

Cisco IOS XRv 9000 Router

Product overview

The Cisco IOS[®] XRv 9000 Router implements the feature set of Cisco IOS XR Software. Running on virtualized general x86 compute platforms, it complements existing physical Cisco[®] router platforms that rely on Cisco IOS XR Software, such as Cisco Network Convergence System routers, Cisco ASR 9000 Series Routers, and Cisco Carrier Routing System (CRS) platforms. Now, service providers can enhance their operational excellence and offerings based on physical routers - and move them easily to a virtual form factor. The Cisco IOS XRv 9000 Router (Figure 1) offers greater agility, improved network efficiency, lower capital and operational expenditures, and the ability to efficiently scale network capacity up and down, based on demand.

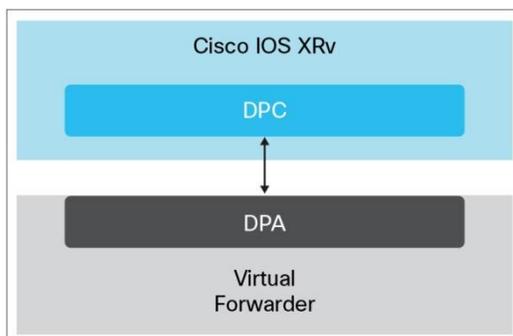
Main Features of the Cisco IOS XRv 9000 Router

- End-to-end solution with Network Functions Virtualization (NFV) infrastructure, virtual network functions, and service orchestration and management
- Based on the extremely resilient, stable, and feature-rich Cisco IOS-XR Software, with the same northbound and management features as Cisco IOS XR Software, which helps ensure smooth integration with existing OSS and Business Support Systems (BSS)
- High-performance data plane with service provider edge features, such as Quality of Service and access control list.
- Architecture that separates the control plane and data plane, which allows for scaling up and down with multicore and multisocket systems.

The Cisco IOS XRv 9000 Router can be deployed in the following two ways:

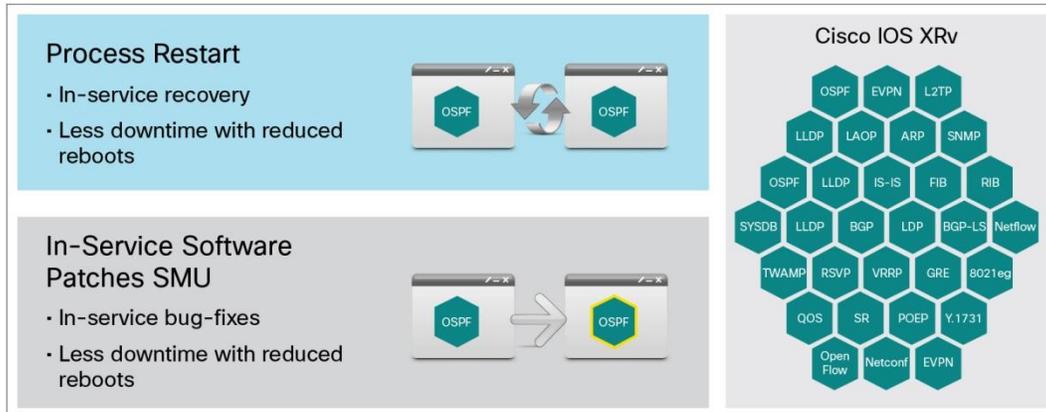
- For control plane functionality, such as a virtual route reflector As a high-performance data plane, based on an X86-optimized code base, developed specifically for Cisco nPower Network Processor Units (NPUs), and the Intel[®] Data Plane Development Kit (DPDK) or a virtual broadband network gateway

Figure 1. Cisco IOS XRv 9000 router



Cisco IOS XRv 9000 Router as a control plane: The Cisco IOS XR Software is an industry-leading, carrier-class operating system supporting highly successful edge and core router platforms from Cisco. This modular OS provides a very high level of availability (Figure 2), and its multiprocess and multithread architecture enhances scale and performance by taking advantage of modern multisoocket and multicore processors.

Figure 2. Cisco IOS XR Software high availability



Cisco IOS XRv 9000 Router as a data plane (virtual forwarder): The virtual forwarder uses the feature and forwarding code developed for Cisco NPU-based physical platforms. However, it is optimized specifically for NFV-based general-purpose CPU environments. It uses Intel Streaming SIMD Extensions 2 (SSE2) and Advanced Vector Extensions (AVX) instructions for improved software-based classification. Memory access is asynchronous for parallel feature processing, and data structures are optimized for best utilization of the cache. In addition, batched packet delivery and processing and high-speed load balancing across the feature execution process help provide a very-high-performance data plane, with the features service providers require.

Cisco IOS XRv 9000 Router as a Broadband Network Gateway (BNG): BNG is the access point for subscribers, through which they connect to the broadband network. When a connection is established between BNG and Customer Premise Equipment (CPE), the subscriber can access the broadband services provided by the Network Service Provider (NSP) or Internet Service Provider (ISP). BNG establishes and manages IPoE subscriber sessions. When a session is active, BNG aggregates traffic from various subscriber sessions from an access network, and routes it to the network of the service provider. Note: BNG for Cisco IOS XRv 9000 Router does not support PPPoE subscribers.

Table 1. Deployment model and benefits

Feature	Benefit
A service provider needs to provide Layer 3 provider edge functionality at a location which has low throughput. They already have their service and offerings based on physical Cisco ASR 9000 Series devices and want to offer the same services at the low-throughput location	
Virtual provider edge	<ul style="list-style-type: none"> • Consistent architecture with widely used ASR 9000 Series platforms • Rich set of networking experiences based on Cisco IOS XR Software • Reduced Capital Expenditures (CapEx) and Operating Expenses (OpEx) realized by using consumption-based models
Virtual Broadband Network Gateway	<ul style="list-style-type: none"> • Termination of Broadband subscriber (IPOE/PPPoE). • Subscriber Identification • Subscriber Authentication • Subscriber Policies Determination and Enforcement • Dynamic policy update
Traditionally a service provider deployed physical routing devices as route reflectors. A route reflector application makes intensive use of the	

Feature	Benefit
control plane and is low on data plane usage. This leads to suboptimal usage of the capacity provided by the physical router	
Virtual route reflector	<ul style="list-style-type: none"> • Convergence of many route reflectors into a few virtual route reflectors using Cisco IOS- XRv 9000 Router • Significant reduction of the physical footprint, power, cooling, and cabling overhead associated with maintaining physical route reflector systems

Licensing

The Cisco IOS XRv 9000 Router offers a flexible licensing scheme, with multiple tiers to choose from, such as Scale, Throughput, Deployment Model, and Term. The licensing structure allows service providers to pay for what they consume. Licenses are activated through Cisco Smart Software Licensing. Further details about Cisco Smart Software Licensing are available at: https://www.cisco.com/c/en/us/products/abt_sw.html.

Product specifications

Table 2 lists specifications for the Cisco IOS XRv 9000 Router.

Table 2. Cisco IOS XRv 9000 router specifications

Features	Description				
Cisco IOS XR packages	The software is available in ISO, Virtual Machine Disk (VMDK), OVA, and qcow2 formats.				
Supported hypervisors	<ul style="list-style-type: none"> • VMware ESXi 5.5, 6.0 and 6.5 Linux KVM based on <ul style="list-style-type: none"> • Red Hat Enterprise Linux 7, 7.1, 7.2, 7.3 and 7.4 • Ubuntu 16.04 LTS • Ubuntu 14.04.03 LTS • CentOS 7, 7.1, 7.2, 7.3, 7.4 • Openstack 10 				
OS-level virtual environments	Linux Containers (LXC)				
Resource specifications	The Cisco IOS XRv 9000 Router can run on Cisco Unified Computing System™ (Cisco UCS®) servers, as well as servers from vendors that support VMware ESXi, Red Hat KVM, and Ubuntu KVM. The server must supply at least the following resources: <ul style="list-style-type: none"> • Virtual CPU Cores required: 1 socket with a minimum of 2 cores • Virtual Machine Memory Size: 12GB Minimum, 19GB recommended for 10G interfaces • Disk space: 45GB minimum for vPE and vRR image variants • Network interfaces: <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="width: 50%;">Minimum of 4 NICs where:</td> <td> <ul style="list-style-type: none"> • 1 for management • 2 are reserved • 1 for traffic </td> </tr> <tr> <td>Maximum of 11 NICs where:</td> <td> <ul style="list-style-type: none"> • 1 is for management • 2 are reserved • 8 is for traffic </td> </tr> </tbody> </table>	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 is for management • 2 are reserved • 8 is for traffic
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Management	<ul style="list-style-type: none"> • Virtual machine creation and deployment: OpenStack, VMware vCenter, and VMware vCloud Director • Provisioning and management: Cisco IOS XR CLI, Secure Shell (SSH) Protocol, Telnet, Cisco Prime™ Infrastructure, Cisco Prime Network Services Controller, and OpenStack Configdrive • Monitoring and troubleshooting: Simple Network Management Protocol (SNMP), Syslog, and Embedded Event Manager (EEM) 				
Supported features	<ul style="list-style-type: none"> • NFV: virtual PE (vPE) and virtual RR (vRR) • Routing: Border Gateway Protocol (BGP), Open Shortest Path First (OSPF), Intermediate System to Intermediate System (IS-IS) Protocol, Static Routing, Multiprotocol Label Switching (MPLS), and Label Distribution Protocol (LDP), RFC 3107 • Broadband Network Gateway (BNG): IP Over Ethernet (IPoE) and Point-to-Point Protocol over Ethernet (PPPoE) subscriber termination, Local Mobility Anchor (LMA) using Proxy Mobile IPv6 (PMIPv6) • Encapsulations: IEEE802.1Q VLAN, IEEE 802.1ad (QinQ) High Availability: Process-Restart, SMU, Bidirectional Forwarding Detection (BFD), BGP Prefix-Independent Convergence (PIC) • Data plane features: Hierarchical QoS (H-QoS), access control list (ACL), Lawful Intercept, and Unicast Reverse Path Forwarding (uRPF) 				

Warranty information

Warranty information is available on Cisco.com at the [Product Warranties](#) page.

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<https://www.cisco.com/c/en/us/products/ios-nx-os-software/ios-xr-software/index.html>.



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