



## **Release Notes for Cisco ASR 900 Series Routers, Cisco IOS XE Bengaluru 17.5.x**

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## CONTENTS

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### CHAPTER 1

#### **Introduction 1**

Overview of Cisco ASR 900 Series Routers	1
Cisco ASR 900 Series Router	2
Cisco ASR 902 Router	2
Cisco ASR 903 Router	2
Cisco ASR 907 Router	2
Cisco ASR 914 Router	2
Feature Navigator	3
Hardware Support	4
Cisco ASR 902 Supported Interface Modules	4
A900-RSP2-Supported Interface Modules (ASR 902 Router)	4
A900-RSP3C-200-S Supported Interface Modules (ASR 902 Router)	6
Cisco ASR 903 Supported Interface Modules	6
A900-RSP2 Supported Interface Modules	6
A900-RSP3C-400-S Supported Interface Modules	8
A900-RSP3C-200-S Supported Interface Modules	10
Cisco ASR 907 Supported Interface Modules	12
Supported Interface Modules	12
Cisco ASR 914 Supported Interface Modules	14
Swapping of Interface Modules	14
Feature Matrix	17
Software Licensing Overview	17
Determining the Software Version	18
Upgrading to a New Software Release	18
Supported FPGA, HoFPGA, and ROMMON Versions for Cisco IOS XE 17.5.x Release	19
Documentation Updates	21

MIB Support 22  
     MIB Documentation 25  
     Additional References 25

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**CHAPTER 2**      **What's New for Cisco IOS XE Bengaluru 17.5.x 27**  
     What's New in Hardware for Cisco IOS XE Bengaluru 17.5.1 27  
     What's New in Software for Cisco IOS XE Bengaluru 17.5.1 27

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**CHAPTER 3**      **Caveats 31**  
     Resolved Caveats – Cisco IOS XE Bengaluru 17.5.1 31  
     Open Caveats – Cisco IOS XE Bengaluru 17.5.1 32  
     Cisco Bug Search Tool 33

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**CHAPTER 4**      **Restrictions and Limitations 35**



# CHAPTER 1

## Introduction

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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.

- [Overview of Cisco ASR 900 Series Routers](#) , on page 1
- [Feature Navigator](#), on page 3
- [Hardware Support](#) , on page 4
- [Feature Matrix](#), on page 17
- [Software Licensing Overview](#), on page 17
- [Determining the Software Version](#) , on page 18
- [Upgrading to a New Software Release](#), on page 18
- [Supported FPGA, HoFPGA, and ROMMON Versions for Cisco IOS XE 17.5.x Release](#), on page 19
- [Documentation Updates](#), on page 21
- [MIB Support](#), on page 22
- [Additional References](#), on page 25

## 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 900 Series Router

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.

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## 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) +	A900-IMA8S1Z	
	1-port 10-Gigabit Ethernet (1x10GE)		
	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 <sup>1</sup>
	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	

<sup>1</sup> 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-port T1/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.

**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
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

Supported Interface Modules	Part Numbers	Slot
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 <sup>2</sup>
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 <sup>3</sup>  <b>Note</b> To enable this IM on slot 0 or slot 1, do the following and reload the router:  <pre>Router# configure t Router(config)# license feature service-offload enable</pre>

<sup>2</sup> IM supports only one port of 100G with RSP3 as QSFP28 on Port 0 in both slots 4 and 5.

<sup>3</sup> 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.

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 <sup>4</sup>
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-IMA3GIMSG	2-5 <sup>5</sup>
8-Port 10 Gigabit Ethernet (8x10GE) SFP+ Interface Module with Conformal Coating	<sup>6</sup> A900-IMA8ZCC	0

<sup>4</sup> If you have a 1-port 10G IM in slot 0, then SFP combo may not be supported in slot 5.

<sup>5</sup> 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.

<sup>6</sup> Supported only from release XE-17.13.1 onwards.

# Cisco ASR 907 Supported Interface Modules

## Supported Interface Modules



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**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



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**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.

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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
	8-port T1/E1 Interface Module	A900-IMA8D	Not Supported
	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 <sup>7</sup>
	2x40G Interface module	A900-IMA2F	3,4,7,8,11,12
	8x10G Interface module	A900-IMA8Z <sup>8</sup>	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	

RSP Module	Interface Modules	Part Number	Slot
	Combo 8-Port SFP GE and 1-Port 10GE With CEM/iMSG 20G Interface Module	A900-IMA1Z8S-CXMS	3, 7, 11 <sup>9</sup> 4, 8, 12 <sup>10</sup> 5, 9, 13, 15 <sup>11</sup> <b>Note</b> 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	Not Supported
	4-port C37.94 Interface Module	A900-IMA4C3794	Not Supported

<sup>7</sup> 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.

<sup>8</sup> Six IM slots are supported with various combinations but only five IM slots are functional at a time.

<sup>9</sup> These slots are supported on 10G or 20G mode.

<sup>10</sup> These slots are supported on 10G or 20G mode, only if the adjacent odd slots are empty.

<sup>11</sup> 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](#).

### Swapping of Interface Modules

The following Ethernet interface modules support swapping on the Cisco A900-RSP3C-400-W module:

Use the **hw-module subslot default** command before performing a swap of the modules to default the interfaces on the interface module.

- SFP Combo IM—8-port Gigabit Ethernet (8X1GE) + 1-port 10 Gigabit Ethernet (1X10GE)
- 2-port 40 Gigabit Ethernet Interface Module (2X40GE)
- 8-port 10 Gigabit Ethernet Interface Module (8X10GE)
- 1-port 100 Gigabit Ethernet Interface Module (1X100GE)
- OC-192 Interface Module with 8-port Low Rate CEM Interface Module (10G HO / 10G LO)
- 48 T1/E1 TDM Interface Module (48XT1/E1)
- 48 T3/E3 TDM Interface Module (48XT3/E3)

Use of **hw-module subslot default** command is not supported on the following interface modules.

- 1-port OC-192 Interface Module with 8-port Low Rate CEM Interface Module (10G HO / 10G LO)
- 48 T1/E1 TDM Interface Module (48XT1/E1)
- 48 T3/E3 TDM Interface Module (48XT3/E3)
- 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)
- ASR 900 Combo 8-Port SFP GE and 1-Port 10 GE 20G Interface Module (A900-IMA1Z8S-CXMS)



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**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



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

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Table 8: Cisco A900-RSP3C-400-W Supported Interface Modules and Part Numbers

RSP Module	Interface Modules	Part Number	Slot
A900-RSP3C-400-W	SFP Combo IM—8-port Gigabit Ethernet (8X1GE) + 1-port 10 Gigabit Ethernet (1X10GE)	A900-IMA8S1Z	2,5,6,9,10,13,14,15
	1x100G Interface module	A900-IMA1C	7,8
	2x40G Interface module	A900-IMA2F	3,4,7,8,11,12
	8x10G Interface module	A900-IMA8Z	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, and 15
	OC-192 Interface Module with 8-port Low Rate CEM Interface Module (10G HO / 10G LO)	A900-IMA1Z8S-CX	3,4,7,8,11,12 <b>Note</b> Other slots are supported in the 5G mode.
	48XT1/E1 Interface module	A900-IMA48D-C	2,3,4,5,6,7,8,9,10,11,12,13,14, and 15
	48XT3/E3 Interface module	A900-IMA48T-C	2,3,4,5,6,7,8,9,10,11,12,13,14, and 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	2,3,4,5,6,7,8,9,10,13,14, and 15
	2x100G Interface module	NCS560-IMA2C/A900-IMA2C	7, 8
	Combo 8-Port SFP GE and 1-Port 10GE With CEM/iMSG 20G Interface Module	A900-IMA1Z8S-CXMS	0, 1, 2, 5, 6, 9, 10, 13, 14, 15 <sup>12</sup> 3, 4, 7, 8, 11, 12 <sup>13</sup> <b>Note</b> 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

<sup>12</sup> These slots are supported on 10G mode.<sup>13</sup> These slots are supported on 20G mode.

# 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 9: 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
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

Metro Services	Metro IP Services	Metro Aggregation Services
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 on 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 firmware 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](#).




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**Note** ROMMON upgrade is mandatory to boot RSP3 images.

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## Supported FPGA, HoFPGA, and ROMMON Versions for Cisco IOS XE 17.5.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.




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**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.

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**Note** Effective Cisco IOS XE 17.3.1, secure ROMMON version of **15.6(42r)S** is supported to boot RSP3 images. Once you upgrade to the secure BIOS ROMMON version, you cannot downgrade to non-secure ROMMON versions (lower than 15.6(33r)S). The Cisco IOS XE 17.3.1 release is bundled with 15.6(42r)S ROMMON and the auto upgrade feature will upgrade all RSPs running a lower version of ROMMON to Secure 15.6 (42r)S ROMMON.

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**Table 10: IM FPGA Versions for Ethernet Phase 3 IM**

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

Table 11: 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)	Combo 8-Port SFP GE and 1-Port 10GE With CEM/iMSG 20G Interface Module (A900-IMA1Z8S-CXMS)
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 12: HoFPGA and ROMMON 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)	Combo 8-Port SFP GE and 1-Port 10GE With CEM/iMSG 20G Interface Module (A900-IMA1Z8S-CXMS)
ROMMON	Cisco IOS XE 17.5.1	15.6(47r)S	15.6(47r)S	15.6(47r)S	15.6(47r)S	15.6(47r)S
HoFPGA (Active/ Standby)		0x52050052	0x52420052	0x10230063	0x10020076	0x10090051

Table 13: FPGA, HoFPGA, and ROMMON Versions for Cisco IOS XE 17.5.1 Release

Platform	Interface Module	FPGA Current Version	FPGA Minimum Required Version	RSP HoFPGA Active	RSP HoFPGA Standby	ROMMON
RSP2-128	A900-IMA2Z	69.22	69.22	0X00030010	0X00030010	15.6(43r)S
	A900-IMA8S	0.75	0.75			
	A900-IMA8T1Z	69.32	69.24			



Platform	Interface Module	FPGA Current Version	FPGA Minimum Required Version	RSP HoFPGA Active	RSP HoFPGA Standby	ROMMON
RSP3-400S	A900-IMA1C	0.2	0.2	40035	40035	15.6(42r)S
	A900-IMA8Z	0.21	0.21			
	A900-IMA8S1Z	69.24	69.24			
RSP3-400W	A900-IMA1C	0.2	0.2	20040034	20040034	15.6(42r)S
	A900-IMA2Z	69.22	69.22			

## Documentation Updates

The following are the modifications to the CEM guides.

- **CEM Generic Guide**

This guide covers CEM features, configurations, verifications, and examples that are common to the following CEM interface modules:

- 48-Port T1 or E1 CEM interface module
- 48-Port T3 or E3 CEM interface module
- 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
- 1-port OC-192 or 8-port Low rate CEM interface module
- ASR 900 Combo 8-port SFP GE and 1-port 10 GE 20G interface module

The CEM features are:

- Circuit Emulation
  - CEM Classes
  - CEM Parameters
- CEM Pseudowire
- Clock Recovery
- BERT and BERT Patterns for:
  - T1
  - T3
  - OCX
  - STS
- CEM over MPLS QoS

- RSP-based Non-Intrusive Monitor Ports
- Support for Static MPLS Labels on Cisco RSP3 Module

For more information, see the [CEM Generic Configuration Guide, Cisco IOS XE 17 \(Cisco ASR 900 Series\)](#) .

- **48-Port T1/E1 CEM Interface Module Configuration Guide**

This guide covers the following information:

- Introduction to the 48-Port T1/E1 CEM Interface Module—Provides basic information on interface module.
- Supported Features and Configurations—Provides information on restrictions, configurations, and verification examples of supported features on interface module.
- Monitoring the T1 or E1 Interface Module—Provides information on how features to monitor the interface module.
- Troubleshooting the T1 or E1 Interface Module—Provides information on troubleshooting the interface module.
- Additional References—Provides additional information about the interface module.

For more information, see the [48-Port T1 or E1 CEM Interface Module Configuration Guide, Cisco IOS XE 17 \(Cisco ASR 900 Series\)](#) .

- **48-Port T3/E3 CEM Interface Module Configuration Guide**

This guide covers the following information:

- Introduction to the 48-Port T3/E3 CEM Interface Module—Provides basic information on interface module.
- Supported Features and Configurations—Provides information on restrictions, configurations, and verification examples of supported features on interface module.
- Monitoring the T1 or E1 Interface Module—Provides information on how features to monitor the interface module.
- Troubleshooting the T1 or E1 Interface Module—Provides information on troubleshooting the interface module.
- Providing Redundancy Support At the Interface Module—Provides information on providing redundancy support at the interface module.
- Additional References—Provides conceptual information of STS-1 frame, STS-1 overhead, asynchronous mapping for T3 or E3 CEP, and alarms for T3 or E3 CEP.

For more information, see the [48-Port T3/E3 CEM Interface Module Configuration Guide, Cisco IOS XE 17 \(Cisco ASR 900 Series\)](#) .

## MIB Support

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

Table 14: 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 15: 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](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:

<http://tools.cisco.com/ITDIT/MIBS/servlet/index>

## 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](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](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](mailto: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](mailto: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 Bengaluru 17.5.x

This chapter describes the new hardware and software features supported in Cisco IOS XE Bengaluru 17.5.x.

For information on features supported for each release, see [Feature Compatibility Matrix](#).

- [What's New in Hardware for Cisco IOS XE Bengaluru 17.5.1, on page 27](#)
- [What's New in Software for Cisco IOS XE Bengaluru 17.5.1, on page 27](#)

## What's New in Hardware for Cisco IOS XE Bengaluru 17.5.1

Feature	Description
High Density DS1 Panel for CEM	<p>A new higher density, 144-port patch panel (PANEL-144-1-AMP64) is now available and can be used for DS1 termination of the 48-port T1/E1 Interface Module (48XT1/E1) (A900-IMA48D-C) on the Cisco ASR 903, 907, and 914 routers.</p> <p>For more information on A900-IMA48D-C support, see the <a href="#">Cisco ASR 903 and ASR 903U Aggregation Services Router Hardware Installation Guide</a>, <a href="#">Cisco ASR 907 Router Hardware Installation Guide</a>, and <a href="#">Cisco ASR 914 Aggregation Services Router Hardware Installation Guide</a>.</p>

## What's New in Software for Cisco IOS XE Bengaluru 17.5.1

Feature	Description
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	

Feature	Description
<a href="#">GR-820-CORE specific Performance Monitoring</a>	<p>The <b>show controller tabular</b> command enables you to view the performance monitoring details in tabular form as per GR-820-Core standards.</p> <p>This feature is supported on the following CEM interface modules:</p> <ul style="list-style-type: none"> <li>• <a href="#">48-Port T3/E3 CEM Interface Module</a></li> <li>• <a href="#">48-Port T1 or E1 CEM Interface Module</a></li> <li>• <a href="#">1-Port OC-192 or 8-Port Low Rate CEM Interface Module</a></li> <li>• <a href="#">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</a></li> </ul>
<a href="#">MLPPP IP Termination on all Serial Physical and Logical Interfaces</a>	<p>This release supports Layer 3 termination using IPv6 addressing on MLPPP interfaces for the 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. In releases earlier, with IPv4 addressing, you can scale up to 512 MLPPP bundles. Now with IPv6 addressing, the MLPPP bundles can be scaled up to 1024.</p>
<a href="#">Unframed Framing Support on E1 and Channel STM links</a>	<p>In this release, a new framing mode 'unframed' is supported for the 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. With the unframed mode, you can create serial interface under the following modes:</p> <ul style="list-style-type: none"> <li>• <a href="#">SDH VC12</a></li> <li>• <a href="#">Electrical E1</a></li> </ul>
<b>QoS: Policing and Shaping</b>	
<a href="#">IP Address Range-Based Filtering Support for CoPP ACL</a>	<p>This feature supports Ingress on In-band Management Loopback interface and Ingress on Data plane interface to block traffic using MPLS. CoPP ACL also enables you to configure the 830 and 5432 ports on the Cisco router. Both, Source IP and Destination IP based filtering are supported on Cisco RSP3 module; however, only Source IP based filtering is supported on the Cisco RSP2 module.</p>
<b>Carrier Ethernet</b>	
<a href="#">CFM Sessions Hardware Offload</a>	<p>This feature enables for effective CPU utilization by offloading the one second CCM interval sessions on the hardware.</p>
<b>IP SLAs</b>	
<a href="#">TWAMP Light</a>	<p>This feature enables you to configure a TWAMP Light session using the <b>ip sla responder twamp-light test-session</b> command.</p> <p>This feature is supported on the Cisco RSP2 module.</p>
<b>Layer 2</b>	
<a href="#">MAC Security</a>	<p>The MACsec and Macsec Key Agreement protocol (MKA) features are introduced on the main interface with pre-shared key support for the MKA.</p> <p>This feature is supported on the Cisco RSP3 module.</p>



Feature	Description
<b>Quality of Service</b>	
Increase QoS Service-Policy Scale	Starting with Cisco IOS XE Bengaluru 17.5.1 release, you can further increase the TCAM scale limit per NPU from 2048 entries to 3072 entries for ingress QoS policy maps.  This feature is supported on the Cisco RSP3 module.
<b>MPLS Layer 2 VPNs</b>	
On-Change Notifications for L2VPN Pseudowire	This feature allows you to subscribe on-change Network Configuration Protocol (NETCONF) notifications for L2VPN pseudowire. You can generate an alert from a device when the pseudowire status changes.
<b>Segment Routing</b>	
ECMP over SR-TE Policy	This feature allows you to configure ECMP over SR-TE policies. In case of multiple paths, this feature enables mitigation of local congestion through load balancing. This feature is supported only on Cisco ASR 900 RSP3 module.
EVPN Integrated Routing and Bridging (L2 and L3 Anycast Gateway) and Data Center Interconnect or Border Leaf (Single Homing)	This feature allows the devices to forward both layer 2 or bridged and layer 3 or routed traffic providing optimum unicast and multicast forwarding for both intra-subnets and inter-subnets within and across data centers. Data Center Interconnects (DCI) products are targeted at the Edge or Border Leaf (BL) of data center environments, joining data centers to each other in a point-to-point or point-to-multipoint fashion, or at times extending the connectivity to internet gateways or peering points.
SR-PM Delay Deduction (Loopback Mode)	This feature improves the SR-PM detection time as the PM probes are not punted on the remote nodes. Also, it does not require a third-party support for interoperability.
SR-TE PM: Liveness of SR Policy Endpoint	This feature enables Performance Measurement (PM) liveness detection and delay measurement for an SR policy on all the segment lists of every candidate path that are present in the forwarding table using PM probes. Thus, you can easily monitor the traffic path and efficiently detect any drop of traffic due to cable or hardware or configuration failures. This feature provides the following benefits: <ul style="list-style-type: none"> <li>• End-to-end liveness is verified before activating the candidate path in the forwarding table.</li> <li>• End-to-end liveness failure can trigger re-optimization to another path by deactivating the current path</li> </ul>
Segment Routing Flexible Algorithm with OSPF	This feature allows you to configure Segment Routing Flexible Algorithm with OSPF. Flexible Algorithm with OSPF supports metric minimization and avoidance, multi-plane, delay metric with rounding, and ODN with auto-steering.

Feature	Description
<a href="#">Segment Routing Policy Counters</a>	<p>This feature enables statistic counters to be displayed when traffic passes over the SR-TE tunnel.</p> <p>You can use the command <b>show segment-routing traffic-eng policy name</b> <i>policy name</i> to view the counters.</p>
<b>CEM Generic</b>	
<a href="#">RSP-based Non-Intrusive Monitor Ports</a>	<p>This feature allows you to transmit data to multiple connections from a single source using the RSP-based non-intrusive monitor port or Terminal Access Point (TAP) port. It establishes a one-way cross-connect listen connection that listens to either the source or destination of an existing cross-connect or a local connect connection. This feature is only supported on Cisco RSP3 module.</p> <p>This feature is supported on the following CEM interface modules:</p> <ul style="list-style-type: none"> <li>• 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</li> <li>• 48-port T3/E3 CEM Interface Module (ASR 900 48-port DS3/E3 Interface Module)</li> <li>• 48-port T1/E1 CEM Interface Module (ASR 900 48 port T1/E1 Interface Module)</li> </ul>
<a href="#">Support for Static MPLS Labels on Cisco RSP3 Module</a>	<p>This feature allows you to provision an Any Transport over Multiprotocol (AToM) label switching static pseudowire without the use of a directed control connection. In environments that do not or cannot use directed control protocols, this feature provides a means for provisioning the pseudowire parameters statically at the Cisco IOS Command-Line Interface (CLI).</p> <p>This feature is supported on Cisco RSP3 module.</p>
<b>Programmability</b>	
<a href="#">gRPC Telemetry Support</a>	<p>Prior to Cisco IOS XE Bengaluru 17.5.1, gRPC protocol was supported on default VRF only. Effective Cisco IOS XE Bengaluru 17.5.1, gRPC protocol is supported on all types (default and non-default ) of VRF. This will help you to get the data from all VRF and non-VRF network.</p>
<a href="#">Complete YANG Model for L2VPN XConnect</a>	<p>L2VPNs can provide pseudowire resiliency through their routing protocols. When the connectivity between the end-to-end PE routers fails, an alternative path to the directed LDP session and the user data takes over. XConnect is a feature that enables you to assign remote IP Addresses, VLAN ID and encapsulation, and Pseudowire class names</p>
<a href="#">Complete YANG Model for Pseudowire Interface Configuration</a>	<p>Pseudowires (PWs) manage encapsulation, timing, order, and other operations in order to make it transparent to users; the PW tunnel appears as an unshared link or circuit of the emulated service. Effective from the Cisco IOS XE 17.5.1 release, you can configure the Pseudowire Interface using YANG models.</p>

**YANG Data Models**—For the list of Cisco IOS XE YANG models available with this release, navigate to <https://github.com/YangModels/yang/tree/master/vendor/cisco/xe/1751>. Revision statements embedded in the YANG files indicate if there has been a model revision. The README.md file in the same GitHub location highlights changes that have been made in the release.



## 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 Bengaluru 17.5.1, on page 31](#)
- [Open Caveats – Cisco IOS XE Bengaluru 17.5.1, on page 32](#)
- [Cisco Bug Search Tool, on page 33](#)

## Resolved Caveats – Cisco IOS XE Bengaluru 17.5.1

Caveat ID Number	Description
<a href="#">CSCvh63374</a>	TCAM related commands do not return values on RSP3
<a href="#">CSCvv06958</a>	CPE SIT: IP Sec tunnel is not reachable after RSP3 SSO
<a href="#">CSCvv23077</a>	Config failure is seen on standby RPS3 from 16_9_4 to 17_3_1 images upgrade
<a href="#">CSCvv33300</a>	Alarm-profile : APS configured for Au-4 mode t3 , e3 after SSO alarms are removed
<a href="#">CSCvv51145</a>	Crash seen on "show plat hard pp active feature multicast database ipv4 table label <> eos <>"
<a href="#">CSCvv72192</a>	IMA2Z IM, xfp and sfp+ are present then XFP is removed LED still shows as green
<a href="#">CSCvv76949</a>	[SVSP-497]-Op state and Ad state showing NA for all slot with Bandwidth command

Caveat ID Number	Description
<a href="#">CSCvv83093</a>	OBFL updation with valid time after NTP Sync in RTC failure case (Rework of CSCvq07399)
<a href="#">CSCvv94214</a>	"no Loopback remote iboc csu/fac1/fac2" does not bring remote end out of loop
<a href="#">CSCvv95745</a>	Crash of standby supervisor because of QoS Overhead Accounting
<a href="#">CSCvv99456</a>	ACL entries with FRAGMENT keywords are not working
<a href="#">CSCvw00749</a>	sensor_state_change TDL message create validation missing
<a href="#">CSCvw04366</a>	UEA: Display GNSS Chassis SN instead of PCB SN in show CLI
<a href="#">CSCvw09881</a>	LOTR IM : RX-S1S0 bytes are not updated in "show controller sonet"
<a href="#">CSCvw46012</a>	Traffic not passing via BDI after physical interface flaps
<a href="#">CSCvw56612</a>	LOTR : ASR914 show lic CLI does not show port details
<a href="#">CSCvw57114</a>	[RSP3 / PoCh-Mcast]: igmp queries are dropped entering a Poch
<a href="#">CSCvw64784</a>	RSP2 CEM ACR: Not able to reuse same clock id on another controller After deleted clock id.
<a href="#">CSCvw81102</a>	RSP3: copy recent standby logs & corefiles to Active
<a href="#">CSCvx07262</a>	[RSP3-DHCP-Relay]: DHCP relay unicast is dropped in transparent case with HSRP/VRRP/GLBP on EVC-BD
<a href="#">CSCvw59531</a>	Auto negotiation failing when CU SFP connected to 100m port
<a href="#">CSCvw30819</a>	RSP3-400S: OTN-Alarms behavior change using Alarm-Profile

## Open Caveats – Cisco IOS XE Bengaluru 17.5.1

Caveat ID Number	Description
<a href="#">CSCvw38827</a>	Observing RSP2A-64 and RSP2A-128 logs in RSP2 HA router with CEM
<a href="#">CSCvx34215</a>	APS 1+1 Uni - Traffic hit due to sonet controllers down after inactive IMOIR then SSO
<a href="#">CSCvx42526</a>	RSP2: A900-IMA2Z IM is impacted during SSO
<a href="#">CSCvx45132</a>	ASR90x-RSP3: Latency for priority traffic is high during congestion in egress over 1G link.
<a href="#">CSCvx46454</a>	FMFP-3-OBJ_DWNLD_TO_DP_FAILED Log Message on ASR-903 RSP3 (A900-RSP3C-400-S)
<a href="#">CSCvx52992</a>	More than 50 msec traffic loss on core ECMP link failure

Caveat ID Number	Description
<a href="#">CSCvx25394</a>	Increase in memory usage by pubd and confd over time with Telemerty

## 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.

- From the Cisco IOS XE 16.5.1 and 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](#).
- 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 port within this port group is configured with OC48 rate, the other port cannot be used.
- RS422 pinout works only on ports from 0 to 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.
- ISSU is not supported between a Cisco IOS XE 3S release and the Cisco IOS XE Bengaluru 17.5.x release.
- 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.
- 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.
- 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 900 RSP3 module.




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

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- 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 exhibited by running the pyang tool with the **lint** flag are



currently non-critical 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.

