



Release Notes for Cisco IOS XRv 9000 Routers, IOS XR Release 7.2.1

[Release Notes for Cisco IOS XRv 9000 Router, IOS XR Release 7.2.1](#) 2

[Cisco IOS XRv 9000 Router Overview](#) 2

[Cisco IOS XRv 9000 Router Licensing Model](#) 2

[License Ordering Information](#) 2

[Supported MIBs](#) 3

[Software Features Introduced in this Release](#) 5

[System Requirements](#) 5

[Upgrading Cisco IOS XR Software](#) 9

[Supported Cisco IOS XR Technologies](#) 9

[Caveats](#) 11

[Other Important Information](#) 11

[Related Documentation](#) 12

[Communications, Services, and Additional Information](#) 12

[Full Cisco Trademarks with Software License](#) 13

Revised: August 14, 2023

Release Notes for Cisco IOS XRv 9000 Router, IOS XR Release 7.2.1

Cisco IOS XRv 9000 Router is a cloud-based router that is deployed on a virtual machine (VM) instance on x86 server hardware running 64 bit IOS XR software. Cisco IOS XRv 9000 Router provides traditional Provider Edge (PE) services in a virtualized form factor, as well as virtual Route Reflector (vRR) capabilities.

Cisco IOS XRv 9000 Router Overview

The Cisco IOS XRv 9000 Router is based on Cisco IOS XR software, so it inherits and shares the wide breadth of routing functionality available on other IOS XR platforms. The IOS XR features available on the Cisco IOS XRv 9000 Router are discussed in *Supported Cisco IOS XR Technologies* section.

When the Cisco IOS XRv 9000 Router virtual IOS XR software is deployed as a VM, the Cisco IOS XR software functions just as if it were deployed on a traditional Cisco IOS XR hardware platform. The Cisco IOS XRv 9000 Router combines Route Processor, Line Card, and virtualized forwarding capabilities into a single, centralized forwarding instance. The Cisco IOS XRv 9000 Router has a fully featured, high speed virtual x86 data plane.

Cisco IOS XRv 9000 Router supports the same look and feel as Cisco ASR 9000 Series Aggregation Services Routers and North-bound APIs. Cisco IOS XRv 9000 Router does not support hardware specific configurations. The configuration commands for control plane and data plane features follow the same syntax as the Cisco ASR 9000 Series Aggregation Services Routers. See [Cisco ASR 9000 Series Aggregation Services Routers command references](#) for more information on configuration commands.

Cisco IOS XRv 9000 Router Licensing Model

The Cisco IOS XRv 9000 Router supports activation using Cisco Smart Licensing. By default the Cisco IOS XRv 9000 Router (without license) is rate limited to 200 Kbps.

For more information on licensing model supported on Cisco IOS XRv 9000 Router, see the *Cisco IOS XRv 9000 Router Smart Licensing* chapter in the [Cisco IOS XRv 9000 Router Installation and Configuration Guide](#).

See [Cisco Smart Software Licensing Overview](#) for more information on Cisco Smart Licensing.

License Ordering Information

The Cisco IOS XRv 9000 Router offers a flexible licensing scheme, with multiple tiers to choose from, such as Scale, and Throughput. This table lists details of Cisco IOS XRv 9000 Router's pool of software licenses or entitlements, arranged according to licensing PIDs.



Note The XRv9000 router only consumes and reports VPE licenses. VRR licenses are not consumed or reported.

Table 1: Cisco IOS XRv 9000 Router UCS M5 Based vRR Appliance PIDS

License PID	Description
R-XRV9000-66-RR	Cisco IOS XRv 9000 software, VRR profile
S-XRV-ROUTE-T4	Preloaded Software Image: IOS XRv 9000 vRR scale upgrade license from 20M up to 70M
XRV9000-APLN-ROUT	IOS XRv 9000 M5 Appliance with preloaded IOS XR functionality with 20 million route scale

Supported MIBs

The following MIBs are supported in this release:

- ENTITY-MIB
- ENTITY-STATE-MIB
- CISCO-ENTITY-ASSET-MIB
- BGP4-MIB
- CISCO-AAA-SERVER-MIB
- CISCO-ACL-MIB
- CISCO-BGP4-MIB
- CISCO-BULK-FILE-MIB
- CISCO-CDP-MIB
- CISCO-CLASS-BASED-QOS-MIB
- CISCO-CONFIG-COPY-MIB
- CISCO-CONFIG-MAN-MIB
- CISCO-CONTEXT-MAPPING-MIB
- CISCO-FTP-CLIENT-MIB
- CISCO-IF-EXTENSION-MIB
- CISCO-PING-MIB
- CISCO-PROCESS-MIB
- CISCO-SYSLOG-MIB
- CISCO-SYSTEM-MIB
- CISCO-TCP-MIB
- CISCO-VLAN-IFTABLE-RELATIONSHIP-MIB
- ETHERLIKE-MIB

- EVENT-MIB
- EXPRESSION-MIB
- IETF-TCP-MIB
- IETF-UDP-MIB
- IF-MIB
- IP-FORWARD-MIB
- IP-MIB
- IPV6-MIB
- IPV6-FORWARD-MIB
- ISIS-MIB
- MPLS-L3VPN-STD-MIB
- MPLS-LDP-GENERIC-STD-MIB
- MPLS-LDP-STD-MIB
- MPLS-LSR-STD-MI
- NOTIFICATION-LOG-MIB
- OSPF-MIB
- OSPF-TRAP-MIB
- OSPFV3-MIB
- RFC1213-MIB
- RFC2011-MIB
- RFC2465-MIB
- SNMP-COMMUNITY-MIB
- SNMP-FRAMEWORK-MIB
- SNMP-NOTIFICATION-MIB
- SNMP-TARGET-MIB
- SNMP-USB-MIB
- SNMPv2-MIB
- SNMP-VACM-MIB
- TCP-MIB
- UDP-MIB
- CISCO-IETF-BFD-MIB
- CISCO-IP-TAP-MIB

- CISCO-TAP2-MIB
- RADIUS-ACC-CLIENT-MIB
- RADIUS-AUTH-CLIENT-MIB
- SNMP-TARGET-MIB

Software Features Introduced in this Release

There are no new software features introduced in this release.

System Requirements

Appliance Model

Cisco IOS XRv 9000 Appliance is the pre-installed Cisco IOS XRv 9000 Router software that is sent from the factory on a bare metal UCS server hardware. It supports hyper scalability as it can scale to 70 Million route prefixes when run as a Virtual Route Reflector. Therefore, the extra layer of software (hypervisor) is not required.

The Appliance also supports Zero Touch Provisioning (ZTP) which allows easier insertion into existing networks. Current offering is based on UCS M5 Servers, comes with 2 Intel X710 quad-port 10G SFP+ NICs.

Hypervisors

A hypervisor enables multiple operating systems to share a single hardware host machine. While each operating system appears to have the dedicated use of the host's processor, memory, and other resources; the hypervisor controls and allocates only needed resources to each operating system and ensures that the operating systems (VMs) do not disrupt each other.

Installation of the Cisco IOS XRv 9000 Router is supported on selected Type 1 (native, bare metal) hypervisors. Installation is not supported on Type 2 (hosted) hypervisors, such as VMware Fusion, VMware Player, or Virtual Box. The following table lists release specific supported hypervisor versions.

Table 2: Support Matrix for Hypervisor Versions

Cisco IOS XR Version	VMWare ESXi	Kernel Based Virtual Machine (KVM)
Release 7.2.1	version 6.5, 6.7, and later	Linux KVM based on <ul style="list-style-type: none"> • Red Hat Enterprise Linux 7, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, and 8.0 • Ubuntu 14.04.03 LTS • Ubuntu 16.04 LTS • CentOS 7, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, and 7.7 • Openstack 10

Virtual Machines

Cisco IOS XRv 9000 Router virtual machines must meet the following requirements:

Table 3: VM Requirement for VMware Environment

Parameters	Supported
VMware ESXi	Version 6.5, 6.7, 7.0 and later
Virtual CPU cores	1 socket with a minimum of 2 cores Note For production environment minimum of 4 cores is recommended.
Virtual Machine memory size	12GB minimum, 19GB recommended for 10G interfaces
Virtual Machine hard disk size	
Virtual Interfaces	E1000 VMXNET3 for traffic interfaces only
Physical NICs	For pass-through: <ul style="list-style-type: none"> • Intel i350 Quad Port 1Gb Adapter • Intel Dual Port 10 GbE Ethernet X520 Server Adapter • Intel 4 port 10GE Fortville Note PCI passthrough only. SRIOV is not supported. Note • Intel Forville has a lower forwarding capability (for high throughput applications in vPE profiles) when compared with Intel 82599 10GE Controller. Cisco UCS Virtual Interface Card (VIC) 1225 Note If you are configuring LLDP on Cisco IOS XRv 9000, then you must first disable LLDP in the Cisco UCS VIC 1225 via Cisco Integrated Management Controller (CIMC).

Parameters	Supported
Number of interfaces	Minimum of 4 NICs where: <ul style="list-style-type: none"> • 1 for management • 2 are reserved • 1 for traffic Maximum of 11 NICs where: <ul style="list-style-type: none"> • 1 for management • 2 are reserved • 8 for traffic
Default video, SCSI controller set	Required SCSI controller not required for IDE disk.
Virtual CD/DVD drive installed	Virtual CD/DVD is required when installing the Cisco IOS XRv 9000 Router on the VM using ISO template.
IDE hard disk	Single IDE hard disk Note Multiple hard disk drives on a VM are not supported.



Note The maximum traffic performance with pass-through NIC interfaces in ESXi is lower than the performance that can be achieved in KVM environments. This is because it is not possible to configure 1G huge-pages in the ESXi hypervisor (as of VMware ESXi 6.0).

Table 4: VM Requirement for KVM Environment

Parameters	Supported
KVM versions	<ul style="list-style-type: none"> • Linux KVM based on Red Hat Enterprise Linux 7, 7.1, 7.2, 7.3 and 7.4 • Ubuntu 14.04.03 LTS Server 64 Bits • Ubuntu 16.04 LTS • Openstack Release 5 (Icehouse), Openstack Juno/Icehouse (RHEL 7), Kilo (RHEL 7.1), Liberty (RHEL 7.2), Openstack 10 (Newton) • CentOS 7, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, and 7.7
Virtual CPU cores	1 socket with minimum of 2 cores.
Virtual Machine memory size	12GB Minimum, 19GB recommended for 10G interfaces

Parameters	Supported
Virtual Machine hard disk size	
Virtual Interfaces	E1000, VirtIO and VMXNET3 for traffic interfaces only
Physical NICs	<p>For pass-through:</p> <ul style="list-style-type: none"> • Intel i350 Quad Port 1Gb Adapter • Intel Dual Port 10 GbE Ethernet X520 Server Adapter • Intel 4 port 10GE Fortville <p>Note PCI passthrough only. SRIOV is not support.</p> <p>Note • Intel Forville has a lower forwarding capability (for high throughput applications in vPE profiles) when compared with Intel 82599 10GE Controller.</p> <p>Cisco UCS Virtual Interface Card (VIC) 1225</p> <p>Note If you are configuring LLDP on Cisco IOS XRv 9000, then you must first disable LLDP in the Cisco UCS VIC 1225 via Cisco Integrated Management Controller (CIMC).</p>
Number of interfaces	<p>Minimum of 4 NICs where:</p> <ul style="list-style-type: none"> • 1 is for management • 2 are reserved • 1 is for traffic <p>Maximum of 11 NICs where:</p> <ul style="list-style-type: none"> • 1 is for management • 2 are reserved • 8 is for traffic
Virtual CD/DVD drive installed	Virtual CD/DVD drive is required for ISO installation



Note In the Cisco IOS XRv 9000 Router, some CPU cores are dedicated to the control plane while others are dedicated to the data plane. Each data plane's core runs a single thread that performs packet forwarding. To achieve maximum performance, these threads constantly look for data packets to process. As a result, the OS records that these cores run at 100% utilization. This is expected behavior and not an indication that packet forwarding has reached its threshold limit.

Server

The server must support:

- Intel Westmere or later CPU versions with clock frequency of 2.0GHz for instances with Gigabit or paravirtualized interfaces
- Intel Ivy Bridge or later CPU versions for instances with 10Gb or higher interfaces
- Intel CPU must support the **sse4_2** capability flag. This can be checked in KVM by looking for the **sse4_2** flag in the flags section of `/proc/cpuinfo`. For example:

```
cat /proc/cpuinfo | grep sse4_2
flags       : fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush mmx fxsr
sse sse2 ss syscall nx pdpe1gb rdtscp lm constant_tsc arch_perfmon nopl xtopology tsc_reliable nonstop_tsc
aperfmpperf pni pclmulqdq vmx ssse3 fma cx16 pcid sse4_1 sse4_2 x2apic movbe popcnt aes xsave avx f16c
rdrand hypervisor lahf_lm ida arat epb pln pts dtherm tpr_shadow vnmi ept vpid fsgsbase smep
```



Note To use passthrough interfaces in KVM, you must set the option **intel_iommu=on** command in the grub configuration.

Upgrading Cisco IOS XR Software

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



Note The FPD related commands are not supported on IOS XRv 9000 Appliance. That includes **fpd auto-upgrade** command.

Supported Cisco IOS XR Technologies

Cisco IOS XRv 9000 Router supports selected Cisco IOS XR technologies.

This table lists the major Cisco IOS XR technologies Cisco IOS XRv 9000 supports. Not all features in a given technology may be supported. To verify support for specific features, use [Cisco Feature Navigator](#).

Table 5: Cisco IOS XR Technologies Supported on the Cisco IOS XRv 9000 Router

Feature	See the Following Documentation	Introduced in Release
<ul style="list-style-type: none">• Bi-directional Policing and Marking	<ul style="list-style-type: none">• Cisco ASR 9000 Series Aggregation Services Router Modular Quality of Service Configuration Guide• Cisco ASR 9000 Series Aggregation Services Router Modular Quality of Service Command Reference	Release 5.4.0

Feature	See the Following Documentation	Introduced in Release
<ul style="list-style-type: none"> • BGP Persistence 	<ul style="list-style-type: none"> • Cisco ASR 9000 Series Aggregation Services Router Routing Configuration Guide • Cisco ASR 9000 Series Aggregation Services Router Routing Command Reference 	Release 6.2.1
Customize Installation using Golden ISO	Customize Installation using Golden ISO	Release 7.3.1
Cisco IOS XRv 9000 Router Deployment on AWS	<ul style="list-style-type: none"> • Cisco IOS XRv 9000 Router Installation and Configuration Guide 	Release 6.3.1
Create User Profiles and Assign Privileges	System Setup and Software Installation Guide for Cisco ASR 9000 Series Routers	Release 7.1.1
<ul style="list-style-type: none"> • Early Fast Discard 	<ul style="list-style-type: none"> • Early Fast discard 	Release 5.4.0
<ul style="list-style-type: none"> • HSRP • VRRP 	<ul style="list-style-type: none"> • IP Addresses and Services Configuration Guide for Cisco ASR 9000 Series Routers • Cisco ASR 9000 Series Aggregation Services Router IP Addresses and Services Command Reference 	Release 6.2.1
<ul style="list-style-type: none"> • IPv4 Routing • IPv6 Routing • OSPF • ISIS 	<ul style="list-style-type: none"> • Cisco ASR 9000 Series Aggregation Services Router Routing Configuration Guide • Cisco ASR 9000 Series Aggregation Services Router Routing Command Reference 	Release 5.4.0
<ul style="list-style-type: none"> • IPv4 and IPv6 ACL 	<ul style="list-style-type: none"> • Cisco ASR 9000 Series Aggregation Services Router IP Addresses and Services Configuration Guide • Access List Commands 	Release 5.4.0
<ul style="list-style-type: none"> • IPv4 L3VPN • 6PE, 6VPE 	<ul style="list-style-type: none"> • Cisco ASR 9000 Series Aggregation Services Router MPLS Layer 3 VPN Configuration Guide • Cisco ASR 9000 Series Aggregation Services Router VPN and Ethernet Services Command Reference 	Release 5.4.0
<ul style="list-style-type: none"> • Lawful Intercept 	<ul style="list-style-type: none"> • Implementing Lawful Intercept • Cisco ASR 9000 Series Aggregation Services Router System Security Command Reference 	Release 5.4.0

Feature	See the Following Documentation	Introduced in Release
<ul style="list-style-type: none"> • LDP 	<ul style="list-style-type: none"> • Cisco ASR 9000 Series Aggregation Services Router MPLS Configuration Guide • Cisco ASR 9000 Series Aggregation Services Router MPLS Command Reference 	Release 5.4.0
<ul style="list-style-type: none"> • LPTS 	<ul style="list-style-type: none"> • Cisco ASR 9000 Series Aggregation Services Router IP Addresses and Services Configuration Guide • LPTS Commands 	Release 5.4.0
<ul style="list-style-type: none"> • MPLS 	<ul style="list-style-type: none"> • Cisco ASR 9000 Series Aggregation Services Router MPLS Configuration Guide • Cisco ASR 9000 Series Aggregation Services Router MPLS Command Reference 	Release 5.4.0
<ul style="list-style-type: none"> • MP-BGP, EBGp PE-CE 	<ul style="list-style-type: none"> • Cisco ASR 9000 Series Aggregation Services Router Routing Configuration Guide • Cisco ASR 9000 Series Aggregation Services Router Routing Command Reference 	Release 5.4.0
<ul style="list-style-type: none"> • NSH Proxy Mode 	Cisco IOS XRv 9000 Router Specific Features	Release 6.2.1
<ul style="list-style-type: none"> • RT Constriant 	<ul style="list-style-type: none"> • Cisco ASR 9000 Series Aggregation Services Router Routing Configuration Guide • Cisco ASR 9000 Series Aggregation Services Router Routing Command Reference 	Release 6.2.1

Caveats

Caveats describe unexpected behavior in Cisco IOS XRv 9000 Software releases. Severity-1 caveats are the most critical caveats; severity-2 caveats are less critical.

Caveats Specific to the XRv 9000 Router

There are no caveats in this release.

Other Important Information

- For the XRv 9000 platform, minimum transmission period supported for the Link Aggregation Control Protocol (LACP) is 200 milliseconds.
- LFA FRR feature is not supported.

Related Documentation

The most current Cisco IOS XRv 9000 Router software documentation is located at this URL:

<http://www.cisco.com/c/en/us/support/routers/ios-xrv-9000-router/tsd-products-support-series-home.html>

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

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

Production Software Maintenance Updates (SMUs)

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

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

Communications, Services, and Additional Information

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

Cisco Bug Search Tool

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

Full Cisco Trademarks with Software License

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

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

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

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

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

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

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

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

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



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

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

Europe Headquarters
CiscoSystemsInternationalBV
Amsterdam,TheNetherlands

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