Cisco IOS XR Software Release 3.8.0 for Cisco CRS-1 Routers and Cisco XR 12000 Series Routers

Product Bulletin No. 534342

Product Overview

Cisco IOS® XR Software Release 3.8.0 provides additional core routing features and extends feature coverage further into edge routing.

This release introduces a major high-availability feature – Nonstop Routing (NSR) support for Border Gateway Protocol (BGP) – for both the Cisco® CRS-1 Carrier Routing System and the Cisco XR 12000 Series Routers.

Release 3.8.0 also offers new support for the Cisco CRS-1 multichassis system, which scales to support eight line-card chassis and four fabric-card chassis; and Dynamic Packet Transport (DPT) on the Cisco 2-Port and 4-Port OC-48/STM-16 POS/RPR Shared Port Adapters (SPAs) and the Cisco 1-Port OC-192/STM-64 SPA. Additional software features for the Cisco CRS-1 include a series of Layer 2 VPN (L2VPN) functions such as Virtual Private LAN Service (VPLS), ATM over MPLS, and Pseudowire Redundancy, along with enhancements to Policy-Based Routing onto MPLS traffic engineering tunnels (Policy-Based Tunnel Selection [PBTS]).

For Cisco XR 12000 Series, the Performance Route Processor 3 (PRP-3) and two types of channelized line cards are now supported: the Cisco 1-Port Channelized OC-12c/STM-4 (DS1/E1) ISE Line Card (part number CHOC12/DS1-IR-SC) and the 4-Port Channelized OC-12/STM-4 (DS3/E3) POS/SDH ISE Line Card (part number 4CHOC12/DS3-I-SCB). In terms of software support, several edge features have been added: Multicast Virtual Private Network (MVPN) for the extranet, enhancements to Layer 2 Tunneling Protocol Version 3 (L2TPv3) and Any Transport over MPLS (AToM)-based Layer 2 VPN support, and L2VPN Pseudowire Redundancy. Detailed information is provided in the following sections.

Cisco IOS XR Software Release 3.8.0 continues to support all hardware modules and software features supported by prior releases.

Complete documentation of this release is available at http://www.cisco.com/en/US/products/ps5845/tsd_products_support_series_home.html

New Features

Cisco IOS XR Software Release 3.8.0 now supports the following hardware for the Cisco CRS-1 routers (Table 1) and the Cisco XR 12000 Series (Table 2).

Table 1. Hardware Supported on the Cisco CRS-1

Part Number	Description
CRS-FLASH-DISK-4G=	CRS-1 4GB Flash Disk Spare
SPA-OC192POS-XFP(=)	1-port OC192/STM64 POS/RPR XFP Optics
SPA-4XOC48POS/RPR(=)	4-port OC48/STM16 POS/RPR Shared Port Adapter
SPA-2XOC48POS/RPR(=)	2-port OC48/STM16 POS/RPR Shared Port Adapter

Note:

1. The 1-port OC-192/STM-64 SPA and the 2- and 4-port OC-48/STM-16 SPAs are already supported on the Cisco CRS-1 routers in previous Cisco IOS XR Software releases. In Cisco IOS XR Software Release 3.8, the DPT support is added on those SPAs.
2. The FAT32 function is not enabled by default for the Cisco XR 12000 Series PRP-2 and the Cisco CRS-1 route processor. The CLI to format disk with FAT32 will be introduced in Cisco IOS XR Software Release 3.8.1.

Table 2. Hardware Supported on the Cisco XR 12000 Series

Part Number	Description
PRP-3(=)	Cisco XR 12000 Performance Route Processor 3
MEM-PRP3-4G(=)	Cisco XR 12000 PRP-3 4GB Memory (2X2GB DIMM)
MEM-PRP3-8G(=)	Cisco XR 12000 PRP-3 4GB Memory (2X4GB DIMM)
CHOC12/DS1-IR-SC(=)	GSR12000 Channelized OC12/STM4 to DS1 (Engine 3 based)
FLASH-PRP3-2G(=)	Cisco XR 12000 PRP-3 2GB Compact Flash
FLASH-PRP3-4G(=)	Cisco XR 12000 PRP-3 4GB Compact Flash
HD-PRP3	Cisco 12000 PRP-3 80G Hard Drive
4CHOC12/DS3-I-SCB(=)	4 PORT CHANNELIZED OC12 B
MEM-FD4G(=)	Cisco 4GB PC ATA Flash Disk
12000E/16-DC	Cisco XR12000 16-slots; 2 Alarms, Advanced 2 Blowers, up to 8 DC
12000E/16-AC	Cisco XR12000 16-slots; 2 Alarms, Advanced 2 Blowers, up to 8 AC
PWR-2000W-DC=	Cisco 2000 Watts DC Power Supply
PWR-2000W-AC=	Cisco 2000 Watts AC Power Supply
12000E/16-AC-SHLF=	Advanced AC Power Supply Shelf for Cisco XR 12000 16-slot
12000E/16-DC-SHLF=	Advanced DC Power Supply Shelf for Cisco XR 12000 16-slot

Note:

1. FAT32 function is not enabled by default for the Cisco XR 12000 Series PRP-2 and the Cisco CRS-1 route processor. The CLI to format disk with FAT32 will be introduced in Cisco IOS XR Software Release 3.8.1.

2. Cisco IOS XR Software Release 3.8.0 is supported in the following chassis: Cisco XR 12004, 12404, 12006, 12406, 12010, 12410, 12810, 12016, 12416, and 12816.

Cisco IOS XR Software Release 3.8.0 supports the following new software features, which are common to both the Cisco CRS-1 and the Cisco XR 12000 Series (Table 3). Tables 4 and 5 list the new software features supported by Release 3.8.0 on the Cisco CRS-1 and Cisco XR 12000 Series, respectively.

Table 3. New Software Features Supported on the Cisco CRS-1 and Cisco XR 12000 Series Routers

Feature	Description
Nonstop Routing (NSR) support for BGP	BGP NSR functionality makes failures invisible to routing peers with minimal to no disruption of convergence performance. The failure situation can result in: • RP/DRP failover • Process restart • Rack OIR in the case of the multichassis system In those failure conditions, with BGP Nonstop Routing: • The BGP sessions will not be terminated during failover. • Routing interaction continues on the newly active route processor without peers being aware.
EIGRP MD5 authentication	This feature indicates that the MD5 hash is used for authentication.
Enhancements to Network Time Protocol (NTP)	To allow the software clock to be synchronized by a Network Time Protocol (NTP) server within a VRF, or a server which is reached over an IPv6 address. • VRF-aware support for NTP • IPv6 support for NTP
MIBs support	• Alarm Correlation Feature (on SNMP MIB traps) • CISCO-IETF-FRR-MIB unprotected trap • MPLS-TE-STD-MIB • CISCO-IPMROUTE-MIB • CISCO-IETF-BFD-MIB • ISIS-MIB

Table 4. New Software Features Supported on the Cisco CRS-1 Routers

Feature	Description
Cisco CRS-1 multichassis system	The Cisco CRS-1 multichassis system scales to 8 line card chassis and 4 fabric card chassis.
IPv4 Lawful Intercept	Lawful Intercept is the process by which law enforcement agencies (LEAs) conduct electronic surveillance as authorized by judicial or administrative order. Increasingly, legislation is being adopted and regulations are being enforced that require service providers and ISPs to implement their networks to explicitly support authorized electronic surveillance.
Enhancements to quality of service (QoS)	• QoS In-place Modification • Multi Action Set • mVPN CoS • QoS support for VPLS
Multichassis Control Ethernet MIBs	This set of MIBs provides SNMP management function of the Control-Ethernet card CRS-FCC-SC-22GE in the Cisco CRS-1 multichassis system. • IF-MIB • BRIDGE-MIB • MAU-MIB • CISCO-CONTEXT-MAPPING-MIB • CISCO-MAU-EXT-MIB • IANA-MAU-MIB
Bidirectional Forwarding Detection (BFD) for Open Shortest Path First Version 3 (OSPFv3)	BFD provides low-overhead, short-duration detection of failures in the path between adjacent forwarding engines. BFD allows a single mechanism to be used for failure detection over any media and at any protocol layer, with a wide range of detection times and overhead. The fast detection of failures provides immediate reaction to failure in the event of a failed link or neighbor. In this release BFD support for OSPFv3 is introduced.
QinQ support for Layer 2 and Layer 3 VPN services	QinQ is an extension of 802.1Q for specifying multiple 802.1Q tags (IEEE 802.1QinQ VLAN Tag stacking). In this release, Layer 3 VPN service termination and L2VPN service transport are enabled over QinQ sub-interfaces. The Cisco CRS-1 router implements the Layer 2 tunneling or Layer 3 forwarding depending on the subinterface configuration at provider edge routers. This function only supports up to two QinQ tags on the SPA and fixed PLIM: • Layer 2 QinQ VLANs in L2VPN attachment circuit: QinQ L2VPN attachment circuits will be configured under Layer 2 transport subinterfaces for point-to-point EoMPLS based cross-connects using both virtual circuit type 4 and type 5. pseudowires and point-to-point local-switching-based cross-connects including full interworking support of QinQ with 802.1q VLANs and port mode. • Layer 3 QinQ VLANs: Used as a Layer 3 termination point, both VLANs will be removed at the ingress provider edge and added back at the remote provider edge as the frame is forwarded. Layer 3 services over QinQ include: ◦ IPv4 unicast and multicast ◦ IPv6 unicast and multicast ◦ MPLS ◦ Connectionless Network Service (CLNS) for use by Intermediate System-to-Intermediate System (IS-IS) Protocol Note: There is no support for VPLS functionality with the QinQ interface. In this release, the Cisco CRS-1 will not support Layer 2/Layer 3 bundle QinQ VLANs, bundle attachment circuits, advanced Layer 2 QinQ QoS (QoS on inner VLAN tag will not be supported), and Hot Standby Router Protocol (HSRP) or Virtual Router Redundancy Protocol (VRRP) on QinQ subinterfaces.
Enhancements to ATM-over-MPLS-based Layer 2 VPN support	The following enhancements are added in this release: • ATM VP/VC mode • ATM Layer 2 QoS ◦ Ingress: match oam/clp, set EXP ◦ Egress: match exp, set oam, clp • OAM (F4/F5 segment end-point, and pass-through mode) • ILMI 4.0 user side, with backward 3.0/3.1 compatibility • OAM continuity check Note: These functions are enabled on the SPA-3XOC3-ATM-V2 and SPA-1XOC12-ATM-V2 shared port adapters.
Virtual Private LAN Service (VPLS)	VPLS is a VPN technology that enables Ethernet Multipoint Services (EMS) over a packet-switched network infrastructure. VPN users get an emulated LAN segment that offers a Layer 2 broadcast domain. The end user perceives the service as a virtual private Ethernet switch that forwards frames to their respective destinations within the VPN. Ethernet is the technology of choice for LANs due to its relative low cost and simplicity.

Feature	Description
L2VPN Pseudowire Redundancy	The L2VPN Pseudowire Redundancy feature enables you to configure your network to detect a failure in the network and reroute the Layer 2 service to another endpoint that can continue to provide service. This feature provides the ability to recover from a failure either of the remote provider edge router or of the link between the provider edge and customer edge routers.
MPLS traffic engineering — automatic bandwidth adjustment for traffic engineering tunnels	Traffic engineering automatic bandwidth adjustment provides the means to automatically adjust the bandwidth allocation for traffic engineering tunnels based on their measured traffic load. Traffic engineering auto-bandwidth samples the average output rate for each tunnel marked for automatic bandwidth adjustment. For each marked tunnel, it periodically (for example, once per day) adjusts the tunnel's allocated bandwidth to be the largest sample for the tunnel since the last adjustment. The frequency with which tunnel bandwidth is adjusted and the allowable range of adjustments is configurable on a per-tunnel basis. In addition, the sampling interval and the interval over which to average tunnel traffic to obtain the average output rate is user-configurable on a per-tunnel basis.
Enhancements to Policy-Based Tunnel Selection (PBTS)	PBTS provides a mechanism that lets the network administrator direct traffic into specific traffic engineering tunnels based on different criteria. PBTS will benefit ISPs that carry voice and data traffic through their MPLS networks and MPLS VPNs and that want to route this traffic to provide optimized voice service. PBTS works by selecting tunnels based on the classification criteria of the incoming packets, which are based on the IP precedence, EXP, or type-of-service (ToS) field in the packet. When there are no paths with a default class configured, this traffic is forwarded using the paths with the lowest class value. The PBTS function is introduced in Cisco IOS XR Software Release 3.6 on the Cisco CRS-1 routers. The following enhancements are introduced in this release: • Support with (multi-path) Inter-AS Option C2 configuration (for L3VPNv4 and L2VPN) • L2VPN traffic support • 6(V)PE traffic support • Default IGP path support

Table 5. New Software Features Supported on the Cisco XR 12000 Series Routers

Feature	Description
Multicast VPN extranet support	With this feature, service providers can distribute IP multicast content originated from one enterprise site to other enterprise sites. This feature enables service providers to offer the next generation of flexible extranet services, helping to enable business partnerships between different enterprise VPN customers.
L2VPN Pseudowire Redundancy	The L2VPN Pseudowire Redundancy feature enables you to configure your network to detect a failure in the network and reroute the Layer 2 service to another endpoint that can continue to provide service. This feature provides the ability to recover from a failure either of the remote provider edge router or of the link between the provider edge and customer edge routers.
Multiple Tunnel Source Address for Layer 3 VPN service across IP core	This feature enables traffic load balancing across the IP core by sending packets with the L2TPv3 tunnel source address selected from a /28 address pool.
Quality-of-service (QoS) enhancements	• Enhanced hierarchical policing • In-place modification (add/remove) • Match ALL • Policer granularity • Classification and marking of Ethernet CoS bits • Layer 2 QoS on ATM L2VPN attachment circuit (Engine 3 only) • Layer 2 QoS on Frame Relay L2VPN attachment circuit
Multilink Frame Relay (MLFR) and FRF.12 support for Cisco 1-Port Channelized OC-12/STM-4 SPA	• MLFR support is now available for the Cisco 1-Port Channelized OC-12/STM-4 SPA. • FRF.12 support is now available for the Cisco 1-Port Channelized OC-12/STM-4 SPA.
Enhancements to L2TPv3-based Layer 2 VPN support	Layer 2 transport over IP network works for like-to-like attachment circuits, such as Ethernet-to-Ethernet or PPP-to-PPP. L2VPN Interworking builds on this functionality by allowing disparate attachment circuits to be connected. An interworking function facilitates the translation between the different Layer 2 encapsulations. IP Interworking is also called routed interworking. The customer edge routers encapsulate IP on the link between the customer edge and provider edge routers. A new virtual circuit type is used to signal the IP pseudowire in L2TPv3. Translation between the Layer 2 and IP encapsulations across the pseudowire is required. This mode is used to provide IP connectivity between sites, regardless of the Layer 2 connectivity to these sites. It is different from a Layer 3 VPN because it is point-to-point in nature and the service provider does not maintain any customer routing information. In this release, the following functions are added on the Cisco XR 12000 Series Routers: • L2TPv3 Point-to-Point Protocol/High-Level Data Link Control (PPP/HDLC) like-to-like pseudowires on Engine 3 and 5 line cards • L2TPv3 ATM like-to-like pseudowires on Engine 3 line cards • L2TPv3 Frame Relay DLCI, and MLFR like-to-like pseudowires on Engine 3 line cards • L2TPv3 Ethernet port mode and VLAN like-to-like on Engine 3 line cards • L2TPv3 IP Interworking on Engine 3 and 5 line cards ◦ Ethernet port mode/1Q (VLAN)

Feature	Description
	◦ Frame Relay point-to-point DLCI and MLFR ◦ ATM AAL5 (Engine 3 supports only, SNAP/Mux) • Local switching support with L2TPv3 (Engine 3 and Engine 5 line cards for Ethernet/Frame Relay, only E3 support for ATM): ◦ IPIW for Ethernet, Frame Relay, and ATM ◦ PPP/HDLC like-to-like ◦ Like-to-like for Ethernet, Frame Relay, and ATM
Enhancements to Any Transport over MPLS (AToM)-based Layer 2 VPN support	Layer 2 transport over MPLS network works for like-to-like attachment circuits, such as Ethernet-to-Ethernet or PPP-to-PPP. L2VPN Interworking builds on this functionality by allowing disparate attachment circuits to be connected. An interworking function facilitates the translation between the different Layer 2 encapsulations. IP Interworking is also called routed interworking. The customer edge routers encapsulate IP on the link between the CE and provider edge routers. A new virtual circuit type is used to signal the IP pseudowire in L2TPv3. Translation between the Layer 2 and IP encapsulations across the pseudowire is required. This mode is used to provide IP connectivity between sites, regardless of the Layer 2 connectivity to these sites. It is different from a Layer 3 VPN because it is point-to-point in nature and the service provider does not maintain any customer routing information. In this release, the following functions are added on the Cisco XR 12000 Series Routers: • AToM IP Interworking for Engine 3 and 5 line cards ◦ Ethernet port mode/1Q/QinQ ◦ Frame Relay point-to-point DLCI and MLFR ◦ ATM AAL5 – Engine 5 supports SNAP/Mux/NLPID – Engine 3 supports SNAP/Mux • AToM PPP/HDLC like-to-like pseudowires on Engine 3 and 5 line cards • AToM ATM like-to-like pseudowires on Engine 3 and 5 line cards • AToM Frame Relay DLCI, and MLFR like-to-like pseudowires on Engine 3 line cards • AToM Ethernet port mode and VLAN like-to-like on Engine 3 line cards Caveats: The following AToM functions are **not** supported in this release on the Cisco XR 12000 Series Routers: • IP interworking for PPP/HDLC is not supported. Only like-to-like is supported for PPP/HDLC. • Frostbite and channelized Jag48 line cards are not supported. Note that PI will only reject configurations based on the attachment circuit type, and not the line card family. • Multilink Point-to-Point Protocol (MLPPP) is not supported • Link bundling support on core-facing link • Sequencing is not supported for IW • Pseudowire Redundancy is not supported
Access control entry (ACE) 2.0 (virtual firewall on X-blade) **[[correct?]]**	• Object grouping • SYN cookies • Enhanced syslog • New protocol inspection

Ordering Information

Table 6 lists ordering information for Cisco IOS XR Software Release 3.8.0 for Cisco CRS-1 Carrier Routing Systems and Cisco XR 12000 Series Routers. These are the only part numbers that will be orderable. When re-releases of Cisco IOS Software Release 3.8.0 are available, ordering these part numbers will automatically result in the latest release being shipped.

Table 6. Ordering Information for Cisco IOS XR Software Release 3.8.0 for Cisco CRS-1 Routers and Cisco XR 12000 Series Routers

Part Number	Description
XC-RP-03.08	Cisco CRS-1 All Packages except Cryptographic Support
XC-RPK9-03.08	Cisco CRS-1 All Packages with Cryptographic Support
XC-XR12K-03.08	Cisco XR 12000 All Packages except Cryptographic Support
XC-XR12KK9-03.08	Cisco XR 12000 All Packages with Cryptographic Support

Release 3.8 Lifecycle

The Cisco IOS XR Software release strategy is time-based, with a fixed release date and lifecycle, as opposed to being a feature-based release strategy with a variable release date. Table 7 lists the major milestones of Cisco IOS XR Software Release 3.8.

Table 7. Major Milestones for Cisco IOS XR Software Release 3.8

Milestone	Definition	Date
Availability Date	The date that the Cisco IOS XR Software Release 3.8.0 information is published on Cisco.com and becomes available to the general public.	March 20, 2009
End-of-Life Announcement Date	The official End-of-Life document that announces the end of sale and end of life of Cisco IOS XR 3.8 is distributed to the general public.	December 31, 2009
End-of-Sale Date	The last date to order the product through Cisco point-of-sale mechanisms. The product is no longer for sale after this date.	September 30, 2010
End-of-Maintenance Date	This marks end of engineering, maintenance rebuilds, and software fixes through rebuilds of XR 3.8.x and through SMUs built off of XR 3.8.x. After this date, maintenance rebuilds and software-fix support will be provided only through rebuilds of XR 3.9.x or later.	June 30, 2011
End of Software Maintenance Releases through migration: OS Software	The last date that Cisco Engineering may release any final software maintenance releases or bug fixes via SMU for issues seen on XR 3.8.x. From June 30, 2011 until June 30, 2012, maintenance rebuilds and software fix-via SMU support for XR 3.8.x will be provided only through migration to rebuilds of XR 3.9.x or later releases, and through SMUs built off of XR 3.9.x or later releases as appropriate. After June 30, 2012, Cisco Engineering will no longer develop, repair, maintain, or test XR 3.8.x.	June 30, 2012
Last Date of Support	The last date to receive service and support for the product. After this date, all support services for the product are unavailable and the product becomes obsolete.	September 30, 2015

For official end-of-life and end-of-sale announcements for Cisco IOS XR Software, please visit http://www.cisco.com/en/US/products/ps5845/prod_eol_notices_list.html or contact your local account representative.

For More Information

For more information about the Cisco CRS-1 Carrier Routing System, Cisco 12000 Series Router, Cisco XR 12000 Series Router, or Cisco IOS XR Software, visit http://www.cisco.com/ or contact your local Cisco account representative.

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