Cisco IOS XR Software Release 3.5.2 for Cisco CRS-1 Routers and Cisco XR 12000 Series Routers

PB478695

Cisco IOS® XR Software Release 3.5.2 introduces new multicast VPN capabilities. The release supports Layer 2 Tunneling Protocol Version 3 (L2TPv3) as a transport mechanism on Cisco® XR 12000 Series Routers for Layer 2 and Layer 3 MPLS VPN (L2VPN and L3VPN). Edge capabilities on the Cisco XR 12000 Series are enhanced with support for IPv6 on VPN to Provider Edge Router (6VPE) to support IPv6 VPN customers and IPv6 on Provider Edge Router (6PE) support to connect IPv6 islands over an IPv4 core. Release 3.5.2 also brings Management Plane Protection. Additional security enhancements include hitless key exchange for Open Shortest Path First (OSPF) and Intermediate System-to-Intermediate System (IS-IS). NetFlow support is expanded to support IPv6 sampled NetFlow.

Cisco IOS XR Software Release 3.5.2 incorporates support for all hardware modules and software features of all prior releases.

Hardware Features

Cisco IOS XR Software Release 3.5.2 incorporates support for new hardware, listed in Table 1 and Table 2.

Table 1. New Hardware Supported on Cisco CRS-1 in Cisco IOS XR Software Release 3.5.2

Part Number	Description
SPA-1X10GE-WL-V2	Cisco 10 GE WAN PHY Shared Port Adapter introduces 10-GE connectivity based on IEEE 802.3ae in configurable WAN and LAN modes in a single-height, modular I/O form factor

Table 2. New Hardware Supported on Cisco XR 12000 Series in Cisco IOS XR Software Release 3.5.2

Part Number	Description
SPA-1XOC48POS/RPR	1-Port OC-48/STM-16 POS/RPR Shared Port Adapter
SPA-2XOC12-POS	2-Port OC-12/STM-4 POS Shared Port Adapter
SPA-4XOC12-POS	4-Port OC-12/STM-4 POS Shared Port Adapter
SPA-8XOC12-POS	8-Port OC-12/STM-4 POS Shared Port Adapter
SPA-8XOC3-POS	8-Port OC-3/STM-1 POS Shared Port Adapter
SPA-4XOC3-POS-V2	4-Port OC-3/STM-1 POS Shared Port Adapter
SPA-1XCHSTM1/OC3	1-Port Channelized STM-1/OC-3c to DS-0 Shared Port Adapter
12010E/50	50-Gbps Enhanced Fabric with 5 Switch Fabric Cards (SFCs) and 2 Clock and Scheduler Cards (CSCs) for Cisco 12010
12410E/200	200-Gbps Enhanced Fabric with 5 SFCs and 2 CSCs for Cisco 12410
12016E/80	80-Gbps Enhanced Fabric with 3 SFCs and 2 CSCs for Cisco 12016
12416E/320	320-Gbps Enhanced Fabric with 3 SFCs and 2 CSCs for Cisco 12416

Note: Cisco IOS XR Software Release 3.5.2 is supported in the following chassis: Cisco 12000/4, 12000/6, 12000/10, and 12000/16

Software Features

Cisco IOS XR Software Release 3.5.2 incorporates all software features supported in Release 3.4 and adds support for new features, listed in Table 3.

Table 3. Software Features Supported in Cisco IOS XR Software Release 3.5.2 Common to Cisco CRS-1 Routers and Cisco 12000 Series Routers

Feature	Description
MVPNv4	Cisco IOS XR Release 3.5.2 introduces L3VPN functionalities for IPv4 multicast and supports default and data Multicast Distribution Tree (MDT). Protocol Independent Multicast sparse mode (PIM SM) and PIM source-specific mode (PIM SSM) are supported in the core on both platforms. PIM bidirectional mode (PIM bi-dir) is supported on the Cisco CRS-1 only. Virtual Route Forwarding (VRF) mode support includes IGMP, BSR, Auto-RP, PIM SM/SSM, and the ability to map static group to RP. PIM bi-dir in VRF mode is supported on the Cisco CRS-1 only.
Path Computation Element (PCE)	Path Computation Element (PCE) provides optimal tunnel provisioning for inter-domain Traffic Engineering (TE) tunnel setup. In Release 3.5.2, the inter-area TE tunnel setup is implemented for IS-IS and OSPF. The following features are implemented with PCE in this release: • Inter-area TE with both PCC and PCE support • TE tunnels over regular bandwidth pool (non-DS TE) • Manual or Dynamic PCE Discovery
Management Plane Protection	This feature allows specific in-band interface to be configured to support Management Plane traffic. Feature support extends the following capabilities. • RP Ethernet interface supported as default out-of-band interface • Support for HTTP, HTTPS, SNMPv3, TELNET, SSH, and TFTP daemon (TFTPD) servers
Hitless Key Exchange	Hitless Key rollover is supported for OSPF and IS-IS
OSPF GTSM	This feature extends the Generalized TTL Security Mechanism to OSPF to ensure that the OSPF packets are indeed coming from an immediate neighbor.
LDP Auto-configuration	This feature allows a user to automatically configure LDP on every interface associated with an IGP instance. The feature allows disabling LDP on a per-interface basis.
IP SLA	IP SLA enhancements made in Release 3.5.2 include the ability to schedule and generate automatic MPLS LSP Monitoring (MPLS LM) capability. This capability allows LSP path monitoring among PE routers that participate in L3VPN services. Monitoring includes LSP Ping and Trace.
Manageability	CISCO-IETF FRR MIB CISCO-BGP4-MIB enhancement to support IPv6 peer monitoring

Cisco IOS XR Software Release 3.5.2 incorporates all software features supported in Release 3.4 and adds support for new features on Cisco CRS-1 Carrier Routing System, listed in Table 4.

Table 4. Additional Software Features Supported in Cisco IOS XR Software Release 3.5.2 New to Cisco CRS-1 Routers

Feature	Description
IP FRR	IP Fast Reroute capability supported with IS-IS routing protocol for fast convergence
TE Unequal Load Balancing	Supports unequal bandwidth load sharing using an explicit load-share command or the configured bandwidth
IPv6 Sampled Netflow	Support includes: • V9 export format • Interface support: Physical, sub-intf, bundles, VLAN over bundles • Ingress and egress • NetFlow key: v6 Src address, v6 DST address, v6 flow label, L4 Src/Dst Port, Input Intf, L4 protocol type, ToS • Flow cache fields: Destination prefix length, Egress Interface, Number of packets, Number of bytes, First timestamp, Last timestamp, TCP flags, Bitmask for TCP options header • Export incoming packet ToS • Export outgoing packet ToS
Session Border Controller	Support for distributed model (Data Border Element only) of SBC on DRP

Cisco IOS XR Software Release 3.5.2 incorporates all software features supported in Release 3.4 and adds support for new features on Cisco XR 12000 Series Routers, listed in Table 5.

Table 5. Additional Software Features Supported in Cisco IOS XR Software Release 3.5.2 New to the Cisco 12000 Series Routers

Feature	Description
L2TPv3 Support	L2TPv3 support includes the following: • Static configuration mode without Hellos • Dynamic signaling mode • TOS-bit reflection • DF (Don't Fragment) bit mirroring • Set TTL Value Ethernet-over-L2TPv3 L2VPN support includes: • draft-ietf-l2tpext-pwe3-ethernet-05.txt (draft-ietf-l2tpext-pwe3-ethernet-xx) • E3 Fixed LC and E5 based SPA • Color Blind Policer (2R3C) on EoL2TPv3 (P-bits) on 4GE-SFP-LC • Color Blind Policer (2R3C) on EoL2TPv3 (P-bits) on 12000-SIP-401, 12000-SIP-501, 12000-SIP-601 LCs • Egress parent shaping for Ethernet ATM and Frame Relay over L2TPv3 support includes: • draft-ietf-l2tpext-pwe3-atm-04.txt • draft-ietf-l2tpext-pwe3-fr-07.txt • L2TPv3 support for Frame Relay attachment circuits (AC) on CHOCx SPAs including T3/E3, CT3, and CH-STM1 • L2TPv3 support for Frame Relay ACs defined on 12000-SIP-x01 POS and ChOC-3 SPAs L2TPv3 L3VPN support includes: • IPv4 VPN traffic • IPv6 VPN traffic • PE-CE protocol: external Border Gateway Protocol (eBGP), Enhanced Interior Gateway Routing Protocol Version 4 (EIGRPv4), EIGRPv6, OSPFv2 • BGP Multipath support for eBGP, internal BGP (iBGP), and eiBGP • Inter-autonomous-system (Inter-AS) option A (back-to-back VRF) • Inter-AS option 10B for v4 only • Carrier Supporting Carrier (CSC) for IPv4 BGP label distribution • eBGP support for CSC and Inter-AS MPLS VPN • Route target rewrite on AS boundary • MTU specification under tunnel template • BGP link bandwidth advertisement • Per-VRF prefix limit • BGP Hub and Spoke • Next-Hop Tracking support • Support to set tunnel precedence
MPLS Sampled NetFlow	Support includes: • Sampling ingress and egress MPLS packets • Sampled flow per interface and sub-interface • V9 format • Label swap/pop • Explicit null • Regular forwarding

Feature	Description
6PE/6vPE	This edge feature set supports the following capabilities: • PE-CE protocol: static, EIGRP, eBGP • Site of Origin support • ASN Override • Hub and Spoke • Allow-AS-In • BGP Prefix filtering • BGP AS Path filtering • BGP Max prefix • BGP Route Refresh • Route Target rewrite at AS Boundary • v6 VRF-aware ACL, Ping, Telnet, SNMP, Extensible Markup Language (XML) • v6 VRF-aware traceroute with or without provider router visibility • VRF-aware BGP Dampening • VRF-aware MIB for IPv6 VPN • Diff-Serv QoS on ingress and egress • BGP Multipath • VRF route limit • PE-to-PE MPLS TE tunnels • BGP graceful restart for v6 VPN AFI or v6 AFI • Prefix-based outbound route filtering • CISCO-BGP-MIB to support IPv6 peer tables • L3VPN-MIB • Interface support: VLAN, MLPPP, FR DLCI, ATM
Session Border Controller	Common P-CSCF and NNI (IBCF) processing: • Path Header added to outbound REGISTERs • “Route” header passed through and used • Preset white/blacklisting profiles • “Contact” header passed on REGISTER requests • “P-Access-Network-Info” header passed through • Interoperability with IMS Billing headers: “P-Charging-Vector” and “P-Charging-Function-Addresses” Media processing: • RFC 3312, Preconditions • RFC 3388, SDP m line grouping Gm and Mw (P-CSCF) interfaces: • Subscriber updates: Police that calls must be to/from a known subscriber • “Service-Route”: Cached on 200 REGISTER response • “Route” header: Checked against “Service-Route” for requesting subscriber • “P-Visited-Network-ID”: Header added • “P-Associated-URI”: Cached on 200 REGISTER response • “P-Preferred-Identity”: Validation and conversion to “P-Asserted-Identity” • “P-Called-Party-ID”: Mapping to “P-Asserted-Identity” SIP-I (SIP-T) pass through support: • Passing through parameters in Request-URIs; Configurable passing of INFO; Multipart MIME message body support; Extract SDP and pass other message body parts Enhanced support for SIP Inbound Authentication: • Support for RFC 4590 and draft-sterman-aaa-sip • Add configuration options Additional SIP features: • Auto-detect endpoints behind a NAT • Configurable passing of OPTIONS • Pass through the “From” header on non-REGISTER requests • Add option to force outbound requests to be sent to the signaling peer • HTTP Digest authenticating • Enhanced REGISTER processing Enhanced routing with Wildcard domain routing Cisco ANA support XR-12K-MSB (card management only)
Link Bundling Support	This feature is supported on 12000-SIP-x01 Ethernet link bundling for IPv4

Feature	Description
Enhanced Fabric Support	10-slot and 16-slot 2.5G and 10G per-slot fabric enabling BITS, Single Router APS, and dual priority (support in future releases)
IPsec Enhancements	Enables a combination of SPAs in the same slot: • IPsec into MPLS • VRF-awareness for IPsec MIBS • Accounting and manageability enhancements
Virtual Firewall Enhancements	The following Virtual Firewall capabilities are implemented: High Availability • Intrachassis stateful failover • Active-standby stateful failover • Active-active stateful failover Virtualization • Single MSB can be partitioned into multiple logical firewalls with highly scalable security context Each security context can define the following properties: • Policies (access control lists [ACLs], NAT, fixups) • Management IP address • Authentication, authorization, and accounting (AAA), Simple Network Management Protocol (SNMP), syslog server • Resource management controls resource usage per security context with guaranteed rates and memory allocation: ◦ Throughputs ◦ New connection per second ◦ ACL memory Management • SNMP v1, v2c, v3 • SNMP is virtualized to allow SNMP setting per virtual context • XML interface configuration, provisioning, and monitoring • Role-Based Access Control (RBAC) with management domains • Modular policy commands • AAA: LDAP, TACACS, RADIUS Jumbo Frame Support • The Cisco XR 12000 virtual firewall supports jumbo frames of up to 9180 bytes without the need for fragmentation Inspection Engines • Advanced HTTP inspection: RFC compliance checking for anomaly detection, HTTP misuse, HTTP command filtering, MIME type validation and filtering, and more • RTSP inspection • ICMP inspection and fix-up • DNS inspection and fix-up • FTP • TCP/IP normalization with Adaptive Security algorithm to monitor TCP handshake

Orderable Software Images

Table 6 lists the applicable ordering information for Cisco IOS XR Software Release 3.5.2 for the Cisco CRS-1 Carrier Routing System and the Cisco XR 12000 Series Routers.

These are the only product IDs that will be orderable. When re-releases of Cisco IOS Software Release 3.5.2 are available, ordering these product IDs will automatically result in the latest re-release being shipped.

Table 6. Software Versions and Ordering Information

Part Number	Description
XR-RP-03.05	Cisco IOS XR IP/MPLS Core Software for the Cisco CRS-1
XR-RPK9-03.05	Cisco IOS XR IP/MPLS Core Software with 3DES for the Cisco CRS-1
XR-XR12K-03.05	Cisco IOS XR IP/MPLS Core Software for the Cisco XR 12000 Series
XR-XR12KK9-03.05	Cisco IOS XR IP/MPLS Core Software with 3DES for the Cisco XR 12000 Series

Part Number	Description
XR-12K-MSB-FW-50(=)	Cisco XR 12000 Series Multiservice Blade (MSB) – licensing for 50 virtual firewall contexts
XR-12K-MSB-FW-250(=)	Cisco XR 12000 Series MSB – licensing for 250 virtual firewall contexts

Release 3.5 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 3.5.

Table 7. Major Milestones for Cisco IOS XR Software Release 3.6

Milestone	Definition	Date
Availability Date	Cisco IOS XR Software Release 3.5 information is published on Cisco.com and becomes available to the general public.	November 9, 2007
End-of-Life Announcement Date	The official End-of-Life document for release 3.5 is distributed to the general public.	August 9, 2008
End-of-Sale Date and End-of-Maintenance Date	The last date to order Cisco IOS XR 3.5 through Cisco point-of-sale mechanisms. The product is no longer for sale after this date. This also marks the end of engineering, maintenance rebuilds, and software fixes through rebuilds of Cisco IOS XR 3.5. After this date, maintenance rebuilds and software-fix support will be provided only through rebuilds of Cisco IOS XR 3.6.x or later.	May 9, 2009
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. From May 9, 2009 until May 9, 2010, maintenance rebuilds and software fix via SMU support for Cisco IOS XR 3.5.x will be provided only through migration to rebuilds of Cisco IOS XR 3.6.x. After June 21, 2010, Cisco Engineering will no longer develop, repair, maintain, or test Cisco IOS XR 3.5.x.	May 9, 2010
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.	May 9, 2014

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.

Americas Headquarters
Cisco Systems, Inc.
San Jose, CA

Asia Pacific Headquarters
Cisco Systems (USA) Pte. Ltd.
Singapore

Europe Headquarters
Cisco Systems International BV
Amsterdam, The Netherlands

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.

Printed in USA C25-478695-00 05/08