28	25.28	0.0
	Skylynx-0	YES	0.08	0.08	0.0
	Skylynx-1	YES	0.08	0.08	0.0
	Sunstreaker	YES	0.14	0.14	0.0
	TAMFW-Sunstreaker	YES	2.65	2.65	0.0
A99-32X100GE-SE	Aldrin-FPGA	YES	1.05	1.05	0.0
	CBC	NO	48.09	48.09	0.0
	Grapple-0	YES	0.15	0.15	0.0
	Grapple-1	YES	0.15	0.15	0.0
	IPU-DDR4	YES	1.09	1.09	0.0
	Mixmaster-0	YES	0.13	0.13	0.0
	Mixmaster-1	YES	0.13	0.13	0.0
	Primary-BIOS	YES	21.42	21.42	0.0
	Scamper	YES	0.23	0.23	0.0
	Skylynx-0	YES	0.12	0.12	0.0
	Skylynx-1	YES	0.12	0.12	0.0
A99-32X100GE-TR	Aldrin-FPGA	YES	1.05	1.05	0.0
	CBC	NO	48.09	48.09	0.0
	Grapple-0	YES	0.15	0.15	0.0
	Grapple-1	YES	0.15	0.15	0.0
	IPU-DDR4	YES	1.09	1.09	0.0
	Mixmaster-0	YES	0.13	0.13	0.0
	Mixmaster-1	YES	0.13	0.13	0.0
	Primary-BIOS	YES	21.42	21.42	0.0
	Scamper	YES	0.23	0.23	0.0
	Skylynx-0	YES	0.12	0.12	0.0
	Skylynx-1	YES	0.12	0.12	0.0
A99-32X100GE-X-CM	Aldrin-FPGA	YES	1.05	1.05	0.0
	CBC	NO	57.04	57.04	0.0
	Grapple-0	YES	0.15	0.15	0.0
	Grapple-1	YES	0.15	0.15	0.0
	IPU-DDR4	YES	1.18	1.18	0.0
	Mixmaster-0	YES	0.13	0.13	0.0
	Mixmaster-1	YES	0.13	0.13	0.0
	Primary-BIOS	YES	25.28	25.28	0.0
	Skylynx-0	YES	0.12	0.12	0.0
	Skylynx-1	YES	0.12	0.12	0.0
	Sunstreaker	YES	0.14	0.14	0.0
	TAMFW-Sunstreaker	YES	2.65	2.65	0.0
A99-32X100GE-X-SE	Aldrin-FPGA	YES	1.05	1.05	0.0
	CBC	NO	57.04	57.04	0.0
	Grapple-0	YES	0.15	0.15	0.0
	Grapple-1	YES	0.15	0.15	0.0
	IPU-DDR4	YES	1.18	1.18	0.0
	Mixmaster-0	YES	0.13	0.13	0.0
	Mixmaster-1	YES	0.13	0.13	0.0
	Primary-BIOS	YES	25.28	25.28	0.0
	Skylynx-0	YES	0.12	0.12	0.0
	Skylynx-1	YES	0.12	0.12	0.0
	Sunstreaker	YES	0.14	0.14	0.0
	TAMFW-Sunstreaker	YES	2.65	2.65	0.0

A99-32X100GE-X-TR	Aldrin-FPGA	YES	1.05	1.05	0.0
	CBC	NO	57.04	57.04	0.0
	Grapple-0	YES	0.15	0.15	0.0
	Grapple-1	YES	0.15	0.15	0.0
	IPU-DDR4	YES	1.18	1.18	0.0
	Mixmaster-0	YES	0.13	0.13	0.0
	Mixmaster-1	YES	0.13	0.13	0.0
	Primary-BIOS	YES	25.28	25.28	0.0
	Skylynx-0	YES	0.12	0.12	0.0
	Skylynx-1	YES	0.12	0.12	0.0
	Sunstreaker	YES	0.14	0.14	0.0
	TAMFW-Sunstreaker	YES	2.65	2.65	0.0
A99-48X10GE-1G-CM	CBC	NO	47.03	47.03	0.1
	IPU-FPGA	YES	1.89	1.89	0.1
	IPU-FSBL	YES	1.113	1.113	0.1
	IPU-Linux	YES	1.113	1.113	0.1
	Leadfoot-0	YES	1.00	1.00	0.1
	Leadfoot-1	YES	1.00	1.00	0.1
	Lewis	YES	1.11	1.11	0.1
	Primary-BIOS	YES	18.33	18.33	0.1
A99-48X10GE-1G-SE	CBC	NO	47.03	47.03	0.1
	IPU-FPGA	YES	1.89	1.89	0.1
	IPU-FSBL	YES	1.113	1.113	0.1
	IPU-Linux	YES	1.113	1.113	0.1
	Leadfoot-0	YES	1.00	1.00	0.1
	Leadfoot-1	YES	1.00	1.00	0.1
	Lewis	YES	1.11	1.11	0.1
	Primary-BIOS	YES	18.33	18.33	0.1
A99-48X10GE-1G-TR	CBC	NO	47.03	47.03	0.1
	IPU-FPGA	YES	1.89	1.89	0.1
	IPU-FSBL	YES	1.113	1.113	0.1
	IPU-Linux	YES	1.113	1.113	0.1
	Leadfoot-0	YES	1.00	1.00	0.1
	Leadfoot-1	YES	1.00	1.00	0.1
	Lewis	YES	1.11	1.11	0.1
	Primary-BIOS	YES	18.33	18.33	0.1
A99-4X100GE-SE	CBC	NO	38.23	38.23	0.0
	Dalla	YES	1.09	1.09	0.0
	IPU-FPGA	YES	1.99	1.99	0.0
	IPU-FSBL	YES	1.113	1.113	0.0
	IPU-Linux	YES	1.113	1.113	0.0
	Meldun-0	YES	1.07	1.07	0.0
	Meldun-1	YES	1.07	1.07	0.0
	Primary-BIOS	YES	8.51	8.51	0.0
A99-4X100GE-SE	CBC	NO	38.23	38.23	0.0
	Dalla	YES	1.09	1.09	0.0
	IPU-FPGA	YES	1.99	1.99	0.0
	IPU-FSBL	YES	1.113	1.113	0.0
	IPU-Linux	YES	1.113	1.113	0.0
	Meldun-0	YES	1.07	1.07	0.0
	Meldun-1	YES	1.07	1.07	0.0
	Primary-BIOS	YES	8.51	8.51	0.0
A99-4X100GE-SE-TAA	CBC	NO	38.23	38.23	0.0
	Dalla	YES	1.09	1.09	0.0
	IPU-FPGA	YES	1.99	1.99	0.0
	IPU-FSBL	YES	1.113	1.113	0.0
	IPU-Linux	YES	1.113	1.113	0.0
	Meldun-0	YES	1.07	1.07	0.0

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                     Meldun-1                    YES      1.07         1.07        0.0
                     Primary-BIOS                YES      8.51         8.51        0.0
--------------------------------------------------------------------------------------
A99-4X100GE-TAA      CBC                         NO      38.23        38.23        0.0
                     Dalla                       YES      1.09         1.09        0.0
                     IPU-FPGA                    YES      1.99         1.99        0.0
                     IPU-FSBL                    YES      1.113        1.113       0.0
                     IPU-Linux                   YES      1.113        1.113       0.0
                     Meldun-0                    YES      1.07         1.07        0.0
                     Meldun-1                    YES      1.07         1.07        0.0
                     Primary-BIOS                YES      8.51         8.51        0.0
--------------------------------------------------------------------------------------
A99-4X100GE-TR       CBC                         NO      38.23        38.23        0.0
                     Dalla                       YES      1.09         1.09        0.0
                     IPU-FPGA                    YES      1.99         1.99        0.0
                     IPU-FSBL                    YES      1.113        1.113       0.0
                     IPU-Linux                   YES      1.113        1.113       0.0
                     Meldun-0                    YES      1.07         1.07        0.0
                     Meldun-1                    YES      1.07         1.07        0.0
                     Primary-BIOS                YES      8.51         8.51        0.0
--------------------------------------------------------------------------------------
A99-4X100GE-TR       CBC                         NO      38.23        38.23        0.0
                     Dalla                       YES      1.09         1.09        0.0
                     IPU-FPGA                    YES      1.99         1.99        0.0
                     IPU-FSBL                    YES      1.113        1.113       0.0
                     IPU-Linux                   YES      1.113        1.113       0.0
                     Meldun-0                    YES      1.07         1.07        0.0
                     Meldun-1                    YES      1.07         1.07        0.0
                     Primary-BIOS                YES      8.51         8.51        0.0
--------------------------------------------------------------------------------------
A99-4X100GE-TR-TAA   CBC                         NO      38.23        38.23        0.0
                     Dalla                       YES      1.09         1.09        0.0
                     IPU-FPGA                    YES      1.99         1.99        0.0
                     IPU-FSBL                    YES      1.113        1.113       0.0
                     IPU-Linux                   YES      1.113        1.113       0.0
                     Meldun-0                    YES      1.07         1.07        0.0
                     Meldun-1                    YES      1.07         1.07        0.0
                     Primary-BIOS                YES      8.51         8.51        0.0
--------------------------------------------------------------------------------------
A99-8X100GE-CM       CBC                         NO      38.23        38.23        0.0
                     Dalla                       YES      1.09         1.09        0.0
                     IPU-FPGA                    YES      1.99         1.99        0.0
                     IPU-FSBL                    YES      1.113        1.113       0.0
                     IPU-Linux                   YES      1.113        1.113       0.0
                     Meldun-0                    YES      1.07         1.07        0.0
                     Meldun-1                    YES      1.07         1.07        0.0
                     Primary-BIOS                YES      8.51         8.51        0.0
--------------------------------------------------------------------------------------
A99-8X100GE-SE       CBC                         NO      38.23        38.23        0.0
                     Dalla                       YES      1.09         1.09        0.0
                     IPU-FPGA                    YES      1.99         1.99        0.0
                     IPU-FSBL                    YES      1.113        1.113       0.0
                     IPU-Linux                   YES      1.113        1.113       0.0
                     Meldun-0                    YES      1.07         1.07        0.0
                     Meldun-1                    YES      1.07         1.07        0.0
                     Primary-BIOS                YES      8.51         8.51        0.0
--------------------------------------------------------------------------------------
A99-8X100GE-SE       CBC                         NO      38.23        38.23        0.0
                     Dalla                       YES      1.09         1.09        0.0
                     IPU-FPGA                    YES      1.99         1.99        0.0
                     IPU-FSBL                    YES      1.113        1.113       0.0
                     IPU-Linux                   YES      1.113        1.113       0.0
                     Meldun-0                    YES      1.07         1.07        0.0
                     Meldun-1                    YES      1.07         1.07        0.0
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                    Primary-BIOS              YES     8.51        8.51       0.0
-------------------------------------------------------------------------------------
A99-8X100GE-SE-TAA  CBC                       NO     38.23       38.23       0.0
                    Dalla                     YES     1.09        1.09       0.0
                    IPU-FPGA                  YES     1.99        1.99       0.0
                    IPU-FSBL                  YES     1.113       1.113      0.0
                    IPU-Linux                 YES     1.113       1.113      0.0
                    Meldun-0                  YES     1.07        1.07       0.0
                    Meldun-1                  YES     1.07        1.07       0.0
                    Primary-BIOS              YES     8.51        8.51       0.0
-------------------------------------------------------------------------------------
A99-8X100GE-TAA     CBC                       NO     38.23       38.23       0.0
                    Dalla                     YES     1.09        1.09       0.0
                    IPU-FPGA                  YES     1.99        1.99       0.0
                    IPU-FSBL                  YES     1.113       1.113      0.0
                    IPU-Linux                 YES     1.113       1.113      0.0
                    Meldun-0                  YES     1.07        1.07       0.0
                    Meldun-1                  YES     1.07        1.07       0.0
                    Primary-BIOS              YES     8.51        8.51       0.0
-------------------------------------------------------------------------------------
A99-8X100GE-TR      CBC                       NO     38.23       38.23       0.0
                    Dalla                     YES     1.09        1.09       0.0
                    IPU-FPGA                  YES     1.99        1.99       0.0
                    IPU-FSBL                  YES     1.113       1.113      0.0
                    IPU-Linux                 YES     1.113       1.113      0.0
                    Meldun-0                  YES     1.07        1.07       0.0
                    Meldun-1                  YES     1.07        1.07       0.0
                    Primary-BIOS              YES     8.51        8.51       0.0
-------------------------------------------------------------------------------------
A99-8X100GE-TR      CBC                       NO     38.23       38.23       0.0
                    Dalla                     YES     1.09        1.09       0.0
                    IPU-FPGA                  YES     1.99        1.99       0.0
                    IPU-FSBL                  YES     1.113       1.113      0.0
                    IPU-Linux                 YES     1.113       1.113      0.0
                    Meldun-0                  YES     1.07        1.07       0.0
                    Meldun-1                  YES     1.07        1.07       0.0
                    Primary-BIOS              YES     8.51        8.51       0.0
-------------------------------------------------------------------------------------
A99-8X100GE-TR-TAA  CBC                       NO     38.23       38.23       0.0
                    Dalla                     YES     1.09        1.09       0.0
                    IPU-FPGA                  YES     1.99        1.99       0.0
                    IPU-FSBL                  YES     1.113       1.113      0.0
                    IPU-Linux                 YES     1.113       1.113      0.0
                    Meldun-0                  YES     1.07        1.07       0.0
                    Meldun-1                  YES     1.07        1.07       0.0
                    Primary-BIOS              YES     8.51        8.51       0.0
-------------------------------------------------------------------------------------
A99-RP-F            Aldrin-0-FPGA             YES     1.06        1.06       0.0
                    CBC                       NO     59.13       59.13       0.0
                    Lionheart-FPGA            YES     0.30        0.30       0.0
                    Longshot                  YES     2.16        2.16       0.0
                    Primary-BIOS              YES    33.29       33.29       0.0
                    TamFW-Longshot            YES     2.65        2.65       0.0
                    Wolfpack-FPGA             YES     0.19        0.19       0.0
-------------------------------------------------------------------------------------
A99-RP2-SE          Alpha-FPGA                YES     0.16        0.16       0.0
                    CBC-0                     NO     35.14       35.14       0.0
                    CBC-1                     NO     35.14       35.14       0.0
                    Cha-FPGA                  YES     0.08        0.08       0.0
                    IPU-FPGA                  YES     0.72        0.72       0.0
                    IPU-FSBL                  YES     1.113       1.113      0.0
                    IPU-Linux                 YES     1.113       1.113      0.0
                    Omega-FPGA                YES     0.18        0.18       0.0
                    Optimus-FPGA              YES     0.12        0.12       0.0
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	Primary-BIOS	YES	14.39	14.39	0.0
A99-RP2-TR	Alpha-FPGA	YES	0.16	0.16	0.0
	CBC-0	NO	35.14	35.14	0.0
	CBC-1	NO	35.14	35.14	0.0
	Cha-FPGA	YES	0.08	0.08	0.0
	IPU-FPGA	YES	0.72	0.72	0.0
	IPU-FSBL	YES	1.113	1.113	0.0
	IPU-Linux	YES	1.113	1.113	0.0
	Omega-FPGA	YES	0.18	0.18	0.0
	Optimus-FPGA	YES	0.12	0.12	0.0
	Primary-BIOS	YES	14.39	14.39	0.0
A99-RP3-SE	Aldrin-0-FPGA	YES	1.03	1.03	0.0
	Aldrin-1-FPGA	YES	1.00	1.00	0.0
	Beta-FPGA	YES	0.07	0.07	0.0
	CBC-0	NO	51.12	51.12	0.0
	CBC-1	NO	51.12	51.12	0.0
	IPU-DDR4	YES	0.20	0.20	0.0
	Orion-FPGA	YES	0.23	0.23	0.0
	Primary-BIOS	YES	30.35	30.35	0.0
	Zenith-FPGA	YES	0.10	0.10	0.0
A99-RP3-TR	Aldrin-0-FPGA	YES	1.03	1.03	0.0
	Aldrin-1-FPGA	YES	1.00	1.00	0.0
	Beta-FPGA	YES	0.07	0.07	0.0
	CBC-0	NO	51.12	51.12	0.0
	CBC-1	NO	51.12	51.12	0.0
	IPU-DDR4	YES	0.20	0.20	0.0
	Orion-FPGA	YES	0.23	0.23	0.0
	Primary-BIOS	YES	30.35	30.35	0.0
	Zenith-FPGA	YES	0.10	0.10	0.0
A99-RSP-SE	Alpha-FPGA	YES	0.16	0.16	0.0
	CBC	NO	43.03	43.03	0.0
	Cha-FPGA	YES	0.08	0.08	0.0
	IPU-FPGA	YES	0.72	0.72	0.0
	IPU-FSBL	YES	1.113	1.113	0.0
	IPU-Linux	YES	1.113	1.113	0.0
	Omega-FPGA	YES	0.18	0.18	0.0
	Optimus-FPGA	YES	0.12	0.12	0.0
	Primary-BIOS	YES	16.18	16.18	0.0
A99-RSP-TR	Alpha-FPGA	YES	0.16	0.16	0.0
	CBC	NO	43.03	43.03	0.0
	Cha-FPGA	YES	0.08	0.08	0.0
	IPU-FPGA	YES	0.72	0.72	0.0
	IPU-FSBL	YES	1.113	1.113	0.0
	IPU-Linux	YES	1.113	1.113	0.0
	Omega-FPGA	YES	0.18	0.18	0.0
	Optimus-FPGA	YES	0.12	0.12	0.0
	Primary-BIOS	YES	16.18	16.18	0.0
A99-SFC-S	CBC	NO	44.02	44.02	0.0
	IPU-FPGA	YES	0.37	0.37	0.0
	IPU-FSBL	YES	1.100	1.100	0.0
	IPU-Linux	YES	1.100	1.100	0.0
A99-SFC-T	CBC	NO	44.02	44.02	0.0
	IPU-FPGA	YES	0.37	0.37	0.0
	IPU-FSBL	YES	1.100	1.100	0.0
	IPU-Linux	YES	1.100	1.100	0.0
A99-SFC2	CBC	NO	37.20	37.20	0.0

	IPU-FPGA	YES	0.37	0.37	0.0
	IPU-FSBL	YES	1.100	1.100	0.0
	IPU-Linux	YES	1.100	1.100	0.0
A99-SFC3	CBC	NO	49.03	49.03	0.0
	IPU-DDR4	YES	0.25	0.25	0.0
A99-SFC3-S	CBC	NO	44.02	44.02	0.0
	IPU-DDR4	YES	0.25	0.25	0.0
A99-SFC3-T	CBC	NO	44.02	44.02	0.0
	IPU-DDR4	YES	0.25	0.25	0.0
A99L-4X100GE-SE-TAA	CBC	NO	38.23	38.23	0.0
	Dalla	YES	1.09	1.09	0.0
	IPU-FPGA	YES	1.99	1.99	0.0
	IPU-FSBL	YES	1.113	1.113	0.0
	IPU-Linux	YES	1.113	1.113	0.0
	Meldun-0	YES	1.07	1.07	0.0
	Meldun-1	YES	1.07	1.07	0.0
	Primary-BIOS	YES	8.51	8.51	0.0
A99L-4X100GE-TAA	CBC	NO	38.23	38.23	0.0
	Dalla	YES	1.09	1.09	0.0
	IPU-FPGA	YES	1.99	1.99	0.0
	IPU-FSBL	YES	1.113	1.113	0.0
	IPU-Linux	YES	1.113	1.113	0.0
	Meldun-0	YES	1.07	1.07	0.0
	Meldun-1	YES	1.07	1.07	0.0
	Primary-BIOS	YES	8.51	8.51	0.0
A99L-4X100GE-TR-TAA	CBC	NO	38.23	38.23	0.0
	Dalla	YES	1.09	1.09	0.0
	IPU-FPGA	YES	1.99	1.99	0.0
	IPU-FSBL	YES	1.113	1.113	0.0
	IPU-Linux	YES	1.113	1.113	0.0
	Meldun-0	YES	1.07	1.07	0.0
	Meldun-1	YES	1.07	1.07	0.0
	Primary-BIOS	YES	8.51	8.51	0.0
A99L-8X100GE-SE-TAA	CBC	NO	38.23	38.23	0.0
	Dalla	YES	1.09	1.09	0.0
	IPU-FPGA	YES	1.99	1.99	0.0
	IPU-FSBL	YES	1.113	1.113	0.0
	IPU-Linux	YES	1.113	1.113	0.0
	Meldun-0	YES	1.07	1.07	0.0
	Meldun-1	YES	1.07	1.07	0.0
	Primary-BIOS	YES	8.51	8.51	0.0
A99L-8X100GE-TAA	CBC	NO	38.23	38.23	0.0
	Dalla	YES	1.09	1.09	0.0
	IPU-FPGA	YES	1.99	1.99	0.0
	IPU-FSBL	YES	1.113	1.113	0.0
	IPU-Linux	YES	1.113	1.113	0.0
	Meldun-0	YES	1.07	1.07	0.0
	Meldun-1	YES	1.07	1.07	0.0
	Primary-BIOS	YES	8.51	8.51	0.0
A99L-8X100GE-TR-TAA	CBC	NO	38.23	38.23	0.0
	Dalla	YES	1.09	1.09	0.0
	IPU-FPGA	YES	1.99	1.99	0.0
	IPU-FSBL	YES	1.113	1.113	0.0
	IPU-Linux	YES	1.113	1.113	0.0
	Meldun-0	YES	1.07	1.07	0.0

	Meldun-1	YES	1.07	1.07	0.0
	Primary-BIOS	YES	8.51	8.51	0.0
A9K-1600W-AC	PO-PriMCU	NO	17.137	17.137	0.0
A9K-1600W-DC	PO-PriMCU	NO	1.09	1.09	0.0
A9K-16X100GE-CM	Aldrin-FPGA	YES	1.05	1.05	0.0
	CBC	NO	48.09	48.09	0.0
	Grapple-0	YES	0.15	0.15	0.0
	IPU-DDR4	YES	1.09	1.09	0.0
	Mixmaster-0	YES	0.13	0.13	0.0
	Primary-BIOS	YES	21.42	21.42	0.0
	Scamper	YES	0.23	0.23	0.0
	Skylynx-0	YES	0.12	0.12	0.0
A9K-16X100GE-SE	Aldrin-FPGA	YES	1.05	1.05	0.0
	CBC	NO	48.09	48.09	0.0
	Grapple-0	YES	0.15	0.15	0.0
	IPU-DDR4	YES	1.09	1.09	0.0
	Mixmaster-0	YES	0.13	0.13	0.0
	Primary-BIOS	YES	21.42	21.42	0.0
	Scamper	YES	0.23	0.23	0.0
	Skylynx-0	YES	0.12	0.12	0.0
A9K-16X100GE-TR	Aldrin-FPGA	YES	1.05	1.05	0.0
	CBC	NO	48.09	48.09	0.0
	Grapple-0	YES	0.15	0.15	0.0
	IPU-DDR4	YES	1.09	1.09	0.0
	Mixmaster-0	YES	0.13	0.13	0.0
	Primary-BIOS	YES	21.42	21.42	0.0
	Scamper	YES	0.23	0.23	0.0
	Skylynx-0	YES	0.12	0.12	0.0
A9K-16X100GE-TR	Aldrin-FPGA	YES	1.05	1.05	0.0
	CBC	NO	48.09	48.09	0.0
	Grapple-0	YES	0.15	0.15	0.0
	IPU-DDR4	YES	1.09	1.09	0.0
	Mixmaster-0	YES	0.13	0.13	0.0
	Primary-BIOS	YES	21.42	21.42	0.0
	Scamper	YES	0.23	0.23	0.0
	Skylynx-0	YES	0.12	0.12	0.0
A9K-20HG-FLEX-CM	Aldrin-FPGA	YES	1.05	1.05	0.0
	CBC	NO	58.09	58.09	0.0
	IPU-DDR4	YES	1.18	1.18	0.0
	Primary-BIOS	YES	25.28	25.28	0.0
	Sunstreaker	YES	0.14	0.14	0.0
	TAMFW-Sunstreaker	YES	2.65	2.65	0.0
	Trailbreaker-0	YES	0.21	0.21	0.0
	Trailbreaker-1	YES	0.21	0.21	0.0
	Windcharger-0	YES	0.08	0.08	0.0
	Windcharger-1	YES	0.08	0.08	0.0
A9K-20HG-FLEX-SE	Aldrin-FPGA	YES	1.05	1.05	0.0
	CBC	NO	58.09	58.09	0.0
	IPU-DDR4	YES	1.18	1.18	0.0
	Primary-BIOS	YES	25.28	25.28	0.0
	Sunstreaker	YES	0.14	0.14	0.0
	TAMFW-Sunstreaker	YES	2.65	2.65	0.0
	Trailbreaker-0	YES	0.21	0.21	0.0
	Trailbreaker-1	YES	0.21	0.21	0.0
	Windcharger-0	YES	0.08	0.08	0.0
	Windcharger-1	YES	0.08	0.08	0.0

A9K-20HG-FLEX-TR	Aldrin-FPGA	YES	1.05	1.05	0.0
	CBC	NO	58.09	58.09	0.0
	IPU-DDR4	YES	1.18	1.18	0.0
	Primary-BIOS	YES	25.28	25.28	0.0
	Sunstreaker	YES	0.14	0.14	0.0
	TAMFW-Sunstreaker	YES	2.65	2.65	0.0
	Trailbreaker-0	YES	0.21	0.21	0.0
	Trailbreaker-1	YES	0.21	0.21	0.0
	Windcharger-0	YES	0.08	0.08	0.0
	Windcharger-1	YES	0.08	0.08	0.0
A9K-24X10GE-1G-CM	CBC	NO	47.03	47.03	0.1
	IPU-FPGA	YES	1.89	1.89	0.1
	IPU-FSBL	YES	1.113	1.113	0.1
	IPU-Linux	YES	1.113	1.113	0.1
	Leadfoot-0	YES	1.00	1.00	0.1
	Lewis	YES	1.11	1.11	0.1
	Primary-BIOS	YES	18.33	18.33	0.1
A9K-24X10GE-1G-SE	CBC	NO	47.03	47.03	0.1
	IPU-FPGA	YES	1.89	1.89	0.1
	IPU-FSBL	YES	1.113	1.113	0.1
	IPU-Linux	YES	1.113	1.113	0.1
	Leadfoot-0	YES	1.00	1.00	0.1
	Lewis	YES	1.11	1.11	0.1
	Primary-BIOS	YES	18.33	18.33	0.1
A9K-24X10GE-1G-TR	CBC	NO	47.03	47.03	0.1
	IPU-FPGA	YES	1.89	1.89	0.1
	IPU-FSBL	YES	1.113	1.113	0.1
	IPU-Linux	YES	1.113	1.113	0.1
	Leadfoot-0	YES	1.00	1.00	0.1
	Lewis	YES	1.11	1.11	0.1
	Primary-BIOS	YES	18.33	18.33	0.1
A9K-400G-DWDM-TR	CBC	NO	42.04	42.04	0.0
	Doran	YES	1.05	1.05	0.0
	Frenzy	YES	49.00	49.00	0.0
	IPU-FPGA	YES	1.97	1.97	0.1
	IPU-FSBL	YES	1.103	1.103	0.1
	IPU-Linux	YES	1.103	1.103	0.1
	Martell	YES	1.03	1.03	0.0
	Meldun	YES	1.07	1.07	0.1
	Primary-BIOS	YES	8.51	8.51	0.1
A9K-400GE-LSP	Aldrin-FPGA	YES	1.05	1.05	0.0
	CBC	NO	63.03	63.03	0.0
	IPU-DDR4	YES	1.04	1.04	0.0
	Moonracer	YES	1.02	1.02	0.0
	Primary-BIOS	YES	25.26	25.26	0.0
	Skywarp-0	YES	0.11	0.11	0.0
	Skywarp-1	YES	0.11	0.11	0.0
	Sunstreaker	YES	0.09	0.09	0.0
	TAMFW-Sunstreaker	YES	2.65	2.65	0.0
A9K-48X10GE-1G-CM	CBC	NO	47.03	47.03	0.1
	IPU-FPGA	YES	1.89	1.89	0.1
	IPU-FSBL	YES	1.113	1.113	0.1
	IPU-Linux	YES	1.113	1.113	0.1
	Leadfoot-0	YES	1.00	1.00	0.1
	Leadfoot-1	YES	1.00	1.00	0.1
	Lewis	YES	1.11	1.11	0.1
	Primary-BIOS	YES	18.33	18.33	0.1

A9K-48X10GE-1G-SE	CBC	NO	47.03	47.03	0.1
	IPU-FPGA	YES	1.89	1.89	0.1
	IPU-FSBL	YES	1.113	1.113	0.1
	IPU-Linux	YES	1.113	1.113	0.1
	Leadfoot-0	YES	1.00	1.00	0.1
	Leadfoot-1	YES	1.00	1.00	0.1
	Lewis	YES	1.11	1.11	0.1
	Primary-BIOS	YES	18.33	18.33	0.1
A9K-48X10GE-1G-TR	CBC	NO	47.03	47.03	0.1
	IPU-FPGA	YES	1.89	1.89	0.1
	IPU-FSBL	YES	1.113	1.113	0.1
	IPU-Linux	YES	1.113	1.113	0.1
	Leadfoot-0	YES	1.00	1.00	0.1
	Leadfoot-1	YES	1.00	1.00	0.1
	Lewis	YES	1.11	1.11	0.1
	Primary-BIOS	YES	18.33	18.33	0.1
A9K-4X100GE	CBC	NO	46.06	46.06	0.1
	IPU-FPGA	YES	1.89	1.89	0.1
	IPU-FSBL	YES	1.113	1.113	0.1
	IPU-Linux	YES	1.113	1.113	0.1
	Morra-0	YES	1.02	1.02	0.1
	Primary-BIOS	YES	9.33	9.33	0.1
	Sideswipe-0	YES	1.02	1.02	0.1
A9K-4X100GE-SE	CBC	NO	38.23	38.23	0.0
	Dalla	YES	1.09	1.09	0.0
	IPU-FPGA	YES	1.99	1.99	0.0
	IPU-FSBL	YES	1.113	1.113	0.0
	IPU-Linux	YES	1.113	1.113	0.0
	Meldun-0	YES	1.07	1.07	0.0
	Meldun-1	YES	1.07	1.07	0.0
	Primary-BIOS	YES	8.51	8.51	0.0
A9K-4X100GE-SE	CBC	NO	38.23	38.23	0.0
	Dalla	YES	1.09	1.09	0.0
	IPU-FPGA	YES	1.99	1.99	0.0
	IPU-FSBL	YES	1.113	1.113	0.0
	IPU-Linux	YES	1.113	1.113	0.0
	Meldun-0	YES	1.07	1.07	0.0
	Meldun-1	YES	1.07	1.07	0.0
	Primary-BIOS	YES	8.51	8.51	0.0
A9K-4X100GE-SE-TAA	CBC	NO	38.23	38.23	0.0
	Dalla	YES	1.09	1.09	0.0
	IPU-FPGA	YES	1.99	1.99	0.0
	IPU-FSBL	YES	1.113	1.113	0.0
	IPU-Linux	YES	1.113	1.113	0.0
	Meldun-0	YES	1.07	1.07	0.0
	Meldun-1	YES	1.07	1.07	0.0
	Primary-BIOS	YES	8.51	8.51	0.0
A9K-4X100GE-TAA	CBC	NO	38.23	38.23	0.0
	Dalla	YES	1.09	1.09	0.0
	IPU-FPGA	YES	1.99	1.99	0.0
	IPU-FSBL	YES	1.113	1.113	0.0
	IPU-Linux	YES	1.113	1.113	0.0
	Meldun-0	YES	1.07	1.07	0.0
	Meldun-1	YES	1.07	1.07	0.0
	Primary-BIOS	YES	8.51	8.51	0.0
A9K-4X100GE-TR	CBC	NO	38.23	38.23	0.0

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                    Dalla                     YES     1.09        1.09      0.0
                    IPU-FPGA                  YES     1.99        1.99      0.0
                    IPU-FSBL                  YES     1.113       1.113     0.0
                    IPU-Linux                 YES     1.113       1.113     0.0
                    Meldun-0                  YES     1.07        1.07      0.0
                    Meldun-1                  YES     1.07        1.07      0.0
                    Primary-BIOS              YES     8.51        8.51      0.0
--------------------------------------------------------------------------------
A9K-4X100GE-TR      CBC                       NO     38.23       38.23      0.0
                    Dalla                     YES     1.09        1.09      0.0
                    IPU-FPGA                  YES     1.99        1.99      0.0
                    IPU-FSBL                  YES     1.113       1.113     0.0
                    IPU-Linux                 YES     1.113       1.113     0.0
                    Meldun-0                  YES     1.07        1.07      0.0
                    Meldun-1                  YES     1.07        1.07      0.0
                    Primary-BIOS              YES     8.51        8.51      0.0
--------------------------------------------------------------------------------
A9K-4X100GE-TR-TAA  CBC                       NO     38.23       38.23      0.0
                    Dalla                     YES     1.09        1.09      0.0
                    IPU-FPGA                  YES     1.99        1.99      0.0
                    IPU-FSBL                  YES     1.113       1.113     0.0
                    IPU-Linux                 YES     1.113       1.113     0.0
                    Meldun-0                  YES     1.07        1.07      0.0
                    Meldun-1                  YES     1.07        1.07      0.0
                    Primary-BIOS              YES     8.51        8.51      0.0
--------------------------------------------------------------------------------
A9K-4X100GE-TR-V2   Aldrin-FPGA               YES     1.05        1.05      0.0
                    CBC                       NO     48.09       48.09      0.0
                    Grapple-0                 YES     0.15        0.15      0.0
                    IPU-DDR4                  YES     1.09        1.09      0.0
                    Mixmaster-0               YES     0.13        0.13      0.0
                    Primary-BIOS              YES    21.42       21.42      0.0
                    Scamper                   YES     0.23        0.23      0.0
                    Skylynx-0                 YES     0.12        0.12      0.0
--------------------------------------------------------------------------------
A9K-8HG-FLEX-CM     Aldrin-FPGA               YES     1.05        1.05      0.0
                    CBC                       NO     58.09       58.09      0.0
                    IPU-DDR4                  YES     1.18        1.18      0.0
                    Primary-BIOS              YES    25.28       25.28      0.0
                    Sunstreaker               YES     0.14        0.14      0.0
                    TAMFW-Sunstreaker         YES     2.65        2.65      0.0
                    Trailbreaker-0            YES     0.21        0.21      0.0
                    Windcharger-0             YES     0.08        0.08      0.0
--------------------------------------------------------------------------------
A9K-8HG-FLEX-SE     Aldrin-FPGA               YES     1.05        1.05      0.0
                    CBC                       NO     58.09       58.09      0.0
                    IPU-DDR4                  YES     1.18        1.18      0.0
                    Primary-BIOS              YES    25.28       25.28      0.0
                    Sunstreaker               YES     0.14        0.14      0.0
                    TAMFW-Sunstreaker         YES     2.65        2.65      0.0
                    Trailbreaker-0            YES     0.21        0.21      0.0
                    Windcharger-0             YES     0.08        0.08      0.0
--------------------------------------------------------------------------------
A9K-8HG-FLEX-TR     Aldrin-FPGA               YES     1.05        1.05      0.0
                    CBC                       NO     58.09       58.09      0.0
                    IPU-DDR4                  YES     1.18        1.18      0.0
                    Primary-BIOS              YES    25.28       25.28      0.0
                    Sunstreaker               YES     0.14        0.14      0.0
                    TAMFW-Sunstreaker         YES     2.65        2.65      0.0
                    Trailbreaker-0            YES     0.21        0.21      0.0
                    Windcharger-0             YES     0.08        0.08      0.0
--------------------------------------------------------------------------------
A9K-8X100GE-CM      CBC                       NO     38.23       38.23      0.0
                    Dalla                     YES     1.09        1.09      0.0
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	IPU-FPGA	YES	1.99	1.99	0.0
	IPU-FSBL	YES	1.113	1.113	0.0
	IPU-Linux	YES	1.113	1.113	0.0
	Meldun-0	YES	1.07	1.07	0.0
	Meldun-1	YES	1.07	1.07	0.0
	Primary-BIOS	YES	8.51	8.51	0.0
A9K-8X100GE-L-SE	CBC	NO	38.23	38.23	0.0
	Dalla	YES	1.09	1.09	0.0
	IPU-FPGA	YES	1.99	1.99	0.0
	IPU-FSBL	YES	1.113	1.113	0.0
	IPU-Linux	YES	1.113	1.113	0.0
	Meldun-0	YES	1.07	1.07	0.0
	Meldun-1	YES	1.07	1.07	0.0
	Primary-BIOS	YES	8.51	8.51	0.0
A9K-8X100GE-L-TAA	CBC	NO	38.23	38.23	0.0
	Dalla	YES	1.09	1.09	0.0
	IPU-FPGA	YES	1.99	1.99	0.0
	IPU-FSBL	YES	1.113	1.113	0.0
	IPU-Linux	YES	1.113	1.113	0.0
	Meldun-0	YES	1.07	1.07	0.0
	Meldun-1	YES	1.07	1.07	0.0
	Primary-BIOS	YES	8.51	8.51	0.0
A9K-8X100GE-L-TR	CBC	NO	38.23	38.23	0.0
	Dalla	YES	1.09	1.09	0.0
	IPU-FPGA	YES	1.99	1.99	0.0
	IPU-FSBL	YES	1.113	1.113	0.0
	IPU-Linux	YES	1.113	1.113	0.0
	Meldun-0	YES	1.07	1.07	0.0
	Meldun-1	YES	1.07	1.07	0.0
	Primary-BIOS	YES	8.51	8.51	0.0
A9K-8X100GE-SE	CBC	NO	38.23	38.23	0.0
	Dalla	YES	1.09	1.09	0.0
	IPU-FPGA	YES	1.99	1.99	0.0
	IPU-FSBL	YES	1.113	1.113	0.0
	IPU-Linux	YES	1.113	1.113	0.0
	Meldun-0	YES	1.07	1.07	0.0
	Meldun-1	YES	1.07	1.07	0.0
	Primary-BIOS	YES	8.51	8.51	0.0
A9K-8X100GE-SE-TAA	CBC	NO	38.23	38.23	0.0
	Dalla	YES	1.09	1.09	0.0
	IPU-FPGA	YES	1.99	1.99	0.0
	IPU-FSBL	YES	1.113	1.113	0.0
	IPU-Linux	YES	1.113	1.113	0.0
	Meldun-0	YES	1.07	1.07	0.0
	Meldun-1	YES	1.07	1.07	0.0
	Primary-BIOS	YES	8.51	8.51	0.0
A9K-8X100GE-TAA	CBC	NO	38.23	38.23	0.0
	Dalla	YES	1.09	1.09	0.0
	IPU-FPGA	YES	1.99	1.99	0.0
	IPU-FSBL	YES	1.113	1.113	0.0
	IPU-Linux	YES	1.113	1.113	0.0
	Meldun-0	YES	1.07	1.07	0.0
	Meldun-1	YES	1.07	1.07	0.0
	Primary-BIOS	YES	8.51	8.51	0.0
A9K-8X100GE-TR	CBC	NO	38.23	38.23	0.0
	Dalla	YES	1.09	1.09	0.0
	IPU-FPGA	YES	1.99	1.99	0.0

```
                    IPU-FSBL                  YES     1.113       1.113      0.0
                    IPU-Linux                 YES     1.113       1.113      0.0
                    Meldun-0                  YES     1.07        1.07       0.0
                    Meldun-1                  YES     1.07        1.07       0.0
                    Primary-BIOS              YES     8.51        8.51       0.0
--------------------------------------------------------------------------------
A9K-8X100GE-TR-TAA  CBC                       NO     38.23       38.23       0.0
                    Dalla                     YES     1.09        1.09       0.0
                    IPU-FPGA                  YES     1.99        1.99       0.0
                    IPU-FSBL                  YES     1.113       1.113      0.0
                    IPU-Linux                 YES     1.113       1.113      0.0
                    Meldun-0                  YES     1.07        1.07       0.0
                    Meldun-1                  YES     1.07        1.07       0.0
                    Primary-BIOS              YES     8.51        8.51       0.0
--------------------------------------------------------------------------------
A9K-8X100GE-X-CM    Aldrin-FPGA               YES     1.05        1.05       0.0
                    CBC                       NO     48.09       48.09       0.0
                    Grapple-0                 YES     0.15        0.15       0.0
                    IPU-DDR4                  YES     1.09        1.09       0.0
                    Mixmaster-0               YES     0.13        0.13       0.0
                    Primary-BIOS              YES    21.42       21.42       0.0
                    Scamper                   YES     0.23        0.23       0.0
                    Skylynx-0                 YES     0.12        0.12       0.0
--------------------------------------------------------------------------------
A9K-8X100GE-X-SE    Aldrin-FPGA               YES     1.05        1.05       0.0
                    CBC                       NO     48.09       48.09       0.0
                    Grapple-0                 YES     0.15        0.15       0.0
                    IPU-DDR4                  YES     1.09        1.09       0.0
                    Mixmaster-0               YES     0.13        0.13       0.0
                    Primary-BIOS              YES    21.42       21.42       0.0
                    Scamper                   YES     0.23        0.23       0.0
                    Skylynx-0                 YES     0.12        0.12       0.0
--------------------------------------------------------------------------------
A9K-8X100GE-X-TR    Aldrin-FPGA               YES     1.05        1.05       0.0
                    CBC                       NO     48.09       48.09       0.0
                    Grapple-0                 YES     0.15        0.15       0.0
                    IPU-DDR4                  YES     1.09        1.09       0.0
                    Mixmaster-0               YES     0.13        0.13       0.0
                    Primary-BIOS              YES    21.42       21.42       0.0
                    Scamper                   YES     0.23        0.23       0.0
                    Skylynx-0                 YES     0.12        0.12       0.0
--------------------------------------------------------------------------------
A9K-8X100GE-X-TR    Aldrin-FPGA               YES     1.05        1.05       0.0
                    CBC                       NO     48.09       48.09       0.0
                    Grapple-0                 YES     0.15        0.15       0.0
                    IPU-DDR4                  YES     1.09        1.09       0.0
                    Mixmaster-0               YES     0.13        0.13       0.0
                    Primary-BIOS              YES    21.42       21.42       0.0
                    Scamper                   YES     0.23        0.23       0.0
                    Skylynx-0                 YES     0.12        0.12       0.0
--------------------------------------------------------------------------------
A9K-8X100GE-X2-CM   Aldrin-FPGA               YES     1.05        1.05       0.0
                    CBC                       NO     58.09       58.09       0.0
                    Grapple-0                 YES     0.15        0.15       0.0
                    IPU-DDR4                  YES     1.18        1.18       0.0
                    Mixmaster-0               YES     0.13        0.13       0.0
                    Primary-BIOS              YES    25.28       25.28       0.0
                    Skylynx-0                 YES     0.12        0.12       0.0
                    Sunstreaker               YES     0.14        0.14       0.0
                    TAMFW-Sunstreaker         YES     2.65        2.65       0.0
--------------------------------------------------------------------------------
A9K-8X100GE-X2-SE   Aldrin-FPGA               YES     1.05        1.05       0.0
                    CBC                       NO     58.09       58.09       0.0
                    Grapple-0                 YES     0.15        0.15       0.0
```

```
                    IPU-DDR4                  YES     1.18        1.18      0.0
                    Mixmaster-0               YES     0.13        0.13      0.0
                    Primary-BIOS              YES    25.28       25.28      0.0
                    Skylynx-0                 YES     0.12        0.12      0.0
                    Sunstreaker               YES     0.14        0.14      0.0
                    TAMFW-Sunstreaker         YES     2.65        2.65      0.0
--------------------------------------------------------------------------------
A9K-8X100GE-X2-TR   Aldrin-FPGA               YES     1.05        1.05      0.0
                    CBC                       NO     58.09       58.09      0.0
                    Grapple-0                 YES     0.15        0.15      0.0
                    IPU-DDR4                  YES     1.18        1.18      0.0
                    Mixmaster-0               YES     0.13        0.13      0.0
                    Primary-BIOS              YES    25.28       25.28      0.0
                    Skylynx-0                 YES     0.12        0.12      0.0
                    Sunstreaker               YES     0.14        0.14      0.0
                    TAMFW-Sunstreaker         YES     2.65        2.65      0.0
--------------------------------------------------------------------------------
A9K-8X100GELSE-TAA  CBC                       NO     38.23       38.23      0.0
                    Dalla                     YES     1.09        1.09      0.0
                    IPU-FPGA                  YES     1.99        1.99      0.0
                    IPU-FSBL                  YES     1.113       1.113     0.0
                    IPU-Linux                 YES     1.113       1.113     0.0
                    Meldun-0                  YES     1.07        1.07      0.0
                    Meldun-1                  YES     1.07        1.07      0.0
                    Primary-BIOS              YES     8.51        8.51      0.0
--------------------------------------------------------------------------------
A9K-8X100GELTR-TAA  CBC                       NO     38.23       38.23      0.0
                    Dalla                     YES     1.09        1.09      0.0
                    IPU-FPGA                  YES     1.99        1.99      0.0
                    IPU-FSBL                  YES     1.113       1.113     0.0
                    IPU-Linux                 YES     1.113       1.113     0.0
                    Meldun-0                  YES     1.07        1.07      0.0
                    Meldun-1                  YES     1.07        1.07      0.0
                    Primary-BIOS              YES     8.51        8.51      0.0
--------------------------------------------------------------------------------
A9K-MOD200-CM       Blaster                   YES     1.27        1.27      0.1
                    CBC                       NO     39.09       39.09      0.1
                    IPU-FPGA                  YES     1.97        1.97      0.1
                    IPU-FSBL                  YES     1.103       1.103     0.1
                    IPU-Linux                 YES     1.103       1.103     0.1
                    Primary-BIOS              YES     8.51        8.51      0.1
--------------------------------------------------------------------------------
A9K-MOD200-SE       Blaster                   YES     1.27        1.27      0.1
                    CBC                       NO     39.09       39.09      0.1
                    IPU-FPGA                  YES     1.97        1.97      0.1
                    IPU-FSBL                  YES     1.103       1.103     0.1
                    IPU-Linux                 YES     1.103       1.103     0.1
                    Primary-BIOS              YES     8.51        8.51      0.1
--------------------------------------------------------------------------------
A9K-MOD200-TR       Blaster                   YES     1.27        1.27      0.1
                    CBC                       NO     39.09       39.09      0.1
                    IPU-FPGA                  YES     1.97        1.97      0.1
                    IPU-FSBL                  YES     1.103       1.103     0.1
                    IPU-Linux                 YES     1.103       1.103     0.1
                    Primary-BIOS              YES     8.51        8.51      0.1
--------------------------------------------------------------------------------
A9K-MOD400-CM       Blaster                   YES     1.27        1.27      0.1
                    CBC                       NO     39.09       39.09      0.1
                    IPU-FPGA                  YES     1.97        1.97      0.1
                    IPU-FSBL                  YES     1.103       1.103     0.1
                    IPU-Linux                 YES     1.103       1.103     0.1
                    Primary-BIOS              YES     8.51        8.51      0.1
--------------------------------------------------------------------------------
A9K-MOD400-SE       Blaster                   YES     1.27        1.27      0.1
```

	CBC	NO	39.09	39.09	0.1
	IPU-FPGA	YES	1.97	1.97	0.1
	IPU-FSBL	YES	1.103	1.103	0.1
	IPU-Linux	YES	1.103	1.103	0.1
	Primary-BIOS	YES	8.51	8.51	0.1
A9K-MOD400-TR	Blaster	YES	1.27	1.27	0.1
	CBC	NO	39.09	39.09	0.1
	IPU-FPGA	YES	1.97	1.97	0.1
	IPU-FSBL	YES	1.103	1.103	0.1
	IPU-Linux	YES	1.103	1.103	0.1
	Primary-BIOS	YES	8.51	8.51	0.1
A9K-RSP5-SE	Aldrin-0-FPGA	YES	1.06	1.06	0.0
	Beta-FPGA	YES	0.07	0.07	0.0
	CBC	NO	53.10	53.10	0.0
	IPU-DDR4	YES	0.20	0.20	0.0
	Orion-FPGA	YES	0.23	0.23	0.0
	Primary-BIOS	YES	31.35	31.35	0.0
	Zenith-FPGA	YES	0.10	0.10	0.0
A9K-RSP5-TR	Aldrin-0-FPGA	YES	1.06	1.06	0.0
	Beta-FPGA	YES	0.07	0.07	0.0
	CBC	NO	53.10	53.10	0.0
	IPU-DDR4	YES	0.20	0.20	0.0
	Orion-FPGA	YES	0.23	0.23	0.0
	Primary-BIOS	YES	31.35	31.35	0.0
	Zenith-FPGA	YES	0.10	0.10	0.0
A9K-RSP880-LT-SE	Aldrin-FPGA	YES	1.11	1.11	0.0
	Alpha-FPGA	YES	0.05	0.05	0.0
	CBC	NO	50.03	50.03	0.0
	IPU-FPGA	YES	0.20	0.20	0.0
	IPU-FSBL	YES	1.113	1.113	0.0
	IPU-Linux	YES	1.113	1.113	0.0
	Omega-FPGA	YES	0.05	0.05	0.0
	Optimus-FPGA	YES	0.05	0.05	0.0
	Primary-BIOS	YES	17.40	17.40	0.0
A9K-RSP880-LT-TR	Aldrin-FPGA	YES	1.11	1.11	0.0
	Alpha-FPGA	YES	0.05	0.05	0.0
	CBC	NO	50.03	50.03	0.0
	IPU-FPGA	YES	0.20	0.20	0.0
	IPU-FSBL	YES	1.113	1.113	0.0
	IPU-Linux	YES	1.113	1.113	0.0
	Omega-FPGA	YES	0.05	0.05	0.0
	Optimus-FPGA	YES	0.05	0.05	0.0
	Primary-BIOS	YES	17.40	17.40	0.0
A9K-RSP880-SE	Alpha-FPGA	YES	0.16	0.16	0.0
	CBC	NO	34.39	34.39	0.0
	Cha-FPGA	YES	0.08	0.08	0.0
	IPU-FPGA	YES	0.72	0.72	0.0
	IPU-FSBL	YES	1.113	1.113	0.0
	IPU-Linux	YES	1.113	1.113	0.0
	Omega-FPGA	YES	0.18	0.18	0.0
	Optimus-FPGA	YES	0.12	0.12	0.0
	Primary-BIOS	YES	10.69	10.69	0.0
A9K-RSP880-TR	Alpha-FPGA	YES	0.16	0.16	0.0
	CBC	NO	34.39	34.39	0.0
	Cha-FPGA	YES	0.08	0.08	0.0
	IPU-FPGA	YES	0.72	0.72	0.0
	IPU-FSBL	YES	1.113	1.113	0.0

	IPU-Linux	YES	1.113	1.113	0.0
	Omega-FPGA	YES	0.18	0.18	0.0
	Optimus-FPGA	YES	0.12	0.12	0.0
	Primary-BIOS	YES	10.69	10.69	0.0
A9K-TEST_LSQ_DX1	Aldrin-FPGA	YES	1.05	1.05	0.0
	CBC	NO	58.09	58.09	0.0
	IPU-DDR4	YES	1.18	1.18	0.0
	Primary-BIOS	YES	25.28	25.28	0.0
	Sunstreaker	YES	0.14	0.14	0.0
	TAMFW-Sunstreaker	YES	2.65	2.65	0.0
	Trailbreaker-0	YES	0.21	0.21	0.0
	Windcharger-0	YES	0.08	0.08	0.0
A9KL-4X100GE-SE-TAA	CBC	NO	38.23	38.23	0.0
	Dalla	YES	1.09	1.09	0.0
	IPU-FPGA	YES	1.99	1.99	0.0
	IPU-FSBL	YES	1.113	1.113	0.0
	IPU-Linux	YES	1.113	1.113	0.0
	Meldun-0	YES	1.07	1.07	0.0
	Meldun-1	YES	1.07	1.07	0.0
	Primary-BIOS	YES	8.51	8.51	0.0
A9KL-4X100GE-TAA	CBC	NO	38.23	38.23	0.0
	Dalla	YES	1.09	1.09	0.0
	IPU-FPGA	YES	1.99	1.99	0.0
	IPU-FSBL	YES	1.113	1.113	0.0
	IPU-Linux	YES	1.113	1.113	0.0
	Meldun-0	YES	1.07	1.07	0.0
	Meldun-1	YES	1.07	1.07	0.0
	Primary-BIOS	YES	8.51	8.51	0.0
A9KL-4X100GE-TR-TAA	CBC	NO	38.23	38.23	0.0
	Dalla	YES	1.09	1.09	0.0
	IPU-FPGA	YES	1.99	1.99	0.0
	IPU-FSBL	YES	1.113	1.113	0.0
	IPU-Linux	YES	1.113	1.113	0.0
	Meldun-0	YES	1.07	1.07	0.0
	Meldun-1	YES	1.07	1.07	0.0
	Primary-BIOS	YES	8.51	8.51	0.0
ASR-9006-AC	CBC	NO	7.105	7.105	0.0
ASR-9006-AC-V2	CBC	NO	7.105	7.105	0.0
ASR-9006-FAN	CBC	NO	5.04	5.04	0.0
ASR-9006-FAN-V2	CBC	NO	5.05	5.05	0.0
ASR-9010-AC	CBC	NO	7.105	7.105	0.0
ASR-9010-AC-V2	CBC	NO	7.105	7.105	0.0
ASR-9010-FAN	CBC	NO	4.03	4.03	0.0
ASR-9010-FAN-V2	CBC	NO	29.12	29.12	0.0
ASR-9901-LC	CBC	NO	55.07	55.07	0.1
	Gamora-FPGA	YES	0.36	0.36	0.1
	IPU-FPGA	YES	1.10	1.10	0.1
	IPU-FSBL	YES	1.104	1.104	0.1
	IPU-Linux	YES	1.104	1.104	0.1
	Primary-BIOS	YES	23.22	23.22	0.1

ASR-9901-RP	CBC	NO	54.11	54.11	0.1
	Drax-FPGA	YES	0.35	0.35	0.1
	IPU-FPGA	YES	2.05	2.05	0.1
	IPU-FSBL	YES	1.104	1.104	0.1
	IPU-Linux	YES	1.104	1.104	0.1
	Primary-BIOS	YES	22.26	22.26	0.1
ASR-9903	FAN-CBC	NO	61.24	61.24	0.0
ASR-9903-LC	Aldrin-0-FPGA	YES	1.05	1.05	0.0
	CBC	NO	60.12	60.12	0.0
	Harpoon-0	YES	0.11	0.11	0.0
	Harpoon-1	YES	0.11	0.11	0.0
	IPU-DDR4	YES	1.25	1.25	0.0
	Metalmaster-0	YES	0.02	0.02	0.0
	Metalmaster-1	YES	0.02	0.02	0.0
	Primary-BIOS	YES	34.28	34.28	0.0
	Scattershot	YES	0.14	0.14	0.0
	Sunstreaker	YES	0.14	0.14	0.0
	Supernaut	YES	0.14	0.14	0.0
	TAMFW-Sunstreaker	YES	2.65	2.65	0.0
	Warstar-0	YES	0.02	0.02	0.0
	Warstar-1	YES	0.02	0.02	0.0
ASR-9903-PXC800G-LC	Harpoon-0	YES	0.11	0.11	0.0
	Harpoon-1	YES	0.11	0.11	0.0
ASR-9904-AC	CBC	NO	7.105	7.105	0.0
ASR-9904-FAN	CBC	NO	31.06	31.06	0.0
ASR-9906	CBC	NO	7.105	7.105	0.0
ASR-9906-FAN	CBC	NO	56.01	56.01	0.0
	PSOC	NO	2.06	2.06	0.0
ASR-9910	CBC	NO	7.105	7.105	0.0
ASR-9910-FAN	CBC	NO	45.02	45.02	0.0
	PSOC	NO	2.06	2.06	0.0
ASR-9912-AC	CBC	NO	7.105	7.105	0.0
ASR-9912-FAN	CBC	NO	31.06	31.06	0.0
ASR-9912-SFC220	CBC	NO	37.20	37.20	0.0
	IPU-FPGA	YES	0.37	0.37	0.0
	IPU-FSBL	YES	1.100	1.100	0.0
	IPU-Linux	YES	1.100	1.100	0.0
ASR-9922-AC	CBC-0	NO	7.105	7.105	0.0
	CBC-1	NO	7.105	7.105	0.0
ASR-9922-FAN	CBC	NO	29.12	29.12	0.0
ASR-9922-FAN-V2	CBC	NO	40.07	40.07	0.0
	PSOC	NO	2.06	2.06	0.0
ASR-9922-FAN-V3	CBC	NO	40.07	40.07	0.0
	PSOC	NO	2.06	2.06	0.0
PWR-1.6KW-AC	PriMCU	NO	17.20	17.20	0.0
PWR-1.6KW-DC	PriMCU	NO	1.03	1.03	0.0

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-------------------------------------------------------------------------------
PWR-2KW-DC-V2         DT-PriMCU                NO      6.03        6.03       0.12
                      DT-Sec54vMCU             NO      6.02        6.02       0.12
                      DT-Sec5vMCU              NO      6.03        6.03       0.12
                      EM-PriMCU                NO      3.12        3.12       0.12
                      EM-Sec54vMCU             NO      3.21        3.21       0.12
                      EM-Sec5vMCU              NO      3.20        3.20       0.12
-------------------------------------------------------------------------------
PWR-3KW-AC-V2         DT-PriMCU                NO      6.02        6.02       1.0
                      DT-Sec54vMCU             NO      6.02        6.02       1.0
                      DT-Sec5vMCU              NO      6.04        6.04       1.0
                      EM-Sec54vMCU             NO      3.12        3.12       0.21
                      EM-Sec5vMCU              NO      3.18        3.18       0.21
-------------------------------------------------------------------------------
PWR-3KW-HVDC          DT-PriMCU                NO      2.02        2.02       1.0
                      DT-Sec54vMCU             NO      2.02        2.02       1.0
                      DT-Sec5vMCU              NO      2.03        2.03       1.0
-------------------------------------------------------------------------------
PWR-4.4KW-DC-V3       DT-Pri0MCU               NO      3.01        3.01       0.1
                      DT-Pri1MCU               NO      3.01        3.01       0.1
                      DT-Sec054vMCU            NO      3.01        3.01       0.1
                      DT-Sec154vMCU            NO      3.01        3.01       0.1
                      DT-Sec5vMCU              NO      3.02        3.02       0.1
-------------------------------------------------------------------------------
PWR-6KW-AC-V3         AB-Pri0MCU               NO      3.02        3.02       0.1
                      AB-Pri1MCU               NO      3.02        3.02       0.1
                      AB-Sec054vMCU            NO      3.02        3.02       0.1
                      AB-Sec154vMCU            NO      3.02        3.02       0.1
                      AB-Sec5vMCU              NO      3.05        3.05       0.1
                      DT-Pri0MCU               NO      4.02        4.02       0.1
                      DT-Pri1MCU               NO      4.02        4.02       0.1
                      DT-Sec054vMCU            NO      4.03        4.03       0.1
                      DT-Sec154vMCU            NO      4.03        4.03       0.1
                      DT-Sec5vMCU              NO      4.04        4.04       0.1
-------------------------------------------------------------------------------
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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 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 3: 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 64 bit Release**
ASR 9000 Route Switch Processor 5 for Service Edge	A9K-RSP5-SE	Release 6.5.15
ASR 9000 Route Switch Processor 5 for Packet Transport	A9K-RSP5-TR	Release 6.5.15

Cisco ASR 9000 Series Aggregation Services Router RSP880-Lite, Packet Transport Optimized	A9K-RSP880-LT-TR	Release 6.4.1
Cisco ASR 9000 Series Aggregation Services Router RSP880-Lite, Service Edge Optimized	A9K-RSP880-LT-SE	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 6.2.1
Cisco ASR 9000 Series Aggregation Services Router RSP4-S, Packet Transport Optimized for ASR 9910 from Release 6.0.1.	A99-RSP-TR	Release 6.2.1
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
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
ASR9K Route Switch Processor with 880G/slot and 32 GB for Service Edge	A9K-RSP880-SE	Release 6.1.2
ASR9K Route Switch Processor with 880G/slot and 16 GB for Packet Transport	A9K-RSP880-TR	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router Route Processor Cards		
Component	**Part Number**	**Support Initially Provided in IOS XR 64 bit Release**
ASR 9900 Route Processor 3 for Service Edge	A99-RP3-SE	Release 6.5.15
ASR 9900 Route Processor 3 for Packet Transport	A99-RP3-TR	Release 6.5.15
ASR Route Processor 32 GB for Service Edge	A99-RP2-SE	Release 6.1.2
ASR Route Processor 16 GB for Packet Transport	A99-RP2-TR	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 2-RU Fixed Port – ASR 9901		
Component	**Part Number**	**Support Initially Provided in IOS XR 64 bit Release**
Cisco ASR 9000 Series Aggregation Services Router 2-RU Fixed Port	ASR-9901	Release 6.4.1
Cisco ASR 9000 Series Aggregation Services Router 2-RU Fixed Port Fan Tray	ASR-9901-FAN	Release 6.4.1
Cisco ASR 9000 Series Aggregation Services Router 2-RU 1600W AC Power Module	A9K-1600W-AC	Release 6.4.1
Cisco ASR 9000 Series Aggregation Services Router 2-RU 1600W DC Power Module	A9K-1600W-DC	Release 6.4.1

Cisco ASR 9903 Router		
Cisco ASR 9903 Compact High-Performance Router with fixed ports and PEC (Port Expansion Card) slot.	ASR-9903	Release 7.1.3
Cisco ASR 9900 Fixed Chassis Route Processor	A99-RP-F	Release 7.1.3
Cisco ASR 9903 Router Fan Tray	ASR-9903-FAN	Release 7.1.3
ASR 9903 4-Post Mounting Kit for 19-inch Rack	ASR-9903-4P-KIT	Release 7.1.3
ASR 9903 Cable Management Brackets	ASR-9903-CAB-MGMT	Release 7.1.3
ASR 9903 Air Filter	ASR-9903-FILTER	Release 7.1.3
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 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 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 4-Slot Fan Tray	ASR-9904-FAN	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 4-Slot Filter	ASR-9904-FILTER	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 4-Slot Baffle	ASR-9904-BAFFLE	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 22-Slot		
Component	**Part Number**	**Support Initially Provided in IOS XR 64 bit Release**
Cisco ASR 9900 Switch Fabric Card 3	A99-SFC3	Release 6.5.15
Cisco ASR 9000 Fabric Card	A99-SFC2	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 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 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 22-Slot Fan Tray	ASR-9922-FAN	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 22-Slot Fan Tray version 3	ASR-9922-FAN-V3	Release 6.5.15
Cisco ASR 9000 Series Aggregation Services Router 22-Slot Air Filter with Media, Center	ASR-9922-FLTR-CV2	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 22-Slot Air Filter with Media, Left & Right	ASR-9922-FLTR-LR	Release 6.1.2

Cisco ASR 9000 Series Aggregation Services Router 22-Slot Route Processor Filler	ASR-9922-RP-FILR	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 22-Slot Version 2 Fan Tray	ASR-9922-FAN-V2	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 6-Slot		
Component	**Part Number**	**Support Initially Provided in IOS XR 64 bit Release**
Cisco ASR 9000 Series Aggregation Services Router 6-Slot System	ASR-9006-SYS	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 6-Slot Fan Tray	ASR-9006-FAN	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 6-Slot Door Kit	ASR-9006-DOOR	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 6-Slot AC Chassis	ASR-9006-AC	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 6-Slot DC Chassis	ASR-9006-DC	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 6-Slot Air		
Component	**Part Number**	**Support Initially Provided in IOS XR 64 bit Release**
Cisco ASR 9000 Series Aggregation Services Router 6-Slot Air Filter	ASR-9006-FILTER	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
Cisco ASR 9000 Series Aggregation Services Router 6-Slot Fan Tray	ASR-9906-FAN	Release 6.3.1
Cisco ASR 9000 Series Aggregation Services Router 6-Slot Fan Filter	ASR-9906-FILTER	Release 6.3.1
ASR 9906 Switch Fabric Card 3	A99-SFC3-T	Release 6.5.15
Cisco ASR 9000 Series Aggregation Services Router 10-Slot		
Cisco ASR 9000 Series Aggregation Services Router 10-Slot System	ASR-9010-SYS	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 10-Slot Fan Tray	ASR-9010-FAN	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 10-Slot Door Kit	ASR-9010-DOOR	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 10-Slot AC Chassis	ASR-9010-AC	Release 6.1.2

Cisco ASR 9000 Series Aggregation Services Router 10-Slot DC Chassis	ASR-9010-DC	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 2 Post Mounting Kit	ASR-9010-2P-KIT	Release 6.1.2
Cisco ASR 9000 Series Aggregration Services Router 4 Post Mounting Kit	ASR-9010-2P-KIT	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 10-Slot Air		
Component	**Part Number**	**Support Initially Provided in IOS XR 64 bit Release**
Cisco ASR 9000 Series Aggregation Services Router 10-Slot Air Filter	ASR-9010-FILTER	Release 6.1.2
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 6.2.1
Cisco ASR 9000 Series Aggregation Services Router 10-Slot(9910) Fan Tray	ASR-9910-FAN	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router 10-Slot (9910) Accessory Kit	ASR-9910-ACC-KIT	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router 10-Slot (9910) 4 Post Rack Mounting Kit	ASR-9910-4P-KIT	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router 10-Slot (9910) 2 Post Rack Mounting Kit	ASR-9910-2P-KIT	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router 10-Slot (9910) Air Reflector	ASR-9910-AIRREF	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router 10-Slot (9910) Air Filter	ASR-9910-FILTER	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router 10-Slot (9910) Switch Fabric Card	A99-SFC-S	Release 6.2.1
ASR 9910 Switch Fabric Card 3	A99-SFC3-S	Release 6.5.15
Cisco ASR 9000 Series Aggregation Services Router Power		
Component	**Part Number**	**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 6.1.2

Cisco ASR 9000 Series Aggregation Services Router 3KW AC Power Module, version 2	PWR-3KW-AC-V2	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router AC Power Entry Module Version 2	A9K-AC-PEM-V2	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router DC Power Entry Module Version 2	A9K-DC-PEM-V2	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router Power Entry Module Version 2 Filler	A9K-PEM-V2-FILR	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 1.5kW DC Power Module	A9K-1.5KW-DC	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router 2kW DC Power Module	A9K-2KW-DC	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router 3kW AC Power Module	A9K-3KW-AC	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router AC Power Enclosure Module Version 3	A9K-AC-PEM-V3	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router DC Power Enclosure Module Version 3	A9K-DC-PEM-V3	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 6kW AC Power Module Version 3	PWR-6KW-AC-V3	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 4.4kW DC Power Module Version 3	PWR-4.4KW-DC-V3	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router Line Cards		
Component	**Part Number**	**Support Initially Provided in IOS XR 64 bit Release**
ASR 9900 4T Service Edge Line Card - 5th Generation	A99-10X400GE-X-SE	Release 7.3.1
ASR 9900 4T Packet Transport Line Card - 5th Generation	A99-10X400GE-X-TR	Release 7.3.1
ASR 9903 2T Multi-rate Port Expansion Card	A9903-20HG-PEC	Release 7.1.3
ASR 9000 32-Port 100GE QSFP28/QSFP+ Service Edge optimized Line Card - 5th Generation	A99-32X100GE-X-SE	Release 7.1.15
ASR 9000 32-Port 100GE QSFP28/QSFP+ Packet Transport optimized Line Card - 5th Generation	A99-32X100GE-X-TR	Release 7.1.15
ASR 9000 2T Combo Line Card - 5th Generation	A9K-20HG-FLEX-SE A9K-20HG-FLEX-TR	Release 7.1.15

ASR 9000 800G Combo Line Card - 5th Generation	A9K-8HG-FLEX-SE A9K-8HG-FLEX-TR	Release 7.1.15
ASR 9000 16-port 100GE QSFP TR line card	A9K-16X100GE-TR	Release 6.5.15
ASR 9900 32-port 100GE QSFP TR line card	A99-32X100GE-TR	Release 6.5.15
ASR 9000 48 port dual rate 10G/1G Service Edge line card	A99-48X10GE-1G-SE	Release 6.5.2
ASR 9000 48 port dual rate 10G/1G Transport Optimised line card	A99-48X10GE-1G-TR	Release 6.5.2
ASR 9900 16-port 100GE QSFP SE	A99-16X100GE-X-SE	Release 6.5.3
ASR 9000 48-port dual-rate 10G/1G Consumption Model line card	A9K-48X10GE-1G-CM	Release 6.4.1
ASR 9000 24-port dual-rate 10G/1G Consumption Model line card	A9K-24X10GE-1G-CM	Release 6.4.1
ASR 9000 4-port 100-Gigabit Ethernet Line Card	A9K-4X100GE	Release 6.4.1
ASR9000 48-port dual-rate 10G/1G service edge–optimized line card	A9K-48X10GE-1G-SE	Release 6.3.2
ASR9000 48-port dual-rate 10G/1G packet transport–optimized line card	A9K-48X10GE-1G-TR	Release 6.3.2
ASR9000 24-port dual-rate 10G/1G service edge–optimized line card	A9K-24X10GE-1G-SE	Release 6.3.2
ASR9000 24-port dual-rate 10G/1G packet transport–optimized line card	A9K-24X10GE-1G-TR	Release 6.3.2
ASR 9900 8-port 100GE Service Edge optimized	A99-8X100GE-SE	Release 6.1.2
ASR 9900 8-port 100GE Packet Transport optimized	A99-8X100GE-TR	Release 6.1.2
ASR 9900 8-port 100GE Consumption Model	A99-8X100GE-CM	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 12-Port 100-Gigabit Ethernet Line Card	A99-12X100GE	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 12-port 100GE Ethernet Line card CM	A99-12X100GE-CM	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 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 8-Port 100-Gigabit Ethernet, Service Edge Optimized	A9K-8X100GE-SE	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 8-Port 100-Gigabit Ethernet, Packet Transport Optimized	A9K-8X100GE-TR	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 4--Port 100-Gigabit Ethernet, Service Edge Optimized	A9K-4X100GE-SE	Release 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 4-Port 100-Gigabit Ethernet, Packet Transport Optimized	A9K-4X100GE-TR	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 6.1.2
Cisco ASR 9000 Series Aggregation Services Router 8-port High Density 100GE Ethernet Line Card, Packet Transport Optimized	A9K-8X100GE-L-TR	Release 6.1.2
2-Port 100G + 20-Port 10 GE Combination IPoDWDM Line Card with CFP2 and SFP+, Packet Transport Optimized	A9K-400G-DWDM-TR	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router Modular Line Cards		
Component	**Part Number**	**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 6.3.1
Cisco ASR 9000 Modular 400G Consumption Model Line Card	A9K-MOD400-CM	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router 400 Gigabyte Modular Line Card, Service Edge Optimized	A9K-MOD400-SE	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router 400 Gigabyte Modular Line Card, Packet Transport Optimized	A9K-MOD400-TR	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router Modular Port Adapters (MPAs)		
Component	**Part Number**	**Support Initially Provided in IOS XR 64 bit Release**
Cisco ASR 9000 1-port 200-Gigabit Ethernet MPA, requires CFP2-DCO optics	A9K-MPA-1X200GE	Release 6.6.2
Cisco ASR 9000 32-port 1-Gigabit Ethernet MPA with MACSec	A9K-MPA-32X1GE	Release 6.6.2
Cisco ASR 9000 20x10GE Consumption Model MPA	A9K-MPA20X10GE-CM	Release 6.5.1
Cisco ASR 9000 2x100GE Consumption Model MPA	A9K-MPA2X100GE-CM	Release 6.5.1
Cisco ASR 9000 Series Aggregation Services Router 1-port 100-Gigabit Modular Port Adapter	A9K-MPA-1X100GE	Release 6.3.1
Cisco ASR 9000 Series Aggregation Services Router 2-port 100-Gigabit Modular Port Adapter	A9K-MPA-2X100GE	Release 6.2.2
20-Port 10-Gigabit Ethernet Modular Port Adapter with SFP+	A9K-MPA-20x10GE	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router 8-port 10GE Modular Port Adapter	A9K-MPA-8X10GE	Release 6.3.2

Cisco ASR 9000 Series Aggregation Services Router 1-port 40GE Modular Port Adapter	A9K-MPA-1X40GE	Release 6.3.1
Cisco ASR 9000 Series Aggregation Services Router 4-port 10GE Modular Port Adapter	A9K-MPA-4X10GE	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router 20-port 1GE Modular Port Adapter	A9K-MPA-20X1GE	Release 6.2.1
Cisco ASR 9000 Series Aggregation Services Router 2-port 10GE Modular Port Adapter	A9K-MPA-2X10GE	Release 6.3.2
Cisco ASR 9000 Series Aggregation Services Router 2-port 40GE Modular Port Adapter	A9K-MPA-2X40GE	Release 6.3.1
Cisco Digital Pluggable Optical Modules		
200G, 100G, WDM Digital CFP2 pluggable Licensed for 100G only – TOF	CFP2-WDM-DET-1HL=	Release 6.6.2
200G, 100G, WDM Digital CFP2 pluggable Licensed for 100G only – NON TOF	CFP2-WDM-D-1HL=	Release 6.6.2
Cisco ASR 9000v Satellite Shelf		
Component	**Part Number**	**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 6.2.1
Cisco ASR 9000v Satellite Shelf Version 2 DC power chassis	A9KV-V2-DC-E=	Release 6.2.1
Cisco ASR 9000v Satellite Shelf AC power chassis	A9KV-V2-AC=	Release 6.2.1
Cisco ASR 9000v Satellite Shelf Version 2 Fan Tray	A9KV-V2-FAN=	Release 6.2.1
Cisco NCS 5000 Satellite Shelf		
Cisco NCS 5001 Series Router	NCS-5001	Release 6.2.1
Cisco NCS 5002 Series Router	NCS-5002	Release 6.2.1
Cisco NCS 5001 Router Accessory Kit	NCS-5001-ACSR	Release 6.2.1
Cisco NCS 5002 Router Accessory Kit	NCS-5002-ACSR	Release 6.2.1
Cisco NCS 5001 Router Fan Back to Front AirFlow	NCS-5001-FN-BK	Release 6.2.1
Cisco NCS 5002 Router Fan Back to Front AirFlow	NCS-5002-FN-BK	Release 6.2.1
Cisco NCS 5001 Air Filter Back to Front Airflow	NCS-5001-FLT-BK	Release 6.2.1
Cisco NCS 5002 Air Filter Back to Front Airflow	NCS-5002-FLT-BK	Release 6.2.1
Cisco NCS 5001 Fan Front to Back Airflow	NCS-5001-FN-FR	Release 6.2.1

Cisco NCS 5002 Fan Front to Back Airflow	NCS-5002-FN-FR	Release 6.2.1
Cisco NCS 5001 Air Filter Front to Back Airflow	NCS-5001-FLT-FR	Release 6.2.1
Cisco NCS 5002 Air Filter Front to Back Airflow	NCS-5002-FLT-FR	Release 6.2.1

Other Important Notes

Supported Transceiver Modules

To determine the transceivers that Cisco hardware device supports, refer to the Transceiver Module Group (TMG) Compatibility Matrix tool.

Supported Modular Port Adapters

For the compatibility details of Modular Port Adapters (MPAs) on the line cards, see the datasheet of that specific line card.

Cisco IOS XR Error messages

To view, search, compare, and download Cisco IOS XR Error Messages, refer to the Cisco IOS XR Error messages tool.

Cisco IOS XR MIBs

To determine the MIBs supported by platform and release, refer to the Cisco IOS XR MIBs tool.

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.

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 Route Processor Module (RPM) files that contain one or more software components.

The upgrade document is available along with the software images.

Cisco Software Manager (CSM) application provides an intuitive user interface to manage Cisco IOS XR installations, with pre-installation and post-installation checks and reports. CSM helps manage the process of software maintenance upgrades (SMUs) and service packs (SPs) on devices that run the Cisco IOS XR Software.

For information on using CSM, see *Installation Guide for Cisco Software Manager Server*.

Use user-class Option 'xr-config' Instead Of 'exr-config' To Provision ZTP

In Cisco IOS XR Release 7.3.1 and earlier, the system accepts the device sending **user-class = "exr-config"**; however starting Cisco IOS XR Release 7.3.2 and later, you must use only **user-class = "xr-config"**.

In Cisco IOS XR Release 7.3.2 and later, use:

```
host cisco-rp0 {
   hardware ethernet e4:c7:22:be:10:ba;
   fixed-address 172.30.12.54;
   if exists user-class and option user-class = "iPXE" {
      filename = "http://172.30.0.22/boot.ipxe";
   } elsif exists user-class and option user-class = "xr-config" {
      filename = "http://172.30.0.22/scripts/cisco-rp0_ztp.sh";
   }
}
```

Related Documentation

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

https://www.cisco.com/c/en/us/td/docs/iosxr/asr-9000-series-routers.html

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