

Release Notes for Cisco ASR 900 Series Routers, Cisco IOS XE Cupertino 17.9.x

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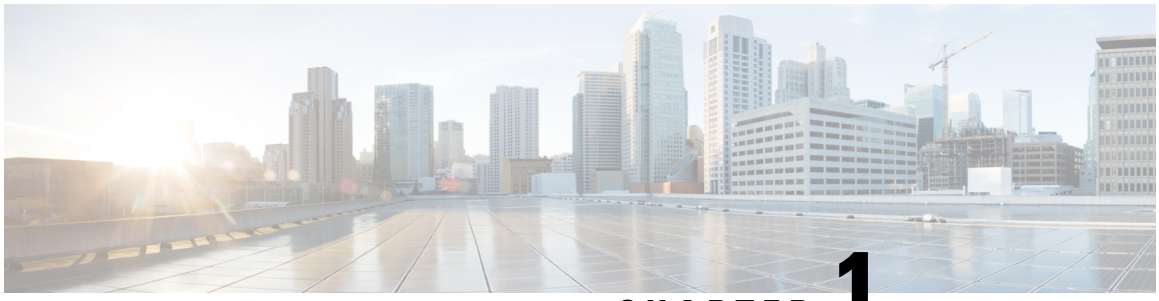
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CHAPTER 1

Introduction

The Cisco ASR 900 Series Routers are full-featured, modular aggregation platforms designed for the cost-effective delivery of converged mobile, residential, and business services. This document provides information about the IOS XE software release for the Cisco ASR 900 Series Routers.

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Overview of Cisco ASR 900 Series Routers

The Cisco ASR 900 Series Router is a fully-featured routing platform designed for the cost-effective delivery of converged mobile and business services. With full redundancy, shallow depth, low power consumption and high service scale, this 3-rack-unit (3RU) router is optimized for small aggregation and remote point-of-presence (POP) applications. The Cisco ASR 900 Series Router provides a rich and scalable feature set of Legacy, Timing, Carrier Ethernet, Layer 2 VPN (L2VPN) and Layer 3 VPN (L3VPN) services in a compact package.

The Cisco ASR 900 Series Router is a fully modular platform with support for upto 6-Interface Modules (IMs), two Route Switch Processor (RSP) slots, two power supplies and redundant fans, based on the router model. Cisco offers a wide choice of LAN and WAN interfaces available in speeds ranging from nxDS0 to 10 Gigabit Ethernet. The design of the Cisco ASR 900 Series Router delivers in-box hardware redundancy for all hardware components and supports software redundancy with In Service Software Upgrade (ISSU) and Non-Stop Forwarding (NSF) support.

Cisco ASR 902 Router

The Cisco ASR 902 Router is a full-featured aggregation platform designed for cost-effective delivery of converged mobile and business services. With shallow depth, low power consumption, and an extended

temperature range, this compact 2-rack unit (2RU) router provides high service scale and flexible hardware configuration.

Cisco ASR 903 Router

The Cisco ASR 903 Series Aggregation Services Router is a Cisco aggregation router product. This router uses an innovative and powerful forwarding technology known as the Cisco Carrier Ethernet ASIC.

The Cisco ASR 903 Series Router is a 6-Interface Module (IM), 3-RU, hardware-redundant chassis with two Route Switch Processor (RSP) slots, and six IM slots. It supports fully redundant RSPs that allow for full RSP hardware redundancy, NSF, ISSU, and future RSP service upgrades.

Cisco ASR 907 Router

The Cisco ASR 907 Router seven-rack (7RU) unit router that belongs to the Cisco ASR90x family of routers. This router complements Cisco's offerings for IP RAN solutions for the GSM, UMTS, LTE and CDMA. Given its form-factor, interface types and Gigabit Ethernet density the Cisco ASR 907 Router can also be positioned as a Carrier Ethernet aggregation platform.

The Cisco ASR 907 Router is a cost optimized, fully redundant, centralized forwarding, extended temperature, and flexible pre-aggregation router.

Cisco ASR 914 Router

The Cisco ASR 914 Router is a 14-rack unit router that belongs to the Cisco ASR 900 family of routers. This router complements Cisco's offerings for IP RAN solutions for the GSM, UMTS, LTE, and CDMA. Given its form-factor, interface types and GigabitEthernet density the Cisco ASR 914 Router can also be positioned as a Carrier Ethernet aggregation platform.

The Cisco ASR 914 Router is a cost optimized, fully redundant, centralized forwarding, extended temperature, and flexible pre-aggregation router.

Feature Navigator

You can use Cisco Feature Navigator to find information about feature, platform, and software image support. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on cisco.com is not required.

Hardware Support

Cisco ASR 902 Supported Interface Modules

A900-RSP2-Supported Interface Modules (ASR 902 Router)

Table 1: A900-RSP2-Supported Interface Modules and Part Numbers

RSP	Interface Modules	Part Numbers	Slots
A900-RSP2A-128 A900U-RSP2A-128	8-port Gigabit Ethernet SFP Interface Module (8x1GE)	A900-IMA8S	All
	8-port Gigabit Ethernet RJ45 (Copper) Interface Module (8x1GE)	A900-IMA8T	
	1-port 10-Gigabit Ethernet XFP Interface Module (1x10GE)	A900-IMA1X	
	16-port T1/E1 Interface Module	A900-IMA16D	
	4-port OC3/STM-1 (OC-3) or 1-port OC12/STM-4 (OC-12) Interface Module	A900-IMA4OS	
	SFP Combo IM—8-port Gigabit Ethernet (8x1GE) + 1-port 10-Gigabit Ethernet (1x10GE)	A900-IMA8S1Z	
	Copper Combo IM—8-port Gigabit Ethernet (8x1GE) + 1-port 10-Gigabit Ethernet Interface Module (1x10GE)	A900-IMA8T1Z	
	2-port 10 Gigabit Ethernet Interface Module (2x10GE)	A900-IMA2Z	
	14-port Serial Interface Module	A900-IMASER14A/S	

RSP	Interface Modules	Part Numbers	Slots
	4-port C37.94 Interface Module	A900-IMA4C3794	
A900-RSP2A-64 A900U-RSP2A-64	1-port 10 Gigabit Ethernet XFP Interface Module (1x10GE)	A900-IMA1X	0-2
	2-port 10 Gigabit Ethernet Interface Module (2x10GE)	A900-IMA2Z	
	4-port OC3/STM-1 (OC-3) or 1-port OC12/STM-4 (OC-12) Interface Module	A900-IMA4OS	
	8-port Gigabit Ethernet SFP Interface Module (8x1GE)	A900-IMA8S	0, 2 and 3
	8-port Gigabit Ethernet RJ45 (Copper) Interface Module (8x1GE)	A900-IMA8T	
	16-port T1/E1 Interface Module	A900-IMA16D	
	32-port T1/E1 Interface Module	A900-IMA32D	
	8-port T1/E1 Interface Module	A900-IMA8D	
	6-port E & M Interface Module	A900-IMA6EM	
	14-port Serial Interface Module	A900-IMASER14A/S	
	4-port C37.94 Interface Module	A900-IMA4C3794	

A900-RSP3C-200-S Supported Interface Modules (ASR 902 Router)

Table 2: A900-RSP3C-200 Supported Interface Modules and Part Numbers

RSP Module	Supported Interface Modules	Part Numbers	Slot
A900-RSP3C-200-S	8-port Gigabit Ethernet SFP Interface Module (8x1GE)	A900-IMA8S	All[1]
	8-port Gigabit Ethernet RJ45 (Copper) Interface Module (8x1GE)	A900-IMA8T	
	1-port 10 Gigabit Ethernet XFP Interface Module (1x10GE)	A900-IMA1X	0 and 1
	SFP Combo IM—8-port Gigabit Ethernet (8x1GE) + 1-port 10 Gigabit Ethernet (1x10GE)	A900-IMA8S1Z	All
	Copper Combo IM—8-port Gigabit Ethernet (8x1GE) + 1-port 10 Gigabit Ethernet Interface Module (1x10GE)	A900-IMA8T1Z	
	2-port 10 Gigabit Ethernet Interface Module (2x10GE)	A900-IMA2Z	
	8-port 10 Gigabit Ethernet Interface Module (8x10GE)	A900-IMA8Z	0
	2-port 40 Gigabit Ethernet QSFP Interface Module (2x40GE)	A900-IMA2F	

[1] There are restrictions using the interface modules in different slots with RSP3 module. Contact Cisco Sales/Support for the valid combinations..

Cisco ASR 903 Supported Interface Modules

A900-RSP2 Supported Interface Modules

A900-IMA2Z IM supports SFP+ and XFP on ports 0 and 1. Either SFP+ or XFP can be connected on each port. If both are connected on the same port, the port will go down.

The combination IMs (A900-IMA8S1Z, A900-IMA8T1Z) are not supported on the A900-RSP2-64 RSP module on the Cisco ASR 903 Router.

The table below is applicable for A900-RSP2A-128 and A900U-RSP2A-128 RSP modules.

Table 3: A900-RSP2A-128 Supported Interface Modules and Part Numbers

Supported Interface Modules	Part Numbers	Slot
1-port OC48/ STM-16 or 4-port OC-12/OC-3 / STM-1/STM-4 + 12-Port T1/E1 + 4-Port T3/E3 CEM Interface Module	A900-IMA3G-IMSG	2,3,4,5
8-port Gigabit Ethernet SFP Interface Module (8x1GE)	A900-IMA8S	All
8-port Gigabit Ethernet RJ45 (Copper) Interface Module (8x1GE)	A900-IMA8T	
1-port 10 Gigabit Ethernet XFP Interface Module (1x10GE)	A900-IMA1X	
16-port T1/E1 Interface Module	A900-IMA16D	
32-port T1/E1 Interface Module	A900-IMA32D	
8-portT1/E1 Interface Module	A900-IMA8D	
4-port OC3/STM-1 (OC-3) or 1-port OC12/STM-4 (OC-12) Interface Module	A900-IMA4OS	
SFP Combo IM—8-port SFP Gigabit Ethernet (8x1GE) + 1-port 10 Gigabit Ethernet (1x10GE)	A900-IMA8S1Z	
Copper Combo IM—8-port 10/100/1000 Gigabit Ethernet (8x1GE) + 1-port 10 Gigabit Ethernet Interface Module (1x10GE)	A900-IMA8T1Z	
2-port 10 Gigabit Ethernet Interface Module (2x10GE)	A900-IMA2Z	
6-port E & M Interface Module	A900-IMA6EM	
14-port Serial Interface Module	A900-IMASER14A/S	
4-port C37.94 Interface Module	A900-IMA4C3794	

The table below is applicable for A900-RSP2A-64 and A900U-RSP2A-64 RSP modules.

Table 4: A900-RSP2A-64 Supported Interface Modules and Part Numbers

Supported Interface Modules	Part Numbers	Slot
1-port 10 Gigabit Ethernet XFP Interface Module (1x10GE)	A900-IMA1X	0-2
2-port 10 Gigabit Ethernet Interface Module (2x10GE)	A900-IMA2Z	
4-port OC3/STM-1 (OC-3) or 1-port OC12/STM-4 (OC-12) Interface Module	A900-IMA4OS	

Supported Interface Modules	Part Numbers	Slot
8-port Gigabit Ethernet SFP Interface Module (8x1GE)	A900-IMA8S	3-5
8-port Gigabit Ethernet RJ45 (Copper) Interface Module (8x1GE)	A900-IMA8T	
16-port T1/E1 Interface Module	A900-IMA16D	
32-port T1/E1 Interface Module	A900-IMA32D	
8-port T1/E1 Interface Module	A900-IMA8D	
6-port E & M Interface Module	A900-IMA6EM	
14-port Serial Interface Module	A900-IMASER14A/S	
4-port C37.94 Interface Module	A900-IMA4C3794	

A900-RSP3C-400-S Supported Interface Modules

The table below is applicable for A900-RSP3C-400-S RSP module.

Note If the **license feature service-offload enable** command is configured, then the following IMs are not supported in the router for RSP3:

- A900-IMA8S
- A900-IMA8T
- A900-IMA8S1Z
- A900-IMA8T1Z

Note There are certain restrictions in using the interface modules on different slots with RSP3 module. Contact Cisco Sales/Support for the valid combinations.

Note If there is any silicon oil leakage from the thermal pad of the RSP card, use a lint-free cloth moistened with IsoPropyl Alcohol (IPA) to thoroughly clean the affected area. Silicon oil leakage is an expected behaviour due to the material's properties. It is non-conductive, non-electrical, and poses no hazard to human health. The presence of silicon oil on the card is harmless and will not impact the card's functionality or system performance.

Table 5: A900-RSP3C-400 Supported Interface Modules and Part Numbers

Supported Interface Modules	Part Numbers	Slot
6-port E & M Interface Module	A900-IMA6EM	All

Supported Interface Modules	Part Numbers	Slot
4-port C37.94 Interface Module	A900-IMA4C3794	All
14-port Serial Interface Module	A900-IMASER14A/S	All
8-port Gigabit Ethernet SFP Interface Module (8x1GE)	A900-IMA8S	All
8-port Gigabit Ethernet RJ45 (Copper) Interface Module (8x1GE)	A900-IMA8T	All
1-port 10 Gigabit Ethernet XFP Interface Module (1x10GE)	A900-IMA1X	All
SFP Combo IM—8-port SFP Gigabit Ethernet (8x1GE) + 1-port 10 Gigabit Ethernet (1x10GE)	A900-IMA8S1Z	All
Copper Combo IM—8-port 10/100/1000 Gigabit Ethernet (8x1GE) + 1-port 10 Gigabit Ethernet Interface Module (1x10GE)	A900-IMA8T1Z	All
2-port 10 Gigabit Ethernet Interface Module (2x10GE)	A900-IMA2Z	All
8-port 10 Gigabit Ethernet Interface Module (8x10GE)	A900-IMA8Z	All
1-port 100 Gigabit Ethernet Interface Module (1x100GE)	A900-IMA1C	4 or 5
2-port 100 Gigabit Ethernet (QSFP) Interface Module (2x100GE)	N560-IMA2C/A900-IMA2C	4 and 5[2]
2-port 40 Gigabit Ethernet QSFP Interface Module (2x40GE)	A900-IMA2F	4 or 5
8/16-port 1 Gigabit Ethernet (SFP/SFP) + 1-port 10 Gigabit Ethernet (SFP+) / 2-port 1 Gigabit Ethernet (CSFP) Interface Module	A900-IMA8CS1Z-M	0,3,4 or 5
48-port T1/E1 Interface module	A900-IMA48D-C	All
48-port T3/E3 Interface module	A900-IMA48T-C	All
1-port OC-192 or 8-Port Low Rate CEM Interface Module	A900-IMA8S1Z-CX	2,3,4,5
4-port OC-48/OC-12/OC-3 + 12-Port A900-IMA3G-IMSG T1/E1 + 4-Port T3/E3 CEM Interface Module	A900-IMA3G-IMSG	2,3,4,5

Supported Interface Modules	Part Numbers	Slot

ASR 900 1-Port OC-192 or 8-Port Low Rate CEM 20G Bandwidth Interface Module	A900-IMA1Z8S-CXMS	2, 3, 4, 5[3]
		Note To enable this IM on slot 0 or slot 1, do the following and reload the router:
		`Router# configure t`
		`Router(config)# license feature service-offload enable`

[2] IM supports only one port of 100G with RSP3 as QSFP28 on Port 0 in both slots 4 and 5.
[3] These slots are supported on 10G or 20G mode.

A900-RSP3C-200-S Supported Interface Modules

The table below is applicable for A900-RSP3C-200-S RSP module.

Note If the **license feature service-offload enable** command is configured, then the following IMs are not supported in the router for RSP3:

- A900-IMA8S
- A900-IMA8T
- A900-IMA8S1Z
- A900-IMA8T1Z

Note There are certain restrictions in using the interface modules on different slots with RSP3 module. Contact Cisco Sales/Support for the valid combinations.

Note FAN OIR is applicable every time the IM based fan speed profile is switched to the IMA1C and IMA2F interface modules. Even though the IMs remain in the Out-of-Service state, they are still considered as present in the chassis.

Note If there is any silicon oil leakage from the thermal pad of the RSP card, use a lint-free cloth moistened with IsoPropyl Alcohol (IPA) to thoroughly clean the affected area. Silicon oil leakage is an expected behaviour due to the material's properties. It is non-conductive, non-electrical, and poses no hazard to human health. The presence of silicon oil on the card is harmless and will not impact the card's functionality or system performance.

Table 6: A900-RSP3C-200 Supported Interface Modules and Part Numbers

Supported Interface Modules	Part Numbers	Slot
8-port Gigabit Ethernet SFP Interface Module (8x1GE)	A900-IMA8S	All
8-port Gigabit Ethernet RJ45 (Copper) Interface Module (8x1GE)	A900-IMA8T	
1-port 10 Gigabit Ethernet XFP Interface Module (1x10GE)	A900-IMA1X	0, 2 or 4
SFP Combo IM—8-port SFP Gigabit Ethernet (8x1GE) + 1-port 10 Gigabit Ethernet (1x10GE)	A900-IMA8S1Z	1-5[4]
Copper Combo IM—8-port 10/100/1000 Gigabit Ethernet (8x1GE) + 1-port 10 Gigabit Ethernet Interface Module (1x10GE)	A900-IMA8T1Z	0-4
2-port 10 Gigabit Ethernet Interface Module (2x10GE)	A900-IMA2Z	
8-port 10 Gigabit Ethernet Interface Module (8x10GE)	A900-IMA8Z	4
2-port 40 Gigabit Ethernet QSFP Interface Module (2x40GE)	A900-IMA2F	4
4-port OC-48/OC-12/OC-3 + 12-Port A900-IMA3G-IMSG T1/E1 + 4-Port T3/E3 CEM Interface Module	A900-IMA3G-IMSG	2-5[5]
8-Port 10 Gigabit Ethernet (8x10GE) SFP+ Interface Module with Conformal Coating	[6]ASR900-IMA8Z-CC	0

[4] If you have a 1-port 10G IM in slot 0, then SFP combo may not be supported in slot 5.
[5] If slot 0 has 8X10G IM and you want to insert IMA-3G-IMSG to slot 5, then insert 8X10G IM on slot 6, by using the **hw-module subslot 0/0 A900-IMA8Z mode 6-Port** command.
[6] Supported only from release XE-17.13.1 onwards.

Cisco ASR 907 Supported Interface Modules

Supported Interface Modules

Note If the **license feature service-offload enable** command is configured, then the following IMs are not supported in the router for RSP3:

- A900-IMA8S
- A900-IMA8T
- A900-IMA8S1Z
- A900-IMA8T1Z

Note There are certain restrictions in using the interface modules on different slots in the chassis. Contact Cisco Sales and Support for the valid combinations.

Table 7: A900-RSP3 Supported Interface Modules and Part Numbers

RSP Module	Interface Modules	Part Number	Slot
A900-RSP3C-400-W	8-port Gigabit Ethernet SFP Interface Module (8X1GE)	A900-IMA8S	0,1,2,5,6,9,10,13,14,15
	8-port Gigabit Ethernet RJ45 (Copper) Interface Module (8X1GE)	A900-IMA8T	0,1,2,5,6,9,10,13,14,15
	1-port 10 Gigabit Ethernet XFP Interface Module (1X10GE)	A900-IMA1X	Not Supported
	SFP Combo IM—8-port Gigabit Ethernet (8X1GE) + 1-port 10 Gigabit Ethernet (1X10GE)	ASR900-IMA8S1Z	2,5,6,9,10,13,14,15
	Copper Combo IM—8-port Gigabit Ethernet (8X1GE) + 1-port 10 Gigabit Ethernet Interface Module (1X10GE)	ASR900-IMA8T1Z	2,5,6,9,10,13,14,15
	2-port 10 Gigabit Ethernet Interface Module (2X10GE)	ASR900-IMA2Z	3,4,7,8,11,12
	16-port T1/E1 Interface Module	A900-IMA16D	Not Supported
	14-port Serial Interface Module	A900-IMASER14A/S	3,4,7,8,11,12[7]
	8-port T1/E1 Interface Module	A900-IMA8D	Not Supported

RSP Module	Interface Modules	Part Number	Slot
	32-port T1/E1 Interface Module	A900-IMA32D	Not Supported
	1x100G Interface module	A900-IMA1C	7 and 8
	2-port 100 Gigabit Ethernet (QSFP) Interface Module (2X100GE)	A900-IMA2C	7 and 8[8]
	2x40G Interface module	A900-IMA2F	3,4,7,8,11,12
	8x10G Interface module	A900-IMA8Z[9]	3,4,7,8,11,12
	8/16-port 1 Gigabit Ethernet (SFP/SFP) + 1-port 10 Gigabit Ethernet (SFP+) / 2-port 1 Gigabit Ethernet (CSFP) Interface Module	A900-IMA8CS1Z-M	0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
	1-port OC-192 or 8-Port Low Rate CEM Interface Module	A900-IMA8S1Z-CX	3,4,7,8,11,12 (10 G Mode) 0,1,2,5,6,9,10,13,14,15 (5 G Mode)
	48-port T1/E1 Interface module	A900-IMA48D-C	2,3,4,5,6,7,8,9,10,11,12,13,14,15
	48-port T3/E3 Interface module	A900-IMA48T-C	2,3,4,5,6,7,8,9,10,11,12,13,14,15
	1-port OC48/ STM-16 or 4-port OC-12/OC-3 / STM-1/STM-4 + 12-Port T1/E1 + 4-Port T3/E3 CEM Interface Module	A900-IMA3G-IMSG	3,5,7,9,11,13,15

	ASR 900 1-Port OC-192 or 8-Port Low Rate CEM 20G Bandwidth Interface Module	A900-IMA1Z8S-CXMS	3, 7, 11[10]
			4, 8, 12[11]
			5, 9, 13, 15[12]
			Note To enable this IM on slot 0 or slot 1, do the following and reload the router:
			`Router# configure t`
			`Router(config)# license feature service-offload enable`

	6-port E&M Module	A900-IMA6EM	All slots
	4-port C37.94 Interface Module	A900-IMA4C3794	All slots

[7] The serial IM will not work on slots 11 and 12, if the IMs A900-IMA8T or A900-IMA8S is inserted on any slot in the router.
[8] The IMs A900-IMA6EM, A900-IMASER14A/S, and A900-IMA4C3794 can be installed in slots 3, 4, 7, 8, 11, 12. Slots 3, 4 and 11, 12 have dependency with 1 Gigabit Ethernet IMs. These IMs can be placed in slots 3 only if Gigabit Ethernet IM is

not present in slot 5. These IMs can be placed in slots 4 only if Gigabit Ethernet IM is not present in slot 6. These IMs can be placed in slots 11 only if Gigabit Ethernet IM is not present in slots 1, 5, 9, 13, and 15. These IMs can be placed in slots 12 only if Gigabit Ethernet IM is not present in slots 0,2,6,10 and 14.

9 Six IM slots are supported with various combinations but only five IM slots are functional at a time.

10 These slots are supported on 10G or 20G mode.

11 These slots are supported on 10G or 20G mode, only if the adjacent odd slots are empty.

12 These slots are supported on 10G mode.

Cisco ASR 914 Supported Interface Modules

For information in interface modules supported, see Cisco A900-RSP3C-400-W Supported Interface Modules.

Feature Matrix

The feature matrix lists the features that are supported for each platform.

Software Licensing Overview

The router offers the following base licenses:

- Metro Services
- Metro IP Services
- Metro Aggregation Services

Note Starting with Cisco IOS XE Cupertino 17.7.1, licenses are not enabled by default. We recommend that you move to Smart Licensing.

Smart Licensing

Starting with Cisco IOS XE Cupertino 17.7.1, PAK licenses are no longer available. When you purchase the Cisco IOS XE Cupertino 17.7.1 release or later, Smart Licensing is enabled by default. We recommend that you move to Smart Licensing before upgrading to Cisco IOS XE Cupertino 17.7.1 or a higher release, for a seamless experience.

If you are using Cisco IOS XE Bengaluru 17.6.1 or an earlier release version, Smart Licensing is not enabled by default. To enable Smart Licensing, see Software Activation Configuration Guide (Cisco IOS XE ASR 900 Series).

Table 8: Cisco ASR 900 Software Licenses Feature Set

Metro Services	Metro IP Services	Metro Aggregation Services
—	Includes all features in Metro Services	Includes all features in Metro IP Services

Metro Services	Metro IP Services	Metro Aggregation Services
QoS, with deep buffers and hierarchical QoS (HQOS)	IP routing (RIP, OSPF, EIGRP, BGP, IS-IS)	MPLS (LDP and VPN)
Layer 2: 802.1d, 802.1q	PIM (SM, DM, SSM), SSM mapping	MPLS TE and FRR
Ethernet Virtual Circuit (EVC)	BFD	MPLS OAM
Ethernet OAM (802.1ag, 802.3ah)	Multi-VRF CE (VRF lite) with service awareness (ARP, ping, SNMP, syslog, trace-route, FTP, TFTP)	MPLS-TP
Multiple Spanning Tree (MST) and Resilient Ethernet Protocol (REP)	IEEE 1588-2008 Ordinary Slave Clock and Transparent Clock	Pseudowire emulation (EoMPLS, CESoPSN, and SAToP)
Synchronous Ethernet	—	VPLS and HVPLS
IPv4 and IPv6 host connectivity	—	Pseudowire redundancy
—	—	MR-APS and mLACP

The router offers the following additional feature licenses:

- ATM
- IEEE 1588-2008 Boundary Clock/Master Clock
- OCx-overview- Port License

Note These features require a software license to use.

Determining the Software Version

You can use the following commands to verify your software version:

- Consolidated Package—**show version**
- Individual sub-packages—**show version installed** (lists all installed packages)

Upgrading to a New Software Release

Only the latest consolidated packages can be downloaded from Cisco.com; users who want to run the router using individual subpackages must first download the image from Cisco.com and extract the individual subpackages from the consolidated package.

For information about upgrading to a new software release, see the Upgrading the Software on the Cisco ASR 900 Series Routers .

Upgrading the FPD Firmware

FPD Firmware packages are bundled with the software package. FPD upgrade is automatically performed ont the router.

If you like to manually change the FPD Firmware software, use the **upgrade hw-module subslot 0/0 fpd bundle** to perform FPD frmware upgrade.

ROMMON Version

We recommend you to upgrade the ROMMON version to 15.6(49r)S.

For more information on the ROMMON package, see Cisco Software Download.

Note ROMMON upgrade is mandatory to boot RSP3 images.

Supported FPGA, HoFPGA, and ROMMON Versions for Cisco IOS XE 17.9.x Release

Use the **show hw-module all fpd** command to display the IM FPGA version on the router.

The below table lists the FPGA version for the software releases.

Note If there is an FPGA upgrade during ISSU, it will cause traffic disruption. TDM interface modules get reset irrespective of FPGA upgrade during the ISSU.

Table 9: IM FPGA Versions for Ethernet Phase 3 IM

Cisco IOS XE Release	IO FGPA	8 x10 FPGA	2x40 FPGA	1x100 FPGA
17.9.8	0x34	0.21	0.22	0.20
17.9.7	0x34	0.21	0.22	0.20
17.9.6	0x34	0.21	0.22	0.20
17.9.5a	0x34	0.21	0.22	0.20
17.9.4a	0x34	0.21	0.22	0.20
17.9.4	0x34	0.21	0.22	0.20
17.9.3	0x34	0.21	0.22	0.20
17.9.2a	0x34	0.21	0.22	0.20
17.9.1	0x34	0.21	0.22	0.20
17.8.1	0x34	0.21	0.22	0.20

Cisco IOS XE Release	IO FGPA	8 x10 FPGA	2x40 FPGA	1x100 FPGA
17.7.1	0x34	0.21	0.22	0.20
17.6.1	0x34	0.21	0.22	0.20
17.5.1	0x34	0.21	0.22	0.20

Table 10: CEM and IM FPGA Versions for ASR 903 RSP3 and ASR 907

Category	Release	48-port T1/E1 CEM Interface Module FPGA (A900-IMA48D-C)	48-port T3/E3 CEM Interface Module FPGA (A900-IMA48T-C)	1-port OC-192 Interface Module + 8-port Low Rate Interface Module FPGA (A900-IMA8S1Z-CX)	1-port OC-48/STM-16 or 4-port OC-12/OC-3 / STM-1/STM-4 + 12-port T1/E1 + 4-port T3/E3 CEM Interface Module (A900-IMA3G-IMSG)	ASR 900 1-Port OC-192 or 8-Port Low Rate CEM 20G Bandwidth Interface Module (A900-IMA1Z8S-CXMS)
CEM FPGA	Cisco IOS XE 17.9.8	6.0	5.2	5G mode: 6.5 10G mode: 7.9	9.3	10G mode: 7.2 20G mode: 7.2
IM FPGA		1.22	1.22	1.15	2.00	0.95
CEM FPGA	Cisco IOS XE 17.9.7	6.0	5.2	5G mode: 6.5 10G mode: 7.9	9.3	10G mode: 7.2 20G mode: 7.2
IM FPGA		1.22	1.22	1.15	2.00	0.95
CEM FPGA	Cisco IOS XE 17.9.6	6.0	5.2	5G mode: 6.5 10G mode: 7.9	9.3	10G mode: 7.2 20G mode: 7.2
IM FPGA		1.22	1.22	1.15	2.00	0.95
CEM FPGA	Cisco IOS XE 17.9.5a	6.0	5.2	5G mode: 6.5 10G mode: 7.9	9.3	10G mode: 7.2 20G mode: 7.2
IM FPGA		1.22	1.22	1.15	2.00	0.95
CEM FPGA	Cisco IOS XE 17.9.4a	6.0	5.2	5G mode: 6.5 10G mode: 7.9	9.1	10G mode: 7.2 20G mode: 7.2
IM FPGA		1.22	1.22	1.15	2.00	0.95
CEM FPGA	Cisco IOS XE 17.9.4	6.0	5.2	5G mode: 6.5 10G mode: 7.9	9.1	10G mode: 7.2 20G mode: 7.2
IM FPGA		1.22	1.22	1.15	2.00	0.95

Category	Release	48-port T1/E1 CEM Interface Module FPGA (A900-IMA48D-C)	48-port T3/E3 CEM Interface Module FPGA (A900-IMA48T-C)	1-port OC-192 Interface Module + 8-port Low Rate Interface Module FPGA (A900-IMA8S1Z-CX)	1-port OC-48/STM-16 or 4-port OC-12/OC-3 / STM-1/STM-4 + 12-port T1/E1 + 4-port T3/E3 CEM Interface Module (A900-IMA3G-IMSG)	ASR 900 1-Port OC-192 or 8-Port Low Rate CEM 20G Bandwidth Interface Module (A900-IMA1Z8S-CXMS)
CEM FPGA	Cisco IOS XE 17.9.3	6.0	5.2	5G mode: 6.5 10G mode: 7.9	9.1	10G mode: 7.2 20G mode: 7.2
IM FPGA		1.22	1.22	1.15	2.00	0.95
CEM FPGA	Cisco IOS XE 17.9.2a	6.0	5.2	5G mode: 6.5 10G mode: 7.9	9.1	10G mode: 7.2 20G mode: 7.2
IM FPGA		1.22	1.22	1.15	2.00	0.95
CEM FPGA	Cisco IOS XE 17.9.1	6.0	5.2	5G mode: 6.5 10G mode: 7.9	9.1	10G mode: 7.2 20G mode: 7.2
IM FPGA		1.22	1.22	1.15	2.00	0.95
CEM FPGA	Cisco IOS XE 17.8.1	6.0	5.2	5G mode: 6.5 10G mode: 7.9	9.0	10G mode: 7.0 20G mode: 6.0
IM FPGA		1.22	1.22	1.15	2.00	0.93
CEM FPGA	Cisco IOS XE 17.7.1	0x52110052	0x52510052	5G mode: 0x10090065 10G mode: 0x10070079	0x10030076	10G mode: 0x 10290051 20G mode: 0x 10290051
IM FPGA		1.22	1.22	1.15	2.00	0.93
CEM FPGA	Cisco IOS XE 17.6.1	0x52110052	0x52520052	5G mode: 0x10090065 10G mode: 0x10070079	0x10030076	10G mode: 0x 10290051 20G mode: 0x 10290051
IM FPGA		1.22	1.22	1.15	2.00	0.93
CEM FPGA	Cisco IOS XE 17.5.1	0x52050052	0x52420052	5G mode: 0x10210063 10G mode: 0x10530078	0x10020076	10G mode: 0x10090051 20G mode: 0x10090051
IM FPGA		1.22	1.22	1.15	2.00	0.93

Table 11: FPGA, HoFPGA, and ROMMON Versions for Cisco IOS XE 17.9.1 Release

Platform	Interface Module	FPGA Current Version	FPGA Minimum Required Version	RSP HoFPGA Active	RSP HoFPGA Standby	ROMMON
RSP2-128	A900-IMA2Z	69.24	69.22	0X00030011	0X00030011	15.6(54r)S
	A900-IMA8S	0.75	0.75			
	A900-IMA8T1Z	69.32	69.32			
RSP3-400S	A900-IMA1C	0.20	0.20	40035	40035	15.6(54r)S
	A900-IMA8Z	0.22	0.21			
	A900-IMA8S1Z	69.32	69.32			
RSP3-400W	A900-IMA1C	0.20	0.20	20040034	20040034	15.6(54r)S
	A900-IMA2Z	69.24	69.24			

Table 12: FPGA, HoFPGA, and ROMMON Versions for Cisco IOS XE 17.9.2a Release

Platform	Interface Module	FPGA Current Version	FPGA Minimum Required Version	RSP HoFPGA Active	RSP HoFPGA Standby	ROMMON
RSP2-128	A900-IMA2Z	69.24	69.22	0X00030011	0X00030011	15.6(54r)S
	A900-IMA8S	0.75	0.75			
	A900-IMA8T1Z	69.32	69.32			
RSP3-400S	A900-IMA1C	0.20	0.20	40035	40035	15.6(54r)S
	A900-IMA8Z	0.22	0.21			
	A900-IMA8S1Z	69.32	69.32			
RSP3-400W	A900-IMA1C	0.20	0.20	20040034	20040034	15.6(54r)S
	A900-IMA2Z	69.24	69.24			

MIB Support

The below table summarizes the supported MIBs on the Cisco ASR 900 Series Router.

Table 13: Supported MIBs

Supported MIBs		
BGP4-MIB (RFC 1657)	CISCO-IMAGE-LICENSE-MGMT-MIB	MPLS-LDP-STD-MIB (RFC 3815)

CISCO-BGP-POLICY-ACCOUNTING-MIB	CISCO-IMAGE-MIB	MPLS-LSR-STD-MIB (RFC 3813)
CISCO-BGP4-MIB	CISCO-IPMROUTE-MIB	MPLS-TP-MIB
CISCO-BULK-FILE-MIB	CISCO-LICENSE-MGMT-MIB	MSDP-MIB
CISCO-CBP-TARGET-MIB	CISCO-MVPN-MIB	NOTIFICATION-LOG-MIB (RFC 3014)
CISCO-CDP-MIB	CISCO-NETSYNC-MIB	OSPF-MIB (RFC 1850)
CISCO-CEF-MIB	CISCO-OSPF-MIB	OSPF-TRAP-MIB (RFC 1850)
CISCO-CLASS-BASED-QOS-MIB	CISCO-OSPF-TRAP-MIB	PIM-MIB (RFC 2934)
CISCO-CONFIG-COPY-MIB	CISCO-PIM-MIB	RFC1213-MIB
CISCO-CONFIG-MAN-MIB	CISCO-PROCESS-MIB	RFC2982-MIB
CISCO-DATA-COLLECTION-MIB	CISCO-PRODUCTS-MIB	RMON-MIB (RFC 1757)
CISCO-EMBEDDED-EVENT-MGRMIB	CISCO-PTP-MIB	RSVP-MIB
CISCO-ENHANCED-MEMPOOL-MIB	CISCO-RF-MIB	SNMP-COMMUNITY-MIB (RFC 2576)
CISCO-ENTITY-ALARM-MIB	CISCO-RTTMON-MIB	SNMP-FRAMEWORK-MIB (RFC 2571)
CISCO-ENTITY-EXT-MIB	CISCO-SONET-MIB	SNMP-MPD-MIB (RFC 2572)
CISCO-ENTITY-FRU-CONTROLMIB	CISCO-SYSLOG-MIB	SNMP-NOTIFICATION-MIB (RFC 2573)
CISCO-ENTITY-SENSOR-MIB	DS1-MIB (RFC 2495)	SNMP-PROXY-MIB (RFC 2573)
CISCO-ENTITY-VENDORTYPE-OID-MIB	ENTITY-MIB (RFC 4133)	SNMP-TARGET-MIB (RFC 2573)
CISCO-FLASH-MIB	ENTITY-SENSOR-MIB (RFC 3433)	SNMP-USM-MIB (RFC 2574)
CISCO-FTP-CLIENT-MIB	ENTITY-STATE-MIB	SNMPv2-MIB (RFC 1907)
CISCO-IETF-ISIS-MIB	EVENT-MIB (RFC 2981)	SNMPv2-SMI
CISCO-IETF-PW-ATM-MIB	ETHERLIKE-MIB (RFC 3635)	SNMP-VIEW-BASED-ACM-MIB (RFC 2575)
CISCO-IETF-PW-ENET-MIB	IF-MIB (RFC 2863)	SONET-MIB
CISCO-IETF-PW-MIB	IGMP-STD-MIB (RFC 2933)	TCP-MIB (RFC 4022)
CISCO-IETF-PW-MPLS-MIB	IP-FORWARD-MIB	TUNNEL-MIB (RFC 4087)
CISCO-IETF-PW-TDM-MIB	IP-MIB (RFC 4293)	UDP-MIB (RFC 4113)
CISCO-IF-EXTENSION-MIB	IPMROUTE-STD-MIB (RFC 2932)	CISCO-FRAME-RELAY-MIB
CISCO-IGMP-FILTER-MIB	MPLS-LDP-GENERIC-STD-MIB (RFC 3815)	IF-MIB
CISCO-AAA-SERVER-MIB	—	—

Table 14: Unverified MIBs

Unverified MIBs		
ATM-MIB	CISCO-IETF-DHCP-SERVER-EXT-MIB	EXPRESSION-MIB
CISCO-ATM-EXT-MIB	—	HC-ALARM-MIB
CISCO-ATM-IF-MIB	CISCO-IETF-PPVPN-MPLS-VPN-MIB	HC-RMON-MIB
CISCO-ATM-PVC-MIB	CISCO-IP-STAT-MIB	IEEE8021-CFM-MIB
CISCO-ATM-PVCTRAP-EXTN-MIB	CISCO-IPSLA-ETHERNET-MIB	IEEE8021-CFM-V2-MIB
CISCO-BCP-MIB	CISCO-L2-CONTROL-MIB	IEEE8023-LAG-MIB
CISCO-CALLHOME-MIB	CISCO-LAG-MIB	INT-SERV-GUARANTEED-MIB
CISCO-CIRCUIT-INTERFACE-MIB	CISCO-MAC-NOTIFICATION-MIB	INTEGRATED-SERVICES-MIB
CISCO-CONTEXT-MAPPING-MIB	CISCO-MEMORY-POOL-MIB	MPLS-L3VPN-STD-MIB (RFC 4382)
CISCO-EIGRP-MIB	CISCO-NHRP-EXT-MIB	MPLS-LDP-ATM-STD-MIB (RFC 3815)
CISCO-ERM-MIB	CISCO-NTP-MIB	MPLS-LDP-MIB
CISCO-ETHER-CFM-MIB	CISCO-PING-MIB	MPLS-TE-STD-MIB
CISCO-ETHERLIKE-EXT-MIB	CISCO-RESILIENT-ETHERNET-PROTOCOL-MIB	MPLS-VPN-MIB
CISCO-EVC-MIB	CISCO-RTTMON-ICMP-MIB	NHRP-MIB
CISCO-HSRP-EXT-MIB	CISCO-RTTMON-IP-EXT-MIB	RFC2006-MIB (MIP)
CISCO-HSRP-MIB	CISCO-RTTMON-RTP-MIB	RMON2-MIB (RFC 2021)
CISCO-IETF-ATM2-PVCTRAP-MIB	CISCO-SNMP-TARGET-EXT-MIB	SMON-MIB
CISCO-IETF-ATM2-PVCTRAP-MIBEXTN	CISCO-TCP-MIB	VRRP-MIB
CISCO-IETF-BFD-MIB	CISCO-VRF-MIB	—
CISCO-IETF-DHCP-SERVER-MIB	ETHER-WIS (RFC 3637)	—

MIB Documentation

The following resources provide more detail about MIBs on the Cisco ASR 900 Series Router:

- Cisco ASR 900 Series Router MIB Guide—For information about the Cisco ASR 903 Series Router product implementation of the MIB protocol, see *Cisco ASR 903 Series Aggregation Services Router MIB Specifications Guide* at the following location:

  http://www.cisco.com/c/en/us/td/docs/wireless/asr_900/mib/guide/asr903mib.html

- MIB Locator—To locate and download MIBs for selected platforms, Cisco IOS and Cisco IOS XE releases, and feature sets, use Cisco MIB Locator found at the following location:

  https://snmp.cloudapps.cisco.com/Support/SNMP/do/BrowseOID.do?local=en

Additional References

Product Information

- Cisco ASR 900 Series Aggregation Services Routers Data Sheets

Hardware Installation Guides

- Cisco ASR 900 Series Aggregation Services Routers Hardware Guides

Software Configuration Guides

- Cisco ASR 900 Series Aggregation Services Routers Configuration Guides

Regulatory Compliance and Safety Information

- Regulatory Compliance and Safety Information for the Cisco ASR 900 Series Aggregation Services Routers

Field Notices and Bulletins

- Field Notices—We recommend that you view the field notices for this release to determine whether your software or hardware platforms are affected. You can find field notices at http://www.cisco.com/en/US/support/tsd_products_field_notice_summary.html.
- Bulletins—You can find bulletins at http://www.cisco.com/en/US/products/sw/iosswrel/ps5012/prod_literature.html.

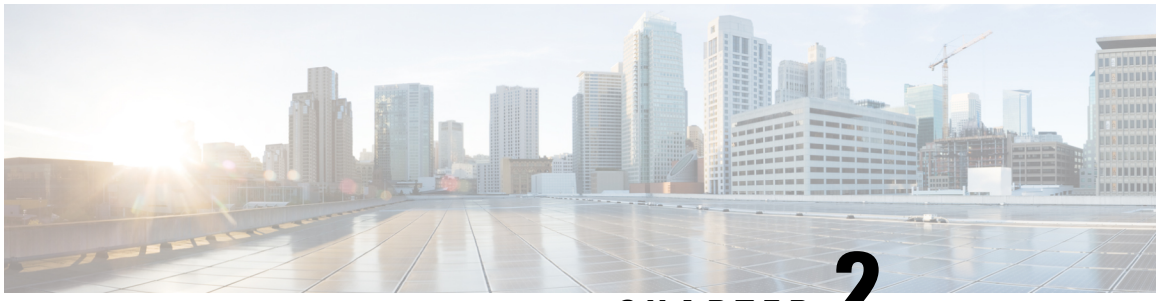
Accessibility Features in the Cisco ASR 900 Series Routers

For a list of accessibility features in Cisco ASR 900 Series Routers, see the Voluntary Product Accessibility Template (VPAT) on the Cisco website, or contact accessibility@cisco.com.

All product documents are accessible except for images, graphics, and some charts. If you would like to receive the product documentation in audio format, braille, or large print, contact accessibility@cisco.com.

End-of-Life and End-of-Sale Notices

For End-of-Life and End-of-Sale Notices for the Cisco ASR 900 Series Routers, see https://www.cisco.com/c/en/us/products/routers/asr-903-series-aggregation-services-routers/eos-eol-notice-listing.html.



CHAPTER 2

What's New for Cisco IOS XE Cupertino 17.9.x

This chapter describes the new hardware and software features supported in Cisco IOS XE Cupertino 17.9.x.

For information on features supported for each release, see Feature Compatibility Matrix.

- What's New in Hardware for Cisco IOS XE Cupertino 17.9.8, on page 23
- What's New in Software for Cisco IOS XE Cupertino 17.9.8, on page 23
- What's New in Hardware for Cisco IOS XE Cupertino 17.9.7, on page 24
- What's New in Software for Cisco IOS XE Cupertino 17.9.7, on page 24
- What's New in Hardware for Cisco IOS XE Cupertino 17.9.6, on page 24
- What's New in Software for Cisco IOS XE Cupertino 17.9.6, on page 24
- What's New in Hardware for Cisco IOS XE Cupertino 17.9.5a, on page 24
- What's New in Software for Cisco IOS XE Cupertino 17.9.5a, on page 24
- What's New in Hardware for Cisco IOS XE Cupertino 17.9.4a, on page 24
- What's New in Software for Cisco IOS XE Cupertino 17.9.4a, on page 24
- What's New in Hardware for Cisco IOS XE Cupertino 17.9.4, on page 24
- What's New in Software for Cisco IOS XE Cupertino 17.9.4, on page 25
- What's New in Hardware for Cisco IOS XE Cupertino 17.9.3, on page 25
- What's New in Software for Cisco IOS XE Cupertino 17.9.3, on page 25
- What's New in Hardware for Cisco IOS XE Cupertino 17.9.2a, on page 25
- What's New in Software for Cisco IOS XE Cupertino 17.9.2a, on page 25
- What's New in Hardware for Cisco IOS XE Cupertino 17.9.1, on page 25
- What's New in Software for Cisco IOS XE Cupertino 17.9.1, on page 25

What's New in Hardware for Cisco IOS XE Cupertino 17.9.8

There are no new hardware features introduced for this release.

What's New in Software for Cisco IOS XE Cupertino 17.9.8

There are no new software features introduced for this release.

What's New in Hardware for Cisco IOS XE Cupertino 17.9.7

There are no new hardware features introduced for this release.

What's New in Software for Cisco IOS XE Cupertino 17.9.7

There are no new software features introduced for this release.

What's New in Hardware for Cisco IOS XE Cupertino 17.9.6

There are no new hardware features introduced for this release.

What's New in Software for Cisco IOS XE Cupertino 17.9.6

There are no new software features introduced for this release.

What's New in Hardware for Cisco IOS XE Cupertino 17.9.5a

There are no new hardware features introduced for this release.

What's New in Software for Cisco IOS XE Cupertino 17.9.5a

There are no new software features introduced for this release.

What's New in Hardware for Cisco IOS XE Cupertino 17.9.4a

There are no new hardware features introduced for this release.

What's New in Software for Cisco IOS XE Cupertino 17.9.4a

There are no new features in this release. This release provides a fix for CSCwh87343: Cisco IOS XE Software Web UI Privilege Escalation Vulnerability. For more information, see cisco-sa-iosxe-webui-privesc-j22SaA4z.

What's New in Hardware for Cisco IOS XE Cupertino 17.9.4

There are no new hardware features introduced for this release.

What's New in Software for Cisco IOS XE Cupertino 17.9.4

There are no new software features introduced for this release.

What's New in Hardware for Cisco IOS XE Cupertino 17.9.3

There are no new hardware features introduced for this release.

What's New in Software for Cisco IOS XE Cupertino 17.9.3

There are no new software features introduced for this release.

What's New in Hardware for Cisco IOS XE Cupertino 17.9.2a

There are no new hardware features introduced for this release.

What's New in Software for Cisco IOS XE Cupertino 17.9.2a

There are no new software features introduced for this release.

What's New in Hardware for Cisco IOS XE Cupertino 17.9.1

There are no new hardware features introduced for this release.

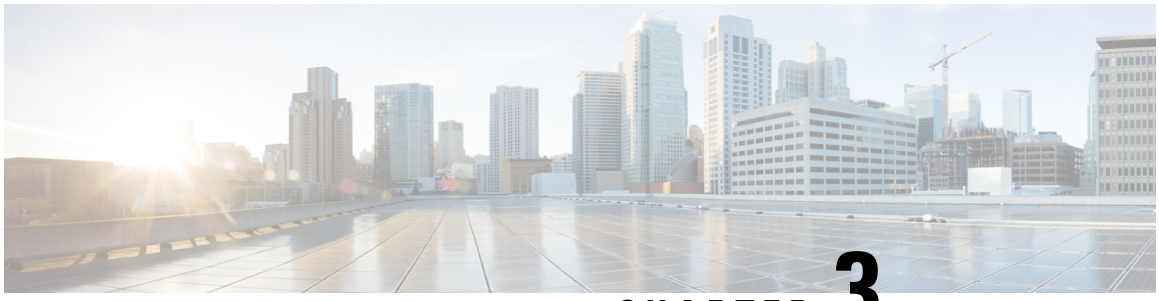
What's New in Software for Cisco IOS XE Cupertino 17.9.1

Feature	Description
Carrier Ethernet	
Application of QoS Policies on ITU-T Y.1731 Egress Packets	You can now apply QoS policies on Y.1731 egress packets. Operations, Administration, and Maintenance (OAM) functions and mechanisms for Ethernet-based networks are defined in ITU-T Y.1731. With this implementation, you can prioritize OAM traffic; for example, prioritizing operational information used to detect faults and determining network performance.

Feature	Description
Custom Idle Pattern	You can configure idle pattern manually on CEM circuits and verify if it's stable and transmitted to the other end in alarm conditions. You can configure on all CEM PWs in a T1/E1 circuit. Supported on the following IMs on CESoPSN circuits with both partial and full time slots. • ASR 900 48 port T1/E1 Interface Module • ASR 900 48 port DS3/E3 Interface Module • 1-port OC481/ STM-16 or 4-port OC-12/OC-3 / STM-1/STM-4 + 12-Port T1/E1 + 4-Port T3/E3 CEM Interface Module • ASR 900 Combo 8-Port SFP GE and 1-Port 10 GE 20G Interface Module These idle pattern numbers are used for tracking purposes.
Layer 2 Control Protocol Enhancements	Layer 2 Control Protocols (L2CP) propagate the MAC address control information to determine which parts of a network the router should forward, tunnel, peer, or discard information. For the RSP2 and RSP3 modules, this release supports **forward** and **discard** options for the following protocols: • MRP Block • Cisco BPDU • Cisco STP UplinkFast • Cisco CFM For the RSP3 module, this release supports **forward** , **discard** , and **tunnel** options for the following protocols: • DOT1X • MMRP • MVRP
Cisco ASR 900 Router Series	
Persistent Bandwidth for 8-port 10 Gigabit Ethernet Interface module (A900-IMA8Z)	This feature persistently retains the configured bandwidth value of the interface for 8-port 10 Gigabit Ethernet Interface module (A900-IMA8Z) across triggers such as interface shut or no-shut, IM reload, Stateful Switchover (SSO), and so on.
IOT Interface Modules	
Hitless Switching on C37.94 Interface Module	Hitless switching protection describes the ability to switch between the active and backup paths without losing packets when an active path fails. This feature ensures uninterrupted continuous service and maintains an extremely high-reliability rating.

Feature	Description
IP Multicast: Multicast	
Support for MVPN Bidirectional PIM	This release extends the support of bidirectional PIM over MVPN. This feature is only supported on profile 1 MVPN or default MDT - MLDP MP2MP - PIM C-mcast signaling. This feature is only supported on Cisco RSP3 module.
OCx CEM Interface Module	
MLPPP ACR support for IPv4 or IPv6 Interworking Multiservice Gateway (iMSG)	MLPPP ACR is supported for IPv4 or IPv6 iMSG on: • ASR 900 1-Port OC-192 or 8-Port Low Rate CEM 20G Bandwidth Interface Module (A900-IMA1Z8S-CXMS) Now, you can increase the bandwidth of a specific OCx port using MLPPP. The restrictions for MLPPP interworking are applicable to iMSG ACR.
QoS Support on Serial Interfaces	QoS is supported on serial interfaces. You can apply service policies on egress of L3 terminated serial interfaces with both HDLC and PPP encapsulation. By implementing QoS policies on serial interfaces you can shape, classify, or prioritize the data.
MPLS Basic	
Support for Co-routed Inter-area Flex-LSP Tunnels	Flex LSPs (also called Associated Bidirectional LSPs) now support inter-area co-routed tunnels. This implementation meets the specific requirements of network operators (LSP users) to create on-demand tunnels by defining an explicit path across different areas.
Segment Routing	
LSR Support for Autoroute Announce SR Policies	This feature enables Label Switch Routing (LSR) and thus helps to forward labeled (EOS0, EOS1) traffic over three or four labeled segment routing autoroute static tunnels.
Support of BGP PIC for Short LCM Policies	This feature introduces the support of BGP Prefix Independent Convergence (PIC) and helps you to enable BGP PIC core and BGP PIC edge for short local congestion mitigation (LCM) policies. This feature helps to minimise the convergence time after a network failure. You should only configure LCM policies or the SR policies with 0, 1, and 2 SR labels.
YANG Model Support for QoS Service Group	Cisco YANG now supports QoS Service Groups. Service-Groups allow you to add service instances to groups and apply service policies. You can configure the definition of the service-group and apply the service-group to an interface. With this implementation, you can quickly deploy QoS mechanisms, such as creating a class for email traffic.
IPv6: RFC 8200 Compliance	Improvements have been made to the Cisco IOS XE platforms to maintain compliance with IETF standards as specified for the Internet Protocol, Version 6 (IPv6) in RFC 8200. The enhancements bring in improved security and better handling of IP packets with fragments.

Feature	Description
Show tech-support Enhancements	
Show tech-support Enhancements	The **show tech-support** now supports generic commands to provide better debuggability. The **show tech-support platform cef** command now displays IPv4 address information. For more information, see Cisco IOS Configuration Fundamentals Command Reference.



CHAPTER 3

Caveats

This chapter describes open and resolved severity 1 and 2 caveats and select severity 3 caveats:

- The "Open Caveats" sections list open caveats that apply to the current release and may apply to previous releases. A caveat that is open for a prior release and is still unresolved applies to all future releases until it is resolved.
- The "Resolved Caveats" sections list caveats resolved in a specific release, but open in previous releases.

The bug IDs are sorted alphanumerically.

Note The Caveats section includes the bug ID and a short description of the bug. For details on the symptoms, conditions, and workaround for a specific caveat you must use the Bug Search Tool.

- Resolved Caveats - Cisco IOS XE Cupertino 17.9.8, on page 30
- Open Caveats - Cisco IOS XE Cupertino 17.9.8, on page 30
- Resolved Caveats - Cisco IOS XE Cupertino 17.9.7, on page 30
- Open Caveats - Cisco IOS XE Cupertino 17.9.7, on page 30
- Resolved Caveats - Cisco IOS XE Cupertino 17.9.6, on page 30
- Open Caveats - Cisco IOS XE Cupertino 17.9.6, on page 30
- Resolved Caveats - Cisco IOS XE Cupertino 17.9.5a, on page 31
- Open Caveats - Cisco IOS XE Cupertino 17.9.5a, on page 31
- Resolved Caveats - Cisco IOS XE Cupertino 17.9.4a, on page 31
- Open Caveats - Cisco IOS XE Cupertino 17.9.4a, on page 32
- Resolved Caveats - Cisco IOS XE Cupertino 17.9.4, on page 32
- Open Caveats - Cisco IOS XE Cupertino 17.9.4, on page 32
- Resolved Caveats - Cisco IOS XE Cupertino 17.9.3, on page 32
- Open Caveats - Cisco IOS XE Cupertino 17.9.3, on page 33
- Resolved Caveats - Cisco IOS XE Cupertino 17.9.2a, on page 33
- Open Caveats - Cisco IOS XE Cupertino 17.9.2a, on page 34
- Resolved Caveats - Cisco IOS XE Cupertino 17.9.1, on page 34
- Open Caveats - Cisco IOS XE Cupertino 17.9.1, on page 35
- Cisco Bug Search Tool, on page 35

Resolved Caveats - Cisco IOS XE Cupertino 17.9.8

There are no resolved caveats in this release.

Open Caveats - Cisco IOS XE Cupertino 17.9.8

There are no open caveats in this release.

Resolved Caveats - Cisco IOS XE Cupertino 17.9.7

Identifier	Headline
CSCwm86214	LDP session flap causes memory leak for EMPLS3LD which leads to RSP crash.
CSCwm91197	Silent reload of 3GMS IM due to PCI transaction failure.
CSCwj72178	ASR903(RSP3) - OSPF not coming on G8032 vlan post reload.
CSCwk87121	Ports on A900-IMA8S remain down after ISSU operation with RSP3.

Open Caveats - Cisco IOS XE Cupertino 17.9.7

Identifier	Headline
CSCwi76112	Message to be displayed for M13 framing when configured with clear-channel.

Resolved Caveats - Cisco IOS XE Cupertino 17.9.6

Identifier	Headline
CSCwj05647	3GMS serial interface protocol down with specific modem
CSCwj06370	Serial cease traffic when configuring module other port

Open Caveats - Cisco IOS XE Cupertino 17.9.6

Identifier	Headline
CSCwj38216	BDI ARP is not learning but peer side BDI MAC is learning through VC
CSCwj72178	ASR903 (RSP3) - OSPF not coming on G8032 vlan post reload

Identifier	Headline
CSCwi74892	VLAN tagged pause frames were flooded towards ASR903 (RSP3) and caused port-channel flap

Resolved Caveats - Cisco IOS XE Cupertino 17.9.5a

Identifier	Headline
CSCwh28391	The **show running config** and **write memory** commands trigger **ERR:Interfacenotfound** error messages
CSCwf77316	ASR900/RSP3: MPLS incorrect label programmed with scenarios of double implicit-null
CSCwf86864	CEM traffic flow is dropped in one direction due to DEI bit set from 4202
CSCwf07736	The cem interface counters momentarily report error when x21 xconnect is cleared and reestablished
CSCwh06287	When policy is attached to serial interface, the device is going for a reload
CSCwf53995	17.13 system BERT interval is reset with clear counters
CSCwh64181	After losing primary master, T-BC stuck in the HOLDOVER state though secondary master is reachable.
CSCwh84309	With telcordia profile, Ethernet interfaces sec admin state is not going to the AINS state.

Open Caveats - Cisco IOS XE Cupertino 17.9.5a

Identifier	Headline
CSCwd87661	Fan running at high speed and creating noise (Fan PID A903-FAN-H) - SW version 17.03.04
CSCwe22859	Ping is not working on EFP based MACSec interfaces after SSO is complete
CSCwc03299	RSP3: Pending ack on active RSP pointing to efp-bridge-domain-bind

Resolved Caveats - Cisco IOS XE Cupertino 17.9.4a

Identifier	Headline
CSCwh87343	Cisco IOS XE Software Web UI Privilege Escalation Vulnerability

Open Caveats - Cisco IOS XE Cupertino 17.9.4a

There are no open caveats in this release.

Resolved Caveats - Cisco IOS XE Cupertino 17.9.4

Identifier	Headline
CSCwd90840	The multicast data traffic is getting dropped over VPLS
CSCwd67723	In the IMA32D/IMA8D card, sometimes change in E1 controller config (after ctrlr flap) results in IM reboot
CSCwe38959	In rs232 ASYNC PW service with full scale, the packet and byte drop intermittently
CSCwf14167	RSP3: uea_mgr memory leak on ARP probes
CSCwe33508	SRTE policy is down when removing and configuring ISIS

Open Caveats - Cisco IOS XE Cupertino 17.9.4

Identifier	Headline
CSCwd88680	High Convergence after Port channel member Failure
CSCwd05362	Performance issue on ASR900 platform
CSCwd87661	Fan is running at high speed and creating noise (Fan PID A903-FAN-H) - SW version 17.03.04
CSCwe13024	ASR900-RSP2: All readings for Power supply unit reflect as zero though the unit is functional
CSCwe27155	Traffic drop with BDI shut (IP_FRR configs)

Resolved Caveats - Cisco IOS XE Cupertino 17.9.3

Identifier	Headline
CSCwb77093	next hop self does changes automatically on VRF lite and ipv4
CSCwc55520	Traceback and IDB leak noticed when a RSP3 setup performs a switchover
CSCwc65971	RSP3: MPLS pseudowire - Incorrect label stack pushed to packet
CSCwc76772	In RSP2 Serial intf protocol goes down after bulk sync and SSO

Identifier	Headline
CSCwd06972	IOS-XE 17.x - user password not saved if user attribute list is configured
CSCwd15539	RSP2/RSP3 : IM's shouldn't reload during sipspa install stage 3 in single step install ISSU
CSCwd26357	rs485 with half-duplex configuration when reloaded, it gets into default full-duplex mode
CSCwd40870	RSP2 will crash when entering "ip prefix" list
CSCwd44817	After router reload E1 framing gets changed to unframed in SDH VC12 mode with channe-group config
CSCwd57471	Change in BGP ORF prefix-filter not being advertised from XE to XR node
CSCwd58396	NETCONF: Failed sync between Running configs and Candidate database
CSCwd66936	RSP2 UDP pseudowire stuck in Activating

Open Caveats - Cisco IOS XE Cupertino 17.9.3

Identifier	Headline
CSCwc03907	ISIS SRLG to BGPLS export problems
CSCwd76589	BGP On Change Notification not sent for BGP Dynamic Peers
CSCwd90908	NTP packets are sent from global VRF with a source IP configured on service VRF interface

Resolved Caveats - Cisco IOS XE Cupertino 17.9.2a

Identifier	Headline
CSCwb78907	DS3_RX_RAI is shown in both **facility-alarm** and **facility-condition status** CLI
CSCwb77396	G.8032: Ring brief output does not display the Block port flag in Idle state
CSCwc21402	Invalid BGP update when add-paths negotiated only for label (SAFI 4) and not unicast (SAFI1)
CSCwc67367	Seeing traffic issues after clearing ISIS with **SRTE_ODN_ISIS_Flex_Algo** configs

Open Caveats - Cisco IOS XE Cupertino 17.9.2a

Identifier	Headline
CSCwc65971	RSP3: MPLS pseudowirte - Incorrect label stack pushed to packet
CSCwc54860	EIGRP down authentication issues after ugprading from 17.3 to 17.6
CSCwc03907	ISIS SRLG to BGPLS export problems
CSCwc23316	Command **show snmp mib ifmib ifindex detail [IntName]** truncated when it is more than 32 characters

Resolved Caveats - Cisco IOS XE Cupertino 17.9.1

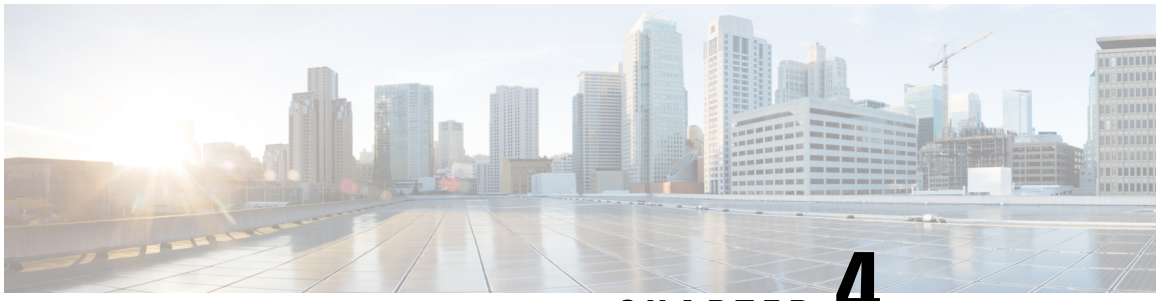
Identifier	Headline
CSCwa94444	F2B chassis: show env does not display the fan speed.
CSCwb06353	Router crashed with ip sla configuration which is not supported
CSCwa33548	Observed traffic issue with latest labels &bi-directional traffic is not working and drop is seen
CSCwa41638	ASR920 MAC Table and L2VPN EVPN Table out of sync
CSCwa54842	RSP3: QOSMGR-4-QUEUE_ExCEEDING_HW: VOQs exceeded hardware limit
CSCwb76150	STS1e -> vt-15 -> t1 -> Difference in ifName string format for controller up/down syslog messages
CSCwb09946	Bilbo/Eomer - T3 loopback doesn't generate syslogs
CSCvz65726	Post SSO with Qos OHA counters stop works
CSCvv16943	Uea-iomd phase2 IM FPD ugprade commit to polaris_dev
CSCwa78999	While rebooting the IM: A900-IMA4C3794, RSP2 device is going for Crash
CSCvz34941	RSP3-4000S: Punt Keepalive Failure issue 17.x
CSCwb20542	DCC not working if 10GMS and 3GMS is connected.
CSCwb69025	Change in SD-BER threshold value to 10e-9 causes SD alarm assertion
CSCwb60002	ASR900 may experience an unexpected reset when configuring or using interface BDI >= 4097
CSCvz02262	TCAM corruption happening at bank boundary when one of the bank is full.
CSCwb33605	Problem with CISCO-ENTITY-SENSOR-MIB SNMP on ASR903 router

Open Caveats - Cisco IOS XE Cupertino 17.9.1

Identifier	Headline
CSCwc28528	Netconf returns wrong IM Slot when supervisor R1 is active in Cisco-IOS-XE-platform-oper
CSCwc34663	FPD: Failure to downgrade the firmware of card 0/0
CSCwb78907	DS3_RX_RAI is shown in both facility-alarm and facility-condition status cli
CSCwb79003	PPLM is asserted when Tx C2=01 in case of mode unframed.

Cisco Bug Search Tool

Cisco Bug Search Tool (BST), the online successor to Bug Toolkit, is designed to improve effectiveness in network risk management and device troubleshooting. You can search for bugs based on product, release, and keyword, and aggregates key data such as bug details, product, and version. For more details on the tool, see the help page located at http://www.cisco.com/web/applicat/cbsshelp/help.html



CHAPTER 4

Restrictions and Limitations

Note The error message "PLATFORM-1-NOSPACE: SD bootflash : no space alarm assert" may occur in the following scenarios:

- Any sector of SD Card gets corrupted
- Improper shut down of router
- power outage.

This issue is observed on platforms which use EXT2 file systems.

We recommend performing a reload of the router. As a result, above alarm will not be seen during the next reload due to FSCK(file systems check) execution.

However, If the error persists after a router reload, we recommend to format the bootflash or FSCK manually from IOS.

- Embedded Packet Capture (EPC) is not supported on ASR 900 routers.
- From the Cisco IOS XE 16.6.1 releases, In-Service Software Upgrade (ISSU) is not supported on the router to the latest releases. For more information on the compatible release versions, see ISSU Support Matrix.
- ISSU is not supported between a Cisco IOS XE 3S release and the Cisco IOS XE Bengaluru 17.6.x release.
- The port restriction on 1-port OC-192 or 8-port low rate CEM interface module is on port pair groups. If you have OC48 configured on a port, the possible port pair groups are 0–1, 2–3, 4–5, 6–7. If one of the ports within this port group is configured with OC48 rate, the other port cannot be used.
- RS422 pinout works only on ports 0–7.
- The **ip cef accounting** command is *not* supported on the router.
- Configuration sync does *not* happen on the Standby RSP when the active RSP has Cisco Software Licensing configured, and the standby RSP has Smart Licensing configured on the router. If the active RSP has Smart Licensing configured, the state of the standby RSP is undetermined. The state could be pending or authorized as the sync between the RSP modules is not performed.

- Evaluation mode feature licenses may not be available to use after disabling, and enabling the smart licensing on the RSP2 module. A reload of the router is required.
- Ingress counters are not incremented for packets of the below format on the RSP3 module for the 10-Gigabit Ethernet interfaces, 100-Gigabit Ethernet interfaces, and 40-Gigabit Ethernet interfaces:

  Packet Format

  MAC header---->VLAN header---->Length/Type

  When these packets are received on the RSP3 module, the packets are not dropped, but the counters are not incremented.
- T1 SAToP, T3 SAToP, and CT3 are supported on an UPSR ring only with local connect mode. Cross-connect configuration of T1, T3, and CT3 circuits to UPSR are not supported.
- PTP is not supported when 8-port 10-Gigabit Ethernet interface module is in oversubscribed mode.
- Port channel 61–64 is not supported in the 16.11.1a release. The range of configurable port channel interfaces has been limited to 60.
- Effective with Cisco IOS XE Everest 16.6.1, the VPLS over Port-channel (PoCH) scale is reduced from 48 to 24 for Cisco ASR 903 RSP3 module.



Note The PoCH scale for Cisco ASR 907 routers is 48.

- The frame drops may occur for packets with packet size of less than 100 bytes, when there is a line rate of traffic over all 1G or 10G interfaces available in the system. This restriction is applicable only on RSP2 module, and is not applicable for RSP3 module.
- One Ternary Content-Addressable Memory (TCAM) entry is utilized for Segment Routing Performance Measurement. This is required for the hardware timestamping to function.
- While performing an auto upgrade of ROMMON, only primary partition is upgraded. Use the **upgrade rom-mon filename** command to upgrade the secondary partition of the ROMMON during the auto upgrade. However, the router can be reloaded during the next planned reload to complete the secondary ROMMON upgrade. This is applicable to ASR 903 and ASR 907 routers.
- In the Cisco IOS XE 17.1.1 release, the EVPN EVI type is VLAN-based by default, and while configuring for the EVPN EVI type, it is recommended to configure the EVPN EVI type as VLAN-based, VLAN bundle and VLAN aware model.
- For Cisco IOS XE Gibraltar Release 16.9.5, Cisco IOS XE Gibraltar Release 16.12.3, and Cisco IOS XE Amsterdam 17.1.x, a minimum disk space of 2 MB is required in the boot flash memory file system for a successful ROMMON auto upgrade process. For a disk space lesser than 2 MB, ROMMON auto upgrade fails and the router reboots. This is applicable to Cisco ASR 903 and Cisco ASR 907 routers.
- In the Cisco IOS XE 16.12.1, 17.1.1, and 17.2.1 releases, IPsec is not supported on the Cisco RSP3 module.
- CEM circuit provisioning issues may occur during downgrade from Cisco IOS XE Amsterdam 17.3.1 to any lower versions or during upgrade to Cisco IOS XE Amsterdam 17.3.1 from any lower versions, if the CEM scale values are greater than 10500 APS/UPSR in protected CEM circuits. So, ensure that the CEM scale values are not greater than 10500, during ISSU to or from 17.3.1.

- Some router models are not fully compliant with all IETF guidelines as exemplified by running the pyang tool with the **lint** flag. The errors and warnings that are exhibited by running the pyang tool with the **lint** flag are currently noncritical as they do not impact the semantic of the models or prevent the models from being used as part of the toolchains. A script has been provided, "check-models.sh", that runs pyang with **lint** validation enabled, but ignoring certain errors. This allows the developer to determine what issues may be present.

  As part of model validation for the Cisco IOS XE Amsterdam 17.3.1 release, "LEAFREF_IDENTIFIER_NOT_FOUND" and "STRICT_XPATH_FUNCTIONS" error types are ignored.

- Test Access Port (TAP) is not supported when the iMSG VLAN handoff feature is enabled on the same node.

- Data Communication Channel (DCC) is not supported in the A900-IMA1Z8S-CXMS interface module for the Cisco IOS XE Cupertino 17.8.1 release.

- SF and SD alarms are not supported on T1 and T3 ports for the following interface modules:
  - A900-IMA3G-IMSG
  - A900-IMA48D-C
  - A900-IMA48T-C

- In RSP2 and RSP3 modules, during In-Service Software Upgrade (ISSU), interface modules undergo FPGA upgrade.

  The following table details the IM Cisco IOS XE versions during ISSU with respect to FPGA upgrade and the impact of traffic flow for these IMs:

Table 15: Impact on IM during ISSU and FPGA Upgrade

IM	IM Version During ISSU	Pre-ISSU FPGA Upgrade	Post-ISSU Impact on IM	FPGA Version post ISSU
Phase 1	Cisco IOS XE 17.3.x or earlier version to Cisco IOS XE 17.4.x	FPGA upgrade completes and IM starts after the reload process. FPGA version (phase -1) - 0.47	Traffic is impacted during upgrade.	0.75

IM	IM Version During ISSU	Pre-ISSU FPGA Upgrade	Post-ISSU Impact on IM	FPGA Version post ISSU
Phases 1 and 2	Version earlier to Cisco IOS XE 17.8.x	FPGA upgrade completes and IM starts after the reload process. • FPGA version (Phase 1)—0.47 • FPGA version (Phase 2) • A900-IMA8Z—62 • Combo IM: 69.24	Traffic is impacted during upgrade.	• FPGA version (Phase 1)—0.75 • FPGA version (Phase 2) • A900-IMA8Z—62 • Combo IM: 69.32
Phase 1	Cisco IOS XE 17.4.1 or later versions to Cisco IOS XE 17.8.1	IM FPGA already upgraded with the latest version and reload is not required.	Traffic is not impacted.	0.75

For more information on the FPGA versions, see Supported FPGA, HoFPGA, and ROMMON Versions.

Refer the following table for supported IMs:

Table 16: ASR 900 Supported Ethernet Interface Module

Phase 1 IM	Phase 2 IM	Phase 3 IM
A900-IMA8S	A900-IMA8S1Z	A900-IMA8Z
A900 -IMA8T	A900-IMA8T1Z	A900-IMA2F
A900-IMA1X	A900-IMA2Z	A900-IMA2C