Release Notes for Cisco 8000 Series Routers, IOS XR Release 24.3.1

Revised: September 13, 2024

Cisco 8200, 8600, 8700, and 8800 Series Routers

What's New in Cisco IOS XR Release 24.3.1

For more details on the Cisco IOS XR release model and associated support, see Software Lifecycle Support Statement - IOS XR.

New in Documentation

Feature	Description
Cisco IOS XR Feature Finder	We have launched this interactive tool that assists you in locating features introduced across Cisco IOS XR releases and platforms. This tool empowers you to explore, discover, and utilize the full potential of our platforms. As we continue to enhance the tool, we would love to hear your feedback. You are welcome to drop us a note here.

Software Features Enhanced and Introduced

To learn about features introduced in other Cisco IOS XR releases, select the release from the Documentation Landing Page.

Feature	Description
Setup and Upgrade	
Bootz Workflow for Standby RP	Introduced in this release on: Modular Systems (8800 [LC ASIC: Q100, Q200, P100]) This feature enables the Bootz workflow to achieve full-system onboarding for devices with both active and standby Route Processors (RPs). In earlier releases, the Bootz workflow only supported onboarding for devices with an active RP. With this enhancement, the Bootz workflow can now detect faulty or tampered standby cards that are inserted dynamically during or after the active RP Bootz process. It does this by verifying the ownership voucher (OV) of the other cards during the initial Bootz process for the active RP. Faulty cards can be shut down to prevent security threats during remote provisioning, ensuring smooth network operation. This feature allows Bootz workflow to validate the standby RP as part of the active RP Bootz process. This feature introduces the **ztp bootz-server** command. This feature modifies the `Cisco-IOS-XR-ztp-cfg.yang`. (see GitHub, YANG Data Models Navigator)

Feature	Description
Exclude the Default PSU Upgrade from the Automatic FPD Upgrade	Introduced in this release on: Fixed Systems (8200, 8700); Centralized Systems (8600); Modular Systems (8800 [LC ASIC: Q100, Q200, P100]) To make the automatic FPD upgrade process more time efficient, we have decreased the default time needed for FPD automatic upgrades by excluding PSUs from the automatic upgrade process. This is because the PSU upgrades are carried out one after the other, and on a fully loaded router, the process could take more than an hour to complete. We have also added an option to include the PSU in the automatic FPD upgrade. Previously, the PSU upgrade was included by default in the automatic FPD upgrade. The feature introduces the following change: **CLI:** • The **include pm** keyword is introduced in the **fpd auto-upgrade** command.
Programmability	
TPM Enrollment and Attestation	Introduced in this release on: Fixed Systems (8200, 8700); Centralized Systems (8600); Modular Systems (8800 [LC ASIC: Q100, Q200, P100]) You can now use the new gNSI service for enrollment and attestation, EnrollZ and AttestZ, to enhance security of networking devices. The EnrollZ has been added to meet open-source requirements, thereby providing advantages such as the verification of device identity and integrity during boot-up, and the provisioning of owner-specific certificates. This bypasses the need for router vendor certificate authorities, offering a user-friendly and secure system. Sensitive credentials are only available to devices that have completed the EnrollZ and AttestZ processes.
gNSI Acctz Logging	Introduced in this release on: Fixed Systems(8200, 8700); Centralized Systems (8600); Modular Systems (8800 [LC ASIC: Q100, Q200, P100]) You can now log and monitor AAA (Authentication, Authorization, and Accounting) accounting of gRPC operations and CLI accounting data through gNSI Acctz for effective management of network for better performance and resource utilization. You can also configure the number of gNSI accounting records that can be streamed. Previously, you could monitor the AAA accounting data through syslog only. The feature introduces these changes: **CLI: grpc aaa accounting queue-size** To view the specification of gNSI Accounting (Acctz) RPCs and messages, see the Github repository.
Routing	
BFD over Pseudowire Headend	Introduced in this release on: Modular Systems (8800 [LC ASIC: P100]) (select variants only*) You can now rapidly detect failures in pseudowires, minimizing downtime and ensuring service reliability. This feature continuously monitors the pseudowire end-to-end, providing quick responses to maintain the integrity of Layer 2 VPNs and Ethernet services. *This feature is supported on: • 88-LC1-12TH24FH-E

Feature	Description
LSP Fast-Flooding on IS-IS Networks	Introduced in this release on: Fixed Systems (8200, 8700); Centralized Systems (8600); Modular Systems (8800 [LC ASIC: Q100, Q200, P100]) You can now accelerate the rate at which Link State Packets (LSPs) are distributed across an IS-IS network. Faster LSP distribution means faster network convergence. This faster convergence ensures that the most accurate topology information is quickly available across all routers on the network, reducing the chances of routing loops or misrouting. The feature introduces these changes: **CLI:** • **lsp-fast-flooding** • **max-lsp-tx** • **psnp-interval** • **remote-psnp-delay** **YANG Data Model:** • `Cisco-IOS-XR-um-router-isis-cfg` (see GitHub, YANG Data Models Navigator)
Segment Routing	
BGP Signaling for co-existence of IP routes	Introduced in this release on: Fixed Systems (8100, 8200); Modular Systems (8800 [LC ASIC: Q100, Q200]) SRv6 with BGP supports the coexistence of IP routes with or without SRv6 SID over an SRv6-enabled core network. This support enables integrating SRv6 capabilities into existing network infrastructures without replacing IP routing completely. This feature enables flexibility and scalability, transition to new technologies, and enhanced network efficiency, making it easier to migrate from MPLS to SRV6. The feature introduces these changes: CLI: • **encapsulation-type srv6 relax-sid**

Feature	Description
H.Insert.Red Headend Behavior for SRv6 on Cisco Silicon One P100-based Routers	Introduced in this release on: Modular Systems (8800 [LC ASIC: P100]) (select variants only*) With H.Insert.Red head-end behavior, you can effectively steer traffic into an SR policy, allowing for fast rerouting, traffic optimization, and simplified path management without additional encapsulation. The H.Insert.Red head-end behavior enables the router to insert a Segment Routing Header (SRH) directly into an existing IPv6 packet. The feature introduces these changes: **CLI:** • **hw-module profile npu-compatibility** * This feature is supported on: • 88-LC1-36EH • 88-LC1-12TH24FH-E • 88-LC1-52Y8H-EM
SRv6 Services on EVPN E-Line	Introduced in this release on: Fixed Systems(8200, 8700); Centralized Systems (8600); Modular Systems (8800 [LC ASIC: Q200, P100]) Segment Routing over IPv6 (SRv6) services on Ethernet Virtual Private Network (EVPN) E-Line offers a modern approach to simplify and enhance network operations. SRv6 utilizes IPv6 addresses to encode segment routing information, seamlessly integrating with EVPN E-Line services to provide efficient, scalable, and flexible network solutions.
BGP	
Flexible BGP Persistence	Introduced in this release on: Fixed Systems (8200, 8700); Centralized Systems (8600); Modular Systems (8800 [LC ASIC: Q100, Q200, P100]) Now you can ensure continuous connectivity by allowing non-Long Lived Graceful Restart (LLGR) eBGP neighbors to use LLGR stale routes, allowing for LLGR capability to be enabled and advertised without having to explicitly configure a timeout value, and gain greater flexibility in route management by advertising stale routes to non-LLGR peers through the NO_EXPORT community. This is an enhancement to the existing BGP Persistence feature. The feature introduces these changes: **CLI:** • The **default** , **any** , and **advertise-internal-only** keywords are added to the **long-lived-graceful-restart** command. • The fields **Long-lived Graceful Restart Stale Time Send Default**, **Default advertised long-lived stale time**, and **Long-lived Graceful Restart Stale Time Accept Any** are added to the show output of the **show bgp** command. **YANG Data Model:** • `Cisco-IOS-XR-ipv4-bgp-cfg` (see GitHub, YANG Data Models Navigator)

Feature	Description
Interface and Hardware Component	
Media Link-down PreFEC Degrade Enablement	Introduced in this release on: Fixed Systems(8200, 8700); Centralized Systems (8600); Modular Systems (8800 [LC ASIC: Q100, Q200, P100]). The Media Link-down PreFEC Degrade functionality can be used to protect the media side of the optical transceiver during transmission errors. By using this feature, you can proactively switch the traffic to standby path when the BER counter crosses the threshold value. This feature helps to avoid further traffic impact when the optical network reaches more noise or error. The feature introduces these changes: **CLI:** Modified the controller optics command by adding the **media link-down prefec-degrade** keyword. **YANG Data Model:** • New XPaths for `Cisco-IOS-XR-controller-optics-oper.yang` • New XPaths for `Cisco-IOS-XR-um-cont-optics-fec-threshold-cfg.yang` (see GitHub, YANG Data Models Navigator)
Remote Link State Propagation	Introduced in this release on: Fixed Systems (8200, 8700); Centralized Systems (8600); Modular Systems (8800 [LC ASIC: Q100, Q200, P100]) Remote Link State Propagation allows the status of a link to be communicated to remote devices, ensuring that all relevant parts of the network are aware of link state changes. Link Loss Forwarding (LLF) uses this feature to propagate link failures to remote endpoints. By enabling remote state propagation and LLF on an interface, you can ensure that the link state changes are communicated to remote devices, allowing for quick failover and rerouting of traffic. This feature introduces the **propagate remote-status** command.
L2VPN	
Pseudowire Headend	Introduced in this release on: Modular Systems (8800 [LC ASIC: P100]) (select variants only*) Pseudowire Headend (PWHE) is a virtual interface that allows termination of access PWs into a Layer 3 (VRF or global) domain or into a Layer 2 domain. PWHE enables integration of legacy Layer 2 services into packet-switched networks (PSNs) like IP or MPLS networks, so that users can integrate their older devices into newer networks without upgrading their hardware. This is possible because PWHE allows the termination or encapsulation of the frames from the attachment circuit into packets that can be transmitted over the PSN. * This feature is supported only on: • 88-LC1-12TH24FH-E • 88-LC1-52Y8H-EM

Feature	Description
Introduced New VLAN Tag Format Support for Load Balancing	Introduced in this release on: Fixed Systems (8200); Centralized Systems (8600); Modular Systems (8800 [LC ASIC: Q100, Q200, P100]) Introduced support for the following VLAN tags on line cards and routers with Q100, Q200, and P100 based Silicon One ASIC: • Single VLAN tag 0x88A8 • QinQ with outer 0x8100 and inner 0x8100 • QinQ with outer 0x9100 and inner 0x8100 Introduced support for BUM traffic in VPLS service load balancing.
Traffic Mirroring on PWHE	Introduced in this release on: Modular Systems (8800 [LC ASIC: P100])(select variants only*) This feature allows you to perform a detailed inspection and analysis of layer 2 network traffic passing through a set of ethernet interfaces without interrupting the flow of traffic. You can copy or mirror the network packets that pass through a specific source interface within a layer 2 VPN, allowing these packets to be redirected to a predetermined destination interface. *This feature is enabled by default and supported on: • 88-LC1-52Y8H-EM • 88-LC1-12TH24FH-E
EVPN	
Layer 2 Fast Reroute	Introduced in this release on: Fixed Systems (8200, 8700); Centralized Systems (8600); Modular Systems (8800 [LC ASIC: Q100, Q200, P100]) Fast reroute minimizes traffic loss by quickly redirecting traffic to a backup path in the event of a link failure, ensuring fast convergence and maintaining the service continuity. This feature introduces the **convergence reroute** command.
Modular QoS	
QoS on PWHE	Introduced in this release on: Modular Systems (8800 [LC ASIC: P100])(select variants only*) You can now prioritize critical services like voice, video, and real-time applications for network traffic entering a Pseudowire Headend (PWHE) interface, which then forwards the prioritized traffic into the pseudowire to be transported over a packet-switched network, such as an IP or MPLS network. The feature introduces the **show qos-ea default-queue** command. The feature modifies the `Cisco-IOS-XR-qos-ma-oper.yang` (see GitHub, YANG Data Models Navigator) data model. *This feature is supported on: • 88-LC1-52Y8H-EM • 88-LC1-12TH24FH-E

Feature	Description
Multicast Traffic Scheduling on Egress Queues	Introduced in this release on: Modular Systems (8800 [LC ASIC:ASIC: P100])(select variants only*) We have introduced multicast traffic scheduling on egress queues. Now you can have more granular control over multicast traffic by applying egress queuing policy map parameters such as traffic shaping, priority, and queuing, to each egress queue. This allows for specific management of multicast traffic for different receivers, ensuring efficient and prioritized handling of multicast data. *This feature is enabled by default and supported on: • 88-LC1-12TH24FH-E • 88-LC1-52Y8H-EM
Egress Class-level Traffic Shaping for Subinterface	Introduced in this release on: Modular Systems (8800 [LC ASIC: P100])(select variants only*) You can now granularly control the traffic flow on each class in the egress queuing policy map ensuring optimal bandwidth allocation and improved network performance. This is achieved by introducing support for enabling class-level rate limiting traffic shapers for each class in the egress subinterface-level (main and LAG) queuing policy maps. *This feature is enabled by default and supported on: • 88-LC1-12TH24FH-E • 88-LC1-52Y8H-EM
Priority Propagation on Egress Queues	Introduced in this release on: Fixed Systems (8200, 8700); Centralized Systems (8600); Modular Systems (8800 [LC ASIC: P100]) You can now ensure that high-priority traffic is consistently prioritized across multiple sub-interfaces on the same network port, enhancing the performance of critical applications. This is achieved by enabling support for egress queuing policy maps that allow high-priority P1 traffic (on class TC7) to take precedence over non-P1 traffic across sub-interfaces. This feature ensures that critical traffic, such as voice or real-time video, is always given the highest priority, regardless of the sub-interface it is associated with, thereby maintaining optimal network performance and reducing latency for essential services.
NetFlow and sFlow	
Monitor PWHE Interface Traffic	Introduced in this release on: Modular Systems (8800 [LC ASIC: P100]) (select variants only*) NetFlow is now supported on Pseudowire Headend (PWHE) interfaces, enhancing traffic congestion monitoring and network operation efficiency. This feature enables monitoring of IP traffic transmitted through PWHE interfaces, which facilitates the termination and encapsulation of legacy non-IP traffic into IP packets. *This feature is supported on: • 88-LC1-52Y8H-EM • 88-LC1-12TH24FH-E
System Management	

Feature	Description
Concurrent Configuration Rebase during Commit	Introduced in this release on: Fixed Systems (8200, 8700); Centralized Systems (8600); Modular Systems (8800 [LC ASIC: Q100, Q200, P100]) The router performs the commit and rebase operations simultaneously, ensuring that the commit operation remains unblocked during the rebase operation. This removes the need to use the **cfs check** command to increase the commit count and the commit file diff size.
Performance Monitoring	Introduced in this release on: Fixed Systems (8200); Centralized Systems (8600); and Modular Systems (8800[LC ASIC: Q100, Q200, P100]) You can now get statistical information with Performance Monitoring in PTP networks, such as clock accuracy, synchronization status, and network delays by defining Performance Monitoring Parameters and Port Specific Parameters. This feature empowers operators with comprehensive performance monitoring and precise time-stamp analysis, offering enhanced granularity for time synchronization in telecommunication networks. By providing detailed insights, it enables operators to make well-informed decisions and take proactive actions to ensure optimal network performance. The feature introduces these changes: **CLI:** • **performance-monitoring** • **show ptp platform performance-counters** • **show ptp dataset performance** **YANG Data Models:** • `Cisco-IOS-XR-ptp-cfg.yang` • `Cisco-IOS-XR-ptp-oper.yang` • `Cisco-IOS-XR-um-ptp-cfg.yang` (see GitHub, YANG Data Models Navigator)
System Security	
MACsec Encryption on 8212-48FH-M	Introduced in this release on: Fixed Systems (8200) (select variants only*) MACsec, the Layer 2 encryption protocol, secures data on physical media and provides data integrity and confidentiality. *We now support MACsec encryption on all ports of 8212-48FH-M.
MACsec Encryption on 88-LC1-52Y8H-EM	Introduced in this release on: Modular Systems (8800 [LC ASIC: P100]) (select variants only*) MACsec, the Layer 2 encryption protocol, secures data on physical media and provides data integrity and confidentiality. *We now support MACsec encryption on all ports of 88-LC1-52Y8H-EM.
Timing and Synchronization	

Feature	Description
Precision Time Protocol (PTP) Support on Cisco 8711-32FH-M Routers	Introduced in this release on: Fixed Systems(8700)(select variants only*) Precision Time Protocol (PTP) is a protocol that defines a method to synchronize clocks in a network for networked measurement and control system. *This feature is supported on 8711-32FH-M. With this release, Cisco 8711-32FH-M routers support these PTP telecom profiles: • G.8265.1 - Fulfills specific frequency distribution requirements in telecom networks. • G.8273.2 - Allows distribution of time and phase synchronization for packet-based network. • G.8275.1 - Enables network element interoperability for the delivery of accurate phase and time synchronization. • G.8275.2 - This profile is used in telecom networks where phase or time-of-day synchronization is required.
Synchronous Ethernet (SyncE) Support on Cisco 8711-32FH-M Routers	Introduced in this release on: Fixed Systems(8700)(select variants only*) SyncE provides synchronization signals transmitted over the Ethernet physical layer to downstream devices, while the Synchronization Status Message (SSM) indicates the quality level of the transmitting clock to the neighboring nodes, informing the nodes about the level of the network's reliability. Ethernet Synchronization Message Channel (ESMC) is the logical channel that uses an Ethernet PDU (protocol data unit) to exchange SSM information over the SyncE link. *This feature is supported on 8711-32FH-M. With this release, the Cisco 8711-32FH-M routers support these SyncE ITU-T profiles: • G.8262 - Enables synchronous ethernet clock support. • G.8262.1 - Defines the timing characteristics of a synchronous equipment slave clock.
Global Navigation Satellite System Support on Cisco 8711-32FH-M Routers	Introduced in this release on: Fixed Systems(8700)(select variants only*); Global Navigation Satellite System (GNSS) is a satellite system used as a timing interface. GNSS receiver receives signals from GNSS satellites and decodes the information from multiple satellites to determine its distance from each satellite. Based on this data, the GNSS receiver identifies the location of each satellite. *This feature is supported on 8711-32FH-M.
PTP Support on 88-LC1-12TH24FH-E and 88-LC1-52Y8H-EM	Introduced in this release on: Modular Systems (8800 [LC ASIC: P100]) (select variants only*) Based on the IEEE 1588-2008 standard, Precision Time Protocol (PTP) is a protocol that defines a method to synchronize clocks in a network for networked measurement and control systems. *This feature is now supported on 88-LC1-12TH24FH-E and 88-LC1-52Y8H-EM line cards. With this release, 88-LC1-12TH24FH-E and 88-LC1-52Y8H-EM line cards support these PTP telecom profiles: • G.8273.2 • G.8275.1

Feature	Description
PTP on Cisco 8608 Router	Introduced in this release on: Centralized Systems (8600) Based on the IEEE 1588-2008 standard, Precision Time Protocol (PTP) is a protocol that defines a method to synchronize clocks in a network for networked measurement and control systems. With this release, support for PTP telecom profiles G.8265.1, G.8275.2 and BITs are extended to the following hardware modules: • 86-MPA-14H2FH-M • 86-MPA-24Z-M • 86-MPA-4FH-M • Cisco 8608 Router
Licensing	
Support for Smart Licensing using Policy on the line cards 88-LC1-12TH24FH-E, 88-LC1-36EH and 88-LC1-52Y8H-EM	Introduced in this release on: Modular Systems (8800 [LC ASIC: P100]) Cisco Smart Licensing Using Policy (SLP) is an enhancement to the existing Cisco Smart Licensing model. It streamlines the licensing process for Cisco IOS XR products by introducing a more flexible and automated approach. With SLP, you no longer need to register your device during installation, and there is no evaluation license state or period. This simplifies the licensing process and reduces complexity. To use SLP, your devices must establish trust and send the initial license usage report within 90 days. Support for Smart Licensing using Policy is now extended to the hardware: • 88-LC1-12TH24FH-E • 88-LC1-36EH • 88-LC1-52Y8H-EM
Support for Smart Licensing using Policy on the 8212-48FH-M and 8711-32FH-M	Introduced in this release on: Fixed Systems (8200, 8700) (select variants only*) Cisco Smart Licensing Using Policy (SLP) is an enhancement to the existing Cisco Smart Licensing model. It streamlines the licensing process for Cisco IOS XR products by introducing a more flexible and automated approach. With SLP, you no longer need to register your device during installation, and there is no evaluation license state or period. This simplifies the licensing process and reduces complexity. To use SLP, your devices must establish trust and send the initial license usage report within 90 days. *Support for Smart Licensing using Policy is now extended to the hardware: • 8212-48FH-M • 8711-32FH-M
Support for Smart Licensing using Policy on the Cisco 8608 Router	Introduced in this release on: Centralized Systems (8600) Cisco Smart Licensing Using Policy (SLP) is an enhancement to the existing Cisco Smart Licensing model. It streamlines the licensing process for Cisco IOS XR products by introducing a more flexible and automated approach. With SLP, you no longer need to register your device during installation, and there is no evaluation license state or period. This simplifies the licensing process and reduces complexity. To use SLP, your devices must establish trust and send the initial license usage report within 90 days. Support for Smart Licensing using Policy is now extended to the Cisco 8608 router.

Feature	Description
Support for Flexible Consumption Model (FCM) 2	Introduced in this release on: Fixed Systems (8200, 8700)(select variants only*); Centralized Systems (8600); Modular Systems (8800 [LC ASIC: P100]) The Flexible Consumption Model (FCM) provides the capability and flexibility to purchase software capacity as needed. This release introduces the FCM Model 2 that offers Essentials, Advantage, and Premier license suites. Premier license suite offers additional licenses that are required on top of Advantage licenses for high scale services. FCM Model 1 offers Essentials and Advantage license suites. *These Cisco 8000 router variants and line cards support FCM Model 2. • Cisco 8608 router • 8711-32FH-M router • 8212-48FH-M router • 88-LC1-36EH line card • 88-LC1-12TH24FH-E line card • 88-LC1-52Y8H-EM line card

YANG Data Models Introduced and Enhanced

This release introduces or enhances the following data models. For detailed information about the supported and unsupported sensor paths of all the data models, see the Github repository. To get a comprehensive list of the data models supported in a release, navigate to the Available-Content.md file for the release in the Github repository. The unsupported sensor paths are documented as deviations. For example, openconfig-acl.yang provides details about the supported sensor paths, whereas cisco-xr-openconfig-acl-deviations.yang provides the unsupported sensor paths for openconfig-acl.yang on Cisco IOS XR routers.

You can also view the data model definitions using the YANG Data Models Navigator tool. This GUI-based and easy-to-use tool helps you explore the nuances of the data model and view the dependencies between various containers in the model. You can view the list of models supported across Cisco IOS XR releases and platforms, locate a specific model, view the containers and their respective lists, leaves, and leaf lists presentedvisually in a tree structure.

Feature	Description
Programmability	
Cisco-IOS-XR-openconfig-system-fpd-ext.yang Version 0.1.0	This data model, an extension by Cisco to the existing openconfig-system data model, allows you to enable or disable FPD auto-upgrade for PSU firmware using these leaves: • *enable auto-upgrade* • *disable-upgrade*

Feature	Description
openconfig-platform.yang Version 0.24.0	The OpenConfig data model has been updated from version 0.22.0 to 0.24.0, introducing the following enhancements to the component container • Retrieve the fan speed data for optimal thermal management using the **fan-speed leaf** under the FAN component. This leaf enables dynamic adjustments and fan speed monitoring based on temperature readings within the device, ensuring the cooling system prevents overheating and maintains router's reliability and performance. • Monitor temperature-related information such as maximum temperature, minimum temperature, average temperature, and alarm status for the transceiver component using the temperature container and its associated leaves. The leaves under the temperature container are: • instant • avg • min • max • interval • min-time • max-time • alarm-status • alarm-threshold • alarm-severity
openconfig-keychain.yang Version 0.4.0	Cisco IOS-XR now supports the openconfig-keychain.yang data model, version 0.4.0, offering a standardized method for key management on network devices. This model introduces a keychain container for managing cryptographic keys, each with defined lifetimes and algorithms. Keys with a key-id string containing any characters from [a-fA-F] are considered MACsec keys and keys with a key-id as an integer are treated as NON-MACsec keys. The key-chains container from the previous version has been removed.

Feature	Description
openconfig-macsec.yang Version 1.0.0	Cisco IOS-XR now supports the openconfig-keychain.yang data model, version 0.4.0. This model provides a standardized approach to key management on network devices by introducing a keychain container for managing cryptographic keys, each with specified lifetimes and algorithms. Key Identification - Keys are identified based on the key-id string: • MACsec Keys: Keys with a key-id string containing any characters from [a-fA-F]. • NON-MACsec Keys: Keys with a key-id as an integer. MACsec Key Requirements - For MACsec keys, the secret-key/key-string must adhere to the following requirements: • 32 Hex Characters: Automatically maps to the AES-128-CMAC cryptographic algorithm in the native model. • 64 Hex Characters: Automatically maps to the AES-256-CMAC cryptographic algorithm. This mapping is assumed because the openconfig-keychain model does not include AES-128-CMAC and AES-256-CMAC crypto-type enums.

openconfig-isis.yang Version 1.6.0	The openconfig-isis.yang data model has been updated to version 1.6.0. The model now supports additional isis configuration paths, that includes:
	• Enabling or disabling the protocol - /config/enabled
	• Configuring graceful restart as helper-only - /global/graceful-restart/config/helper-only
	• Enabling or disabling address families - /global/afi-safi/af/config/enabled
	• Enabling or disabling authentication at different levels:
	  • /levels/level/authentication/config/enabled
	  • /interfaces/interface/authentication/config/enabled
	  • /interfaces/interface/levels/level/hello-authentication/config/enabled
	• Reference configuration for interfaces and subinterfaces:
	  • /interfaces/interface/interface-ref/config/interface
	  • /interfaces/interface/interface-ref/config/subinterface

Feature	Description
opeconfig-lacp.yang version 2.0.0	The openconfig-lacp.yang data model has been updated to version 2.0.0. • The model now supports Enhanced Data Telemetry (EDT) for the on-change telemetry mode for the LACP interface leaf. This enables access to bundle member data such as interface, state, and counters. Updates, creations, or deletions of bundle members trigger telemetry events. The path supported is: **/lacp/interfaces/interface/members/member/interface** • The model now includes support for the **forwarding-viable** leaf, ensuring the parent bundle interface remains up even if all members are marked as forwarding unviable. This update prevents data plane traffic while allowing packet injection and maintaining ingress traffic flow during the drain process. The supported path is: **/interfaces/interface/config/forwarding-viable**.
openconfig-if-ip.yang Version 3.5.0	The openconfig-if-ip.yang data model has been updated to version 3.5.0 for Interfaces. The new address/state/type leaf allows you to set both link-local and regular addresses. If you explicitly configure the LINK_LOCAL address, then in the GET request and telemetry, the configured LINK_LOCAL address details are populated. However, if you explicitly did not configure the LINK_LOCAL address then the default LINK_LOCAL address details are populated.
openconfig-transport-types.yang Version 0.21.0	The OpenConfig data model is revised from version 0.18.1 to 0.21.0. to introduce the following new types corresponding to form factor: • QSFP-56 • QSFPDD-56 • SFP-56 • SFP-DD • QSFP28-DD • CSFP

Feature	Description
openconfig-system.yang Version 0.17.1	The OpenConfig data model is revised from version 0.16.1 to 0.17.1, introducing two new leaves in the NTP container: • network-instance: The network instance used to locate this server. • source-address: The source address to use on outgoing NTP packets. In the current OpenConfig system hierarchy, the NTP server or peer's IP address is the container, with the network instance as its leaf. Therefore, this feature comes with the following restrictions: • The open-config model does not support multiple VRFs on the same NTP server or peer IP address. • The address and network-instance tags are mandatory for creating, updating, merging, or replacing an NTP server or peer with a non-default VRF. Replacing the NTP server or peer for a non-default network instance is not supported. • Users must clear NTP configurations with non-default VRFs before downgrading to another XR SW release due to the inverted OC hierarchy. Due to these limitations, we recommend using the corresponding CLI commands for the NTP functionalities.
Cisco-IOS-XR-ztp-cfg.yang	The Cisco-IOS-XR-ztp-cfg data model is revised from version 1.0.0 to 1.1.0. This model now supports the Bootz server configuration CLI for dynamically inserted standby cards or line cards.
Cisco-IOS-XR-ptp-cfg.yang	The Cisco-IOS-XR-ptp-cfg.yang data model has been updated to version 3.2.0 for Interfaces. The new virtual port gm-threshold-breach leaf allows you to configure the value at which a bi-state alarm is triggered when the virtual port Time of Day (ToD) offset from the TimeTransmitter exceeds the threshold in nanoseconds.
Cisco-IOS-XR-um-ptp-cfg.yang	The Cisco-IOS-XR-um-ptp-cfg.yang data model has been updated to version 2.0.0 for Interfaces. The model now supports container performance-monitoring that allows you to enable performance-monitoring globally.
Cisco-IOS-XR-ptp-oper.yang	The Cisco-IOS-XR-ptp-oper.yang data model has been updated to version 2.3.0. The container performance-monitoring-dses and container performance-monitoring-port-dses, allows you to collect PTP performance monitor statistics for the full dataset and this is the only way to access records for ports.

Feature	Description
Cisco-IOS-XR-um-cont-optics-fec-threshold-cfg.yang	This Unified Yang data model is enhanced for existing *Media* container with the addition of new containers *link-down* and *prefec-degrade* for enabling Media linkdown preFEC degrade.
Cisco-IOS-XR-controller-optics-oper.yang	The Cisco-IOS-XR-controller-optics-oper yang data model is enhanced with *media-linkdown-prefec-degrade* leaf to identify if the Media linkdown preFEC degrade has been enabled or not.
Cisco-IOS-XR-qos-ma-oper.yang	This native data model is modified to add support to configure QoS on pseudowire headend (PWHE) interfaces and subinterfaces.

Hardware Introduced

For a complete list of supported hardware and ordering information, see the Cisco 8000 Series Data Sheet.

Hardware	Description
Cisco 8711-32FH-M	The Cisco 8711-32FH-M router offers 12.8 Tbps of network bandwidth. This P100 silicon chip-based fixed-port router fits into a 1 RU form factor and features 32 QSFP56-DD 400GbE ports. The Cisco 8711-32FH-M router includes HBM/2.5D for advanced performance, and supports Cisco 400GbE Digital Coherent Optical Modules on all the ports.
PSU3KW-DCPI Power Supply Unit for the Cisco 8202-32FH-M and Cisco 8212-48FH-M Routers	We are now introducing a high wattage direct current (DC) power supply unit, PSU3KW-DCPI, that accepts DC power to operate the Cisco 8202-32FH-M and Cisco 8212-48FH-M routers in the port side intake configuration. The PSU3KW-DCPI power supply unit has a maximum power of 3000 watts. The benefits of the PSU3KW-DCPI power supply unit are: • Supports DC input power. It usually supports a wide range of input voltages, often from -40V to -72V DC, making it suitable for use in different regions and environments. • Helps when transceivers are installed in the router which needs more power to operate • Provides better efficiency for power distribution
Cisco 8212-48FH-M Router	The Cisco 8212-48FH-M Router offers 19.2 Tbps of network bandwidth, enhancing data throughput significantly. This high-density, P100 silicon chip-based fixed-port router fits into a 2 RU form factor and features 24 QSFP56-DD ports and 24 QSFP-DD800 ports. It includes HBM/2.5D and MACsec for advanced security and performance.

Hardware	Description

88-LC1-52Y8H-EM Line Card based on P100 Silicon Chip	This release introduces the P100 silicon chip-based 88-LC1-52Y8H-EM line card with these highlights:
	• Sixty-four ports provide an overall throughput of 3.7 Tbps -
	  • Fifty-two ports of 10/25GbE using SFP+/SFP28 optics
	  • Eight ports of 40/100GbE using QSFP+/QSFP28 optics
	  • Four ports of 400GbE using QSFP+/QSFP28/QSFP56-DD optics; supports 400GbE, 4x100GbE, 2x100GbE, 100GbE, and 40GbE
	• PTP Timing with Class C performance
	• Supports MACsec on port speed at line rate
	The 88-LC1-52Y8H-EM line card is supported on Cisco 8808 modular chassis with 8800-RP2 route processors and 8808-FC1 fabric cards.
	For more information on this line card, see the Cisco 8000 Series Routers Data Sheet.

88-LC1-12TH24FH-E Line Card based on P100 Silicon Chip	This release introduces the P100 silicon chip-based 88-LC1-12TH24FH-E Line Card with these highlights:
	• Thirty-six ports provide an overall throughput of 12 Tbps -
	  • Twelve ports of 200GbE using QSFP+/QSFP28/QSFP28-DD/QSFP56-DD optics; supports 40GbE, 100GbE, 2x100GbE and 200GbE
	  • Twenty-four ports of 400GbE using QSFP+/QSFP28/QSFP28-DD/QSFP56-DD optics; supports 40GbE, 100GbE, 2x100GbE, 200GbE, 4x100GbE and 400GbE
	• PTP Timing with Class C performance
	The 88-LC1-12TH24FH-E Line Card is supported on Cisco 8808 modular chassis with 8800-RP2 route processors and 8808-FC1 fabric cards.
	For more information on this line card, see the Cisco 8000 Series Routers Data Sheet.

Optics	This release launches the following new optics on selective hardware within the product portfolio. For details refer to the Transceiver Module Group (TMG) Compatibility Matrix. Cisco 400GBASE Quad Small Form-Factor Pluggable Double Density (QSFP-DD) • DP04QSDD-ER1 Cisco 100GBASE Quad Small Form-Factor Pluggable Double Density (QSFP-DD) • DP01QSDD-ZF1

Release 24.3.1 Packages

The Cisco IOS XR software is composed of a base image (ISO) that provides the XR infrastructure. The ISO image is made up of a set of packages (also called RPMs). These packages are of three types:

- A mandatory package that is included in the ISO

- An optional package that is included in the ISO
- An optional package that is not included in the ISO

Visit the Cisco Software Download page to download the Cisco IOS XR software images.

To determine the Cisco IOS XR Software packages installed on your router, log in to the router and enter the **show install active** command:

```
RP/0/RP0/CPU0#show install active
Xr Package                                                    Version
------------------------------------------------- ----------------------------
xr-8000-af-ea                                                 24.3.1v1.0.0-1
xr-8000-aib                                                   24.3.1v1.0.0-1
xr-8000-bfd                                                   24.3.1v1.0.0-1
xr-8000-buffhdr-ea                                            24.3.1v1.0.0-1
xr-8000-bundles                                               24.3.1v1.0.0-1
xr-8000-card-support                                          24.3.1v1.0.0-1
xr-8000-cdp-ea                                                24.3.1v1.0.0-1
xr-8000-cem-driver                                            24.3.1v1.0.0-1
xr-8000-cfm                                                   24.3.1v1.0.0-1
xr-8000-common-otn                                            24.3.1v1.0.0-1
xr-8000-core                                                  24.3.1v1.0.0-1
xr-8000-cpa                                                   24.3.1v1.0.0-1
xr-8000-cpa-devobj-gnss                                       24.3.1v1.0.0-1
xr-8000-cpa-devobj-misc                                       24.3.1v1.0.0-1
xr-8000-cpa-driver-fpgalib-kmod-oe                            24.3.1v1.0.0-1
xr-8000-cpa-npu                                               24.3.1v1.0.0-1
xr-8000-cpa-sb-data                                           24.3.1v1.0.0-1
xr-8000-dot1x                                                 24.3.1v1.0.0-1
xr-8000-dsm                                                   24.3.1v1.0.0-1
xr-8000-dyinggasp-pd                                          24.3.1v1.0.0-1
xr-8000-edpl                                                  24.3.1v1.0.0-1
xr-8000-encap-id                                              24.3.1v1.0.0-1
xr-8000-ether-ea                                              24.3.1v1.0.0-1
xr-8000-fabric                                                24.3.1v1.0.0-1
xr-8000-feat-mgr                                              24.3.1v1.0.0-1
xr-8000-fib-ea                                                24.3.1v1.0.0-1
xr-8000-forwarder                                             24.3.1v1.0.0-1
xr-8000-fpd                                                   24.3.1v1.0.0-1
xr-8000-fwd-tools                                             24.3.1v1.0.0-1
xr-8000-fwdlib                                                24.3.1v1.0.0-1
xr-8000-gil-ea                                                24.3.1v1.0.0-1
xr-8000-host-core                                             24.3.1v1.0.0-1
xr-8000-hw-resmon                                             24.3.1v1.0.0-1
xr-8000-l2fib                                                 24.3.1v1.0.0-1
xr-8000-l2mcast                                               24.3.1v1.0.0-1
xr-8000-leabaofa                                              24.3.1v1.0.0-1
xr-8000-libofaasync                                           24.3.1v1.0.0-1
xr-8000-lpts-ea                                               24.3.1v1.0.0-1
xr-8000-mcast                                                 24.3.1v1.0.0-1
xr-8000-netflow                                               24.3.1v1.0.0-1
xr-8000-npu                                                   24.3.1v1.0.0-1
xr-8000-oam                                                   24.3.1v1.0.0-1
xr-8000-optics                                                24.3.1v1.0.0-1
xr-8000-os-oe                                                 24.3.1v1.0.0-1
xr-8000-os-oe-extra                                           24.3.1v1.0.0-1
xr-8000-pbr                                                   24.3.1v1.0.0-1
xr-8000-pd-port-mode                                          24.3.1v1.0.0-1
xr-8000-pfilter                                               24.3.1v1.0.0-1
xr-8000-pidb                                                  24.3.1v1.0.0-1
xr-8000-pktio                                                 24.3.1v1.0.0-1
xr-8000-ple-sdk                                               24.3.1v1.0.0-1
xr-8000-pm                                                    24.3.1v1.0.0-1
```

xr-8000-port-mapper	24.3.1v1.0.0-1
xr-8000-ppinfo	24.3.1v1.0.0-1
xr-8000-pwhe-ea	24.3.1v1.0.0-1
xr-8000-qos-ea	24.3.1v1.0.0-1
xr-8000-ras	24.3.1v1.0.0-1
xr-8000-sat	24.3.1v1.0.0-1
xr-8000-span	24.3.1v1.0.0-1
xr-8000-spio	24.3.1v1.0.0-1
xr-8000-spp-ea	24.3.1v1.0.0-1
xr-8000-timing	24.3.1v1.0.0-1
xr-8000-tunnel-ip	24.3.1v1.0.0-1
xr-8000-utapp-blaze	24.3.1v1.0.0-1
xr-8000-vether	24.3.1v1.0.0-1
xr-8000-ztp-ea	24.3.1v1.0.0-1
xr-aaa	24.3.1v1.0.0-1
xr-acl	24.3.1v1.0.0-1
xr-apphosting	24.3.1v1.0.0-1
xr-appmgr	24.3.1v1.0.0-1
xr-bcdl	24.3.1v1.0.0-1
xr-bfd	24.3.1v1.0.0-1
xr-bgp	24.3.1v1.0.0-1
xr-bgputil	24.3.1v1.0.0-1
xr-bng-stubs	24.3.1v1.0.0-1
xr-bundles	24.3.1v1.0.0-1
xr-cal-pi	24.3.1v1.0.0-1
xr-cds	24.3.1v1.0.0-1
xr-cfgmgr	24.3.1v1.0.0-1
xr-cfm	24.3.1v1.0.0-1
xr-cofo	24.3.1v1.0.0-1
xr-core	24.3.1v1.0.0-1
xr-core-calv	24.3.1v1.0.0-1
xr-cpa-common	24.3.1v1.0.0-1
xr-cpa-common-optics	24.3.1v1.0.0-1
xr-cpa-common-psu	24.3.1v1.0.0-1
xr-cpa-driver-devobj-misc	24.3.1v1.0.0-1
xr-cpa-driver-devobj-npu	24.3.1v1.0.0-1
xr-cpa-driver-devobj-phy	24.3.1v1.0.0-1
xr-cpa-driver-devobj-sensors	24.3.1v1.0.0-1
xr-cpa-driver-devobj-storage	24.3.1v1.0.0-1
xr-cpa-driver-devobj-test	24.3.1v1.0.0-1
xr-cpa-driver-devobj-timing	24.3.1v1.0.0-1
xr-cpa-driver-fpgalib-access	24.3.1v1.0.0-1
xr-cpa-driver-fpgalib-common	24.3.1v1.0.0-1
xr-cpa-driver-fpgalib-infra	24.3.1v1.0.0-1
xr-cpa-driver-fpgalib-misc	24.3.1v1.0.0-1
xr-cpa-driver-fpgalib-optics	24.3.1v1.0.0-1
xr-cpa-driver-optics	24.3.1v1.0.0-1
xr-cpa-ethsw	24.3.1v1.0.0-1
xr-cpa-idprom	24.3.1v1.0.0-1
xr-cpa-tamlib	24.3.1v1.0.0-1
xr-ctc	24.3.1v1.0.0-1
xr-debug	24.3.1v1.0.0-1
xr-dhcp	24.3.1v1.0.0-1
xr-diags	24.3.1v1.0.0-1
xr-diskboot	24.3.1v1.0.0-1
xr-drivers	24.3.1v1.0.0-1
xr-edpl	24.3.1v1.0.0-1
xr-eem	24.3.1v1.0.0-1
xr-elmi-stubs	24.3.1v1.0.0-1
xr-ema	24.3.1v1.0.0-1
xr-enhancedmanageability	24.3.1v1.0.0-1
xr-erp	24.3.1v1.0.0-1
xr-featurecapability	24.3.1v1.0.0-1
xr-fib	24.3.1v1.0.0-1

xr-filesysinv	24.3.1v1.0.0-1
xr-foundation-8000	24.3.1v1.0.0-1
xr-fpd	24.3.1v1.0.0-1
xr-gil	24.3.1v1.0.0-1
xr-ha-infra	24.3.1v1.0.0-1
xr-host-core	24.3.1v1.0.0-1
xr-httpclient	24.3.1v1.0.0-1
xr-icpe-eth	24.3.1v1.0.0-1
xr-icpe-opt	24.3.1v1.0.0-1
xr-identifier	24.3.1v1.0.0-1
xr-infra-sla	24.3.1v1.0.0-1
xr-install	24.3.1v1.0.0-1
xr-ip-apps	24.3.1v1.0.0-1
xr-ip-core	24.3.1v1.0.0-1
xr-ip-infra-vrf	24.3.1v1.0.0-1
xr-ip-mibs	24.3.1v1.0.0-1
xr-ip-static	24.3.1v1.0.0-1
xr-ipc	24.3.1v1.0.0-1
xr-ipsla	24.3.1v1.0.0-1
xr-is-is	24.3.1v1.0.0-1
xr-l2snooptransport	24.3.1v1.0.0-1
xr-l2vpn	24.3.1v1.0.0-1
xr-ldp	24.3.1v1.0.0-1
xr-licensing	24.3.1v1.0.0-1
xr-link-oam	24.3.1v1.0.0-1
xr-linuxnetworking	24.3.1v1.0.0-1
xr-linuxsecurity	24.3.1v1.0.0-1
xr-lldp	24.3.1v1.0.0-1
xr-lpts	24.3.1v1.0.0-1
xr-manageabilityxml	24.3.1v1.0.0-1
xr-mandatory	24.3.1v1.0.0-1
xr-mcast	24.3.1v1.0.0-1
xr-mcastl2snoop	24.3.1v1.0.0-1
xr-mda	24.3.1v1.0.0-1
xr-mpls	24.3.1v1.0.0-1
xr-mpls-oam	24.3.1v1.0.0-1
xr-mpls-oam-client	24.3.1v1.0.0-1
xr-mpls-static	24.3.1v1.0.0-1
xr-netflow	24.3.1v1.0.0-1
xr-networkboot	24.3.1v1.0.0-1
xr-nosi	24.3.1v1.0.0-1
xr-ntp	24.3.1v1.0.0-1
xr-ofa	24.3.1v1.0.0-1
xr-optics	24.3.1v1.0.0-1
xr-orrspf	24.3.1v1.0.0-1
xr-os-oe-apps	24.3.1v1.0.0-1
xr-os-oe-core	24.3.1v1.0.0-1
xr-os-oe-docker	24.3.1v1.0.0-1
xr-os-oe-hardware	24.3.1v1.0.0-1
xr-ospf	24.3.1v1.0.0-1
xr-p4rt	24.3.1v1.0.0-1
xr-perf-meas	24.3.1v1.0.0-1
xr-perfmgmt	24.3.1v1.0.0-1
xr-pfi	24.3.1v1.0.0-1
xr-pird-stubs	24.3.1v1.0.0-1
xr-pkt-trace	24.3.1v1.0.0-1
xr-pm-alarm	24.3.1v1.0.0-1
xr-portmode	24.3.1v1.0.0-1
xr-procmgr	24.3.1v1.0.0-1
xr-python	24.3.1v1.0.0-1
xr-qos	24.3.1v1.0.0-1
xr-rid-mgr	24.3.1v1.0.0-1
xr-routing	24.3.1v1.0.0-1
xr-rpl	24.3.1v1.0.0-1

```
xr-rsvp-te                                    24.3.1v1.0.0-1
xr-sanitizer-tools                            24.3.1v1.0.0-1
xr-security                                   24.3.1v1.0.0-1
xr-security-tams                              24.3.1v1.0.0-1
xr-secy-driver                                24.3.1v1.0.0-1
xr-servicelayer                               24.3.1v1.0.0-1
xr-snmp                                       24.3.1v1.0.0-1
xr-snmp-hw                                    24.3.1v1.0.0-1
xr-span                                       24.3.1v1.0.0-1
xr-spi-core                                   24.3.1v1.0.0-1
xr-spi-hw                                     24.3.1v1.0.0-1
xr-spp                                        24.3.1v1.0.0-1
xr-sr                                         24.3.1v1.0.0-1
xr-stats                                      24.3.1v1.0.0-1
xr-stp                                        24.3.1v1.0.0-1
xr-stubs                                      24.3.1v1.0.0-1
xr-sysdb                                      24.3.1v1.0.0-1
xr-syslog                                     24.3.1v1.0.0-1
xr-telemetry                                  24.3.1v1.0.0-1
xr-timing                                     24.3.1v1.0.0-1
xr-tmpdir-cleanup                             24.3.1v1.0.0-1
xr-track                                      24.3.1v1.0.0-1
xr-transports                                 24.3.1v1.0.0-1
xr-tty                                        24.3.1v1.0.0-1
xr-tunnel-ip                                  24.3.1v1.0.0-1
xr-tunnel-nve                                 24.3.1v1.0.0-1
xr-upgradematrix                              24.3.1v1.0.0-1
xr-utils                                      24.3.1v1.0.0-1
xr-vether                                     24.3.1v1.0.0-1
xr-vpnmib                                     24.3.1v1.0.0-1
xr-xmlinfra                                   24.3.1v1.0.0-1
xr-xrlibcurl                                  24.3.1v1.0.0-1
xr-ztp                                        24.3.1v1.0.0-1
```

To know about all the RPMs installed including XR, OS and other components use the **show install active all** command.

The software modularity approach provides a flexible model that allows you to install a subset of IOS XR packages on devices based on your individual requirements. All critical components are modularized as packages so that you can select the features that you want to run on your router.

Note The above show command output displays mandatory packages that are installed on the router. To view the optional and bug fix RPM packages, first install the package and use the **show install active summary** command.

Caveats

Table 1: Cisco 8000 Series Router Specific Bugs

Bug ID	Headline
CSCwk73534	OC terminal-device target-output-power units/definition interpretation is wrong
CSCwk89298	P100 - Policer drops traffic in the non congestion scenario
CSCwm02405	P100 - Reduction in ingress policy-map scale

Bug ID	Headline
CSCwk84795	SRTE with autoroute - After adding policy ISIS routes flapping between ISIS and SRTE
CSCwe96625	DSCP/PREC bits are not preserved after applying egress marking policy-map - P100 ASIC
CSCwj32566	Multicast shaper not working for P100 ASIC based line cards and routers

Behavior Changes

- The **hw-module multicast route scale** command is supported only on modular systems and not on fixed/centralized systems.
- Two new MPLS OAM commands, **address-family ipv4 reply** and **address-family ipv6 reply**,are implemented in Cisco IOS XR Release 24.3.1. Use the keyword **ip-header-source** in either of these commands if an explicit source IP is required in the MPLS OAM reply packets when route policies block packets with non-routed source addresses. By default, the MPLS OAM packets use the local interface address as the source.
- Starting from Cisco IOS XR Release 24.3.1, the **reverse** keyword in **show reboot** command is deprecated and will not be supported in future releases. Hence the **show reboot history reverse location** command is also not supported.

Determine Software Version

Log in to the router and enter the **show version** command:

```
RP/0/RP0/CPU0# show version
Cisco IOS XR Software, Version 24.3.1 LNT
Copyright (c) 2013-2024 by Cisco Systems, Inc.

Build Information:
 Built By     : cisco
 Built On     : Sun Sep 01 03:41:27 UTC 2024
 Build Host   : iox-ucs-003
 Workspace    : /auto/srcarchive11/prod/24.3.1/8000-aarch64/ws/
 Version      : 24.3.1
 Label        : 24.3.1

cisco 8000 (CN9130H board )
cisco 8011-4G24Y4H-I (CN9130H board ) processor with 16GB of memory
8000-aarch64 uptime is 19 minutes
Cisco 8011 Series Fixed 1RU Router 4x100G, 24x1/10/25G, 4xCu
```

Determine Firmware Support

Log in to the router and enter **show fpd package** command:

Cisco 8200 Series Router

```
RP/0/RP0/CPU0# show fpd package
                      Field Programmable Device Package
```

Card Type	FPD Description	Req Reload	SW Ver	Min Req SW Ver	Min Req Board Ver
8201	Bios	YES	1.36	1.36	0.0
	BiosGolden	YES	1.36	1.15	0.0
	IoFpga	YES	1.11	1.11	0.1
	IoFpgaGolden	YES	1.11	0.48	0.1
	SsdIntelS3520	YES	1.21	1.21	0.0
	SsdIntelS4510	YES	11.32	11.32	0.0
	ssdIntelS4520	YES	1.11	1.11	0.0
	SsdMicron5100	YES	7.01	7.01	0.0
	SsdMicron5300	YES	0.01	0.01	0.0
	x86Fpga	YES	1.06	1.06	0.0
	x86FpgaGolden	YES	1.06	0.48	0.0
	x86TamFw	YES	5.13	5.13	0.0
	x86TamFwGolden	YES	5.13	5.05	0.0
8201-ON	Bios	YES	1.208	1.208	0.0
	BiosGolden	YES	1.208	1.207	0.0
	IoFpga	YES	1.11	1.11	0.1
	IoFpgaGolden	YES	1.11	0.48	0.1
	SsdIntelS3520	YES	1.21	1.21	0.0
	SsdIntelS4510	YES	11.32	11.32	0.0
	ssdIntelS4520	YES	1.11	1.11	0.0
	SsdMicron5100	YES	7.01	7.01	0.0
	SsdMicron5300	YES	0.01	0.01	0.0
	x86Fpga	YES	1.06	1.06	0.0
	x86FpgaGolden	YES	1.06	0.48	0.0
	x86TamFw	YES	5.13	5.13	0.0
	x86TamFwGolden	YES	5.13	5.05	0.0
8201-SYS	Bios	YES	1.36	1.36	0.0
	BiosGolden	YES	1.36	1.15	0.0
	IoFpga	YES	1.11	1.11	0.1
	IoFpgaGolden	YES	1.11	0.48	0.1
	SsdIntelS3520	YES	1.21	1.21	0.0
	SsdIntelS4510	YES	11.32	11.32	0.0
	ssdIntelS4520	YES	1.11	1.11	0.0
	SsdMicron5100	YES	7.01	7.01	0.0
	SsdMicron5300	YES	0.01	0.01	0.0
	x86Fpga	YES	1.06	1.06	0.0
	x86FpgaGolden	YES	1.06	0.48	0.0
	x86TamFw	YES	5.13	5.13	0.0
	x86TamFwGolden	YES	5.13	5.05	0.0
8201-SYS-ON	Bios	YES	1.208	1.208	0.0
	BiosGolden	YES	1.208	1.207	0.0
	IoFpga	YES	1.11	1.11	0.1
	IoFpgaGolden	YES	1.11	0.48	0.1
	SsdIntelS3520	YES	1.21	1.21	0.0
	SsdIntelS4510	YES	11.32	11.32	0.0
	ssdIntelS4520	YES	1.11	1.11	0.0
	SsdMicron5100	YES	7.01	7.01	0.0
	SsdMicron5300	YES	0.01	0.01	0.0
	x86Fpga	YES	1.06	1.06	0.0
	x86FpgaGolden	YES	1.06	0.48	0.0
	x86TamFw	YES	5.13	5.13	0.0
	x86TamFwGolden	YES	5.13	5.05	0.0
PSU1.4KW-ACPE	DT-PrimMCU	NO	3.01	3.01	0.0
	DT-SecMCU	NO	2.02	2.02	0.0
	QC-PrimMCU	NO	1.00	1.00	0.0

```
                    QC-SecMCU                NO      1.00      1.00      0.0
--------------------------------------------------------------------------------
PSU1.4KW-ACPI       DT-PrimMCU               NO      3.01      3.01      0.0
                    DT-SecMCU                NO      2.02      2.02      0.0
                    QC-PrimMCU               NO      1.00      1.00      0.0
                    QC-SecMCU                NO      1.00      1.00      0.0
--------------------------------------------------------------------------------
PSU2KW-ACPE         PO-PrimMCU               NO      1.03      1.03      0.0
                    PO-SecMCU                NO      1.06      1.06      0.0
                    QC-PrimMCU               NO      1.01      1.01      0.0
                    QC-SecMCU                NO      1.04      1.04      0.0
--------------------------------------------------------------------------------
PSU2KW-ACPI         PO-PrimMCU               NO      1.03      1.03      0.0
                    PO-SecMCU                NO      1.08      1.08      0.0
                    QC-PrimMCU               NO      1.01      1.01      0.0
                    QC-SecMCU                NO      3.02      3.01      0.0
--------------------------------------------------------------------------------
PSU2KW-DCPE         PO-PrimMCU               NO      1.07      1.07      0.0
--------------------------------------------------------------------------------
PSU2KW-DCPI         PO-PrimMCU               NO      1.07      1.07      0.0
                    QC-PrimMCU               NO      1.00      1.00      0.0
                    QC-SecMCU                NO      1.00      1.00      0.0
--------------------------------------------------------------------------------
PSU2KW-HVPI         PO-PrimMCU               NO      1.09      1.09      0.0
                    PO-SecMCU                NO      1.10      1.10      0.0
```

Cisco 8600 Series Router

```
RP/0/RP0/CPU0# show fpd package
                   Field Programmable Device Package
              ================================================

                                                Req     SW      Min Req   Min Req
Card Type           FPD Description             Reload  Ver     SW Ver  Board Ver
================== ========================== ====== ======= ======== =========
--------------------------------------------------------------------------------
86-3.2KW-AC         EM-LogicMCU                NO      0.10      0.10      0.0
                    EM-PrimMCU                 NO      0.02      0.02      0.0
                    EM-SecMCU                  NO      0.02      0.02      0.0
--------------------------------------------------------------------------------
86-3.2KW-DC         EM-LogicMCU                NO      0.11      0.11      0.0
                    EM-PrimMCU                 NO      0.04      0.04      0.0
                    EM-SecMCU                  NO      0.04      0.04      0.0
--------------------------------------------------------------------------------
86-MPA-14H2FH-M     IoFpga                     YES     1.05      1.05      0.1
                    IoFpgaGolden               NO      1.05      1.00      0.1
--------------------------------------------------------------------------------
86-MPA-24Z-M        IoFpga                     YES     1.05      1.05      0.1
                    IoFpgaGolden               NO      1.05      1.00      0.1
--------------------------------------------------------------------------------
86-MPA-4FH-M        IoFpga                     YES     1.05      1.05      0.1
                    IoFpgaGolden               NO      1.05      1.00      0.1
--------------------------------------------------------------------------------
8608-FS[FB]         IoFpga                     NO      1.11      1.11      0.2
                    IoFpgaGolden               NO      1.11      1.00      0.2
--------------------------------------------------------------------------------
8608-RP             Bios                       YES     1.20      1.20      0.0
                    BiosGolden                 YES     1.20      1.01      0.0
                    IoFpga                     YES     1.10      1.10      0.0
                    IoFpgaGolden               NO      1.10      1.01      0.0
                    SsdMicron7300M2            YES     2.60      2.60      0.0
                    SsdMicron7450M2            YES    11.00     11.00      0.0
                    SsdSRMP8N2                 YES    14.38     14.38      0.0
```

```
                    x86Fpga                   YES     1.07      1.07      0.0
                    x86FpgaGolden             YES     1.07      1.07      0.0
                    x86TamFw                  YES     7.12      7.12      0.0
                    x86TamFwGolden            YES     7.12      7.12      0.0
--------------------------------------------------------------------------------
8608-SC0-128        IoFpga                    YES     1.01      1.01      0.0
                    IoFpgaGolden              YES     1.01      1.01      0.0
--------------------------------------------------------------------------------
8608-SC0-128[FB]    IoFpga                    NO      1.11      1.11      0.2
                    IoFpgaGolden              NO      1.11      1.00      0.2
--------------------------------------------------------------------------------
PSU4.3KW-HVPI       DT-LogicMCU               NO      2.05      2.05      0.0
                    DT-PrimMCU                NO      1.08      1.08      0.0
                    DT-SecMCU                 NO      1.08      1.08      0.0
```

Cisco 8700 Series Router

```
RP/0/RP0/CPU0# show fpd package
               Field Programmable Device Package
          ================================================
                                           Req     SW      Min Req   Min Req
Card Type           FPD Description        Reload  Ver     SW Ver  Board Ver
=================== ====================== ======= ======= ======== =========
--------------------------------------------------------------------------------
8711-32FH-M         Bios                   YES     5.05      5.05      0.0
                    BiosGolden             YES     5.05      5.05      0.0
                    IoFpga                 YES     1.09      1.09      0.0
                    IoFpgaGolden           YES     1.09      1.09      0.0
                    x86Fpga                YES     2.11      2.11      0.0
                    x86FpgaGolden          YES     2.11      2.11      0.0
                    x86TamFw               YES     9.07      9.07      0.0
                    x86TamFwGolden         YES     9.07      9.07      0.0
--------------------------------------------------------------------------------
8711-32FH-M[FB]     IoFpga                 NO      1.10      1.10      0.0
                    IoFpgaGolden           NO      1.10      1.00      0.0
--------------------------------------------------------------------------------
PSU2KW-ACPE         PO-PrimMCU             NO      1.03      1.03      0.0
                    PO-SecMCU              NO      1.06      1.06      0.0
                    QC-PrimMCU             NO      1.01      1.01      0.0
                    QC-SecMCU              NO      1.04      1.04      0.0
--------------------------------------------------------------------------------
PSU2KW-ACPI         PO-PrimMCU             NO      1.03      1.03      0.0
                    PO-SecMCU              NO      1.08      1.08      0.0
                    QC-PrimMCU             NO      1.01      1.01      0.0
                    QC-SecMCU              NO      3.02      3.01      0.0
--------------------------------------------------------------------------------
PSU2KW-DCPE         PO-PrimMCU             NO      1.07      1.07      0.0
--------------------------------------------------------------------------------
PSU2KW-DCPI         PO-PrimMCU             NO      1.07      1.07      0.0
                    QC-PrimMCU             NO      1.00      1.00      0.0
                    QC-SecMCU              NO      1.00      1.00      0.0
```

Cisco 8800 Series Router

```
RP/0/RP0/CPU0# show fpd package
                    Field Programmable Device Package
               ================================================
                                           Req     SW      Min Req   Min Req
Card Type           FPD Description        Reload  Ver     SW Ver  Board Ver
=================== ====================== ======= ======= ======== =========
--------------------------------------------------------------------------------
```

88-LC0-34H14FH	Bios	YES	1.21	1.21	0.0
	BiosGolden	YES	1.21	0.13	0.0
	EthSwitch	YES	1.05	1.05	0.0
	EthSwitchGolden	YES	1.05	0.07	0.0
	IoFpga	YES	1.09	1.09	0.1
	IoFpgaGolden	YES	1.09	1.01	0.1
	SsdIntelS3520	YES	1.21	1.21	0.0
	SsdIntelS4510	YES	11.32	11.32	0.0
	ssdIntelS4520	YES	1.11	1.11	0.0
	SsdMicron5100	YES	7.01	7.01	0.0
	SsdMicron5300	YES	0.01	0.01	0.0
	x86Fpga	YES	0.97	0.97	0.1
	x86FpgaGolden	YES	0.97	0.78	0.1
	x86TamFw	YES	6.18	6.18	0.1
	x86TamFwGolden	YES	6.18	6.10	0.1
88-LC0-34H14FH-O	Bios	YES	0.241	0.241	0.0
	BiosGolden	YES	0.241	0.218	0.0
	EthSwitch	YES	1.05	1.05	0.0
	EthSwitchGolden	YES	1.05	0.07	0.0
	IoFpga	YES	1.09	1.09	0.1
	IoFpgaGolden	YES	1.09	1.01	0.1
	SsdIntelS3520	YES	1.21	1.21	0.0
	SsdIntelS4510	YES	11.32	11.32	0.0
	ssdIntelS4520	YES	1.11	1.11	0.0
	SsdMicron5100	YES	7.01	7.01	0.0
	SsdMicron5300	YES	0.01	0.01	0.0
	x86Fpga	YES	0.97	0.97	0.1
	x86FpgaGolden	YES	0.97	0.78	0.1
	x86TamFw	YES	6.18	6.18	0.1
	x86TamFwGolden	YES	6.18	6.10	0.1
88-LC0-36FH	Bios	YES	1.21	1.21	0.0
	BiosGolden	YES	1.21	0.13	0.0
	EthSwitch	YES	1.05	1.05	0.0
	EthSwitchGolden	YES	1.05	0.07	0.0
	IoFpga	YES	1.14	1.14	0.1
	IoFpga	YES	1.125	1.125	2.0
	IoFpgaGolden	YES	1.14	1.00	0.1
	IoFpgaGolden	YES	1.125	1.125	2.0
	SsdIntelS3520	YES	1.21	1.21	0.0
	SsdIntelS4510	YES	11.32	11.32	0.0
	ssdIntelS4520	YES	1.11	1.11	0.0
	SsdMicron5100	YES	7.01	7.01	0.0
	SsdMicron5300	YES	0.01	0.01	0.0
	x86Fpga	YES	1.51	1.51	0.1
	x86FpgaGolden	YES	1.51	1.04	0.1
	x86TamFw	YES	6.19	6.19	0.1
	x86TamFwGolden	YES	6.19	6.05	0.1
88-LC0-36FH-M	Bios	YES	1.21	1.21	0.0
	BiosGolden	YES	1.21	0.13	0.0
	EthSwitch	YES	1.05	1.05	0.0
	EthSwitchGolden	YES	1.05	0.07	0.0
	IoFpga	YES	1.14	1.14	0.1
	IoFpga	YES	1.125	1.125	2.0
	IoFpgaGolden	YES	1.14	1.00	0.1
	IoFpgaGolden	YES	1.125	1.125	2.0
	SsdIntelS3520	YES	1.21	1.21	0.0
	SsdIntelS4510	YES	11.32	11.32	0.0
	ssdIntelS4520	YES	1.11	1.11	0.0
	SsdMicron5100	YES	7.01	7.01	0.0
	SsdMicron5300	YES	0.01	0.01	0.0
	x86Fpga	YES	1.51	1.51	0.1

	x86FpgaGolden	YES	1.51	1.04	0.1
	x86TamFw	YES	6.19	6.19	0.1
	x86TamFwGolden	YES	6.19	6.05	0.1
88-LC0-36FH-MO	Bios	YES	0.241	0.241	0.0
	BiosGolden	YES	0.241	0.218	0.0
	EthSwitch	YES	1.05	1.05	0.0
	EthSwitchGolden	YES	1.05	0.07	0.0
	IoFpga	YES	1.14	1.14	0.1
	IoFpga	YES	1.125	1.125	2.0
	IoFpgaGolden	YES	1.14	1.00	0.1
	IoFpgaGolden	YES	1.125	1.125	2.0
	SsdIntelS3520	YES	1.21	1.21	0.0
	SsdIntelS4510	YES	11.32	11.32	0.0
	ssdIntelS4520	YES	1.11	1.11	0.0
	SsdMicron5100	YES	7.01	7.01	0.0
	SsdMicron5300	YES	0.01	0.01	0.0
	x86Fpga	YES	1.51	1.51	0.1
	x86FpgaGolden	YES	1.51	1.04	0.1
	x86TamFw	YES	6.19	6.19	0.1
	x86TamFwGolden	YES	6.19	6.05	0.1
88-LC0-36FH-O	Bios	YES	0.241	0.241	0.0
	BiosGolden	YES	0.241	0.218	0.0
	EthSwitch	YES	1.05	1.05	0.0
	EthSwitchGolden	YES	1.05	0.07	0.0
	IoFpga	YES	1.14	1.14	0.1
	IoFpga	YES	1.125	1.125	2.0
	IoFpgaGolden	YES	1.14	1.00	0.1
	IoFpgaGolden	YES	1.125	1.125	2.0
	SsdIntelS3520	YES	1.21	1.21	0.0
	SsdIntelS4510	YES	11.32	11.32	0.0
	ssdIntelS4520	YES	1.11	1.11	0.0
	SsdMicron5100	YES	7.01	7.01	0.0
	SsdMicron5300	YES	0.01	0.01	0.0
	x86Fpga	YES	1.51	1.51	0.1
	x86FpgaGolden	YES	1.51	1.04	0.1
	x86TamFw	YES	6.19	6.19	0.1
	x86TamFwGolden	YES	6.19	6.05	0.1
88-LC1-12TH24FH-E	Bios	YES	1.20	1.20	0.41
	BiosGolden	YES	1.20	1.01	0.41
	EthSwitch	YES	1.05	1.05	0.0
	EthSwitchGolden	YES	1.05	0.07	0.0
	IoFpga	YES	1.05	1.05	0.0
	IoFpgaGolden	YES	1.05	1.00	0.0
	SsdMicron7300M2	YES	2.60	2.60	0.0
	SsdMicron7450M2	YES	11.00	11.00	0.0
	SsdSRMP8N2	YES	14.38	14.38	0.0
	x86Fpga	YES	1.04	1.04	0.31
	x86FpgaGolden	YES	1.04	1.00	0.31
	x86TamFw	YES	7.16	7.16	0.31
	x86TamFwGolden	YES	7.16	7.13	0.31
88-LC1-36EH	Bios	YES	1.20	1.20	0.41
	BiosGolden	YES	1.20	1.01	0.41
	EthSwitch	YES	1.05	1.05	0.0
	EthSwitchGolden	YES	1.05	0.07	0.0
	IoFpga	YES	1.05	1.05	0.0
	IoFpgaGolden	YES	1.05	1.00	0.0
	SsdMicron7300M2	YES	2.60	2.60	0.0
	SsdMicron7450M2	YES	11.00	11.00	0.0
	SsdSRMP8N2	YES	14.38	14.38	0.0
	x86Fpga	YES	1.04	1.04	0.31

	x86FpgaGolden	YES	1.04	1.00	0.31
	x86TamFw	YES	7.16	7.16	0.31
	x86TamFwGolden	YES	7.16	7.13	0.31
88-LC1-52Y8H-EM	Bios	YES	1.20	1.20	0.0
	BiosGolden	YES	1.20	1.01	0.0
	EthSwitch	YES	1.05	1.05	0.0
	EthSwitchGolden	YES	1.05	0.07	0.0
	IoFpga	YES	1.00	1.00	0.1
	IoFpgaGolden	YES	1.00	1.00	0.1
	SsdMicron7300M2	YES	2.60	2.60	0.0
	SsdMicron7450M2	YES	11.00	11.00	0.0
	SsdSRMP8N2	YES	14.38	14.38	0.0
	x86Fpga	YES	1.00	1.00	0.1
	x86FpgaGolden	YES	1.00	1.00	0.1
	x86TamFw	YES	9.05	9.05	0.1
	x86TamFwGolden	YES	9.05	9.05	0.1
8800-LC-36FH	Bios	YES	1.36	1.36	0.0
	BiosGolden	YES	1.36	1.15	0.0
	EthSwitch	YES	1.05	1.05	0.0
	EthSwitchGolden	YES	1.05	0.07	0.0
	IoFpga	YES	1.39	1.39	0.0
	IoFpgaGolden	YES	1.39	0.08	0.0
	SsdIntelS3520	YES	1.21	1.21	0.0
	SsdIntelS4510	YES	11.32	11.32	0.0
	ssdIntelS4520	YES	1.11	1.11	0.0
	SsdMicron5100	YES	7.01	7.01	0.0
	SsdMicron5300	YES	0.01	0.01	0.0
	x86Fpga	YES	1.56	1.56	0.0
	x86FpgaGolden	YES	1.56	0.33	0.0
	x86TamFw	YES	5.17	5.17	0.0
	x86TamFwGolden	YES	5.17	5.05	0.0
8800-LC-36FH-O	Bios	YES	1.208	1.208	0.0
	BiosGolden	YES	1.208	1.207	0.0
	EthSwitch	YES	1.05	1.05	0.0
	EthSwitchGolden	YES	1.05	0.07	0.0
	IoFpga	YES	1.39	1.39	0.0
	IoFpgaGolden	YES	1.39	0.08	0.0
	SsdIntelS3520	YES	1.21	1.21	0.0
	SsdIntelS4510	YES	11.32	11.32	0.0
	ssdIntelS4520	YES	1.11	1.11	0.0
	SsdMicron5100	YES	7.01	7.01	0.0
	SsdMicron5300	YES	0.01	0.01	0.0
	x86Fpga	YES	1.56	1.56	0.0
	x86FpgaGolden	YES	1.56	0.33	0.0
	x86TamFw	YES	5.17	5.17	0.0
	x86TamFwGolden	YES	5.17	5.05	0.0
8800-LC-48H	Bios	YES	1.36	1.36	0.0
	BiosGolden	YES	1.36	1.15	0.0
	EthSwitch	YES	1.05	1.05	0.0
	EthSwitchGolden	YES	1.05	0.07	0.0
	IoFpga	YES	1.39	1.39	0.0
	IoFpgaGolden	YES	1.39	0.08	0.0
	SsdIntelS3520	YES	1.21	1.21	0.0
	SsdIntelS4510	YES	11.32	11.32	0.0
	ssdIntelS4520	YES	1.11	1.11	0.0
	SsdMicron5100	YES	7.01	7.01	0.0
	SsdMicron5300	YES	0.01	0.01	0.0
	x86Fpga	YES	1.56	1.56	0.0
	x86FpgaGolden	YES	1.56	0.33	0.0
	x86TamFw	YES	5.17	5.17	0.0

	x86TamFwGolden	YES	5.17	5.05	0.0
8800-LC-48H-O	Bios	YES	1.208	1.208	0.0
	BiosGolden	YES	1.208	1.207	0.0
	EthSwitch	YES	1.05	1.05	0.0
	EthSwitchGolden	YES	1.05	0.07	0.0
	IoFpga	YES	1.39	1.39	0.0
	IoFpgaGolden	YES	1.39	0.08	0.0
	SsdIntelS3520	YES	1.21	1.21	0.0
	SsdIntelS4510	YES	11.32	11.32	0.0
	ssdIntelS4520	YES	1.11	1.11	0.0
	SsdMicron5100	YES	7.01	7.01	0.0
	SsdMicron5300	YES	0.01	0.01	0.0
	x86Fpga	YES	1.56	1.56	0.0
	x86FpgaGolden	YES	1.56	0.33	0.0
	x86TamFw	YES	5.17	5.17	0.0
	x86TamFwGolden	YES	5.17	5.05	0.0
8800-RP	Bios	YES	1.36	1.36	0.0
	BiosGolden	YES	1.36	1.15	0.0
	EthSwitch	YES	1.03	1.03	0.0
	EthSwitchGolden	YES	1.03	0.07	0.0
	SsdIntelS3520	YES	1.21	1.21	0.0
	SsdIntelS4510	YES	11.32	11.32	0.0
	ssdIntelS4520	YES	1.11	1.11	0.0
	SsdMicron5100	YES	7.01	7.01	0.0
	SsdMicron5300	YES	0.01	0.01	0.0
	TimingFpga	YES	1.02	1.02	0.0
	TimingFpgaGolden	YES	1.02	0.11	0.0
	x86Fpga	YES	1.39	1.39	0.0
	x86FpgaGolden	YES	1.39	0.24	0.0
	x86TamFw	YES	5.19	5.19	0.0
	x86TamFwGolden	YES	5.19	5.05	0.0
8800-RP-E	Bios	YES	1.36	1.36	0.0
	BiosGolden	YES	1.36	1.15	0.0
	EthSwitch	YES	1.03	1.03	0.0
	EthSwitchGolden	YES	1.03	0.07	0.0
	SsdIntelS3520	YES	1.21	1.21	0.0
	SsdIntelS4510	YES	11.32	11.32	0.0
	ssdIntelS4520	YES	1.11	1.11	0.0
	SsdMicron5100	YES	7.01	7.01	0.0
	SsdMicron5300	YES	0.01	0.01	0.0
	TimingFpga	YES	1.02	1.02	0.0
	TimingFpgaGolden	YES	1.02	0.11	0.0
	x86Fpga	YES	1.39	1.39	0.0
	x86FpgaGolden	YES	1.39	0.24	0.0
	x86TamFw	YES	5.19	5.19	0.0
	x86TamFwGolden	YES	5.19	5.05	0.0
8800-RP-O	Bios	YES	1.208	1.208	0.0
	BiosGolden	YES	1.208	1.207	0.0
	EthSwitch	YES	1.03	1.03	0.0
	EthSwitchGolden	YES	1.03	0.07	0.0
	SsdIntelS3520	YES	1.21	1.21	0.0
	SsdIntelS4510	YES	11.32	11.32	0.0
	ssdIntelS4520	YES	1.11	1.11	0.0
	SsdMicron5100	YES	7.01	7.01	0.0
	SsdMicron5300	YES	0.01	0.01	0.0
	TimingFpga	YES	1.02	1.02	0.0
	TimingFpgaGolden	YES	1.02	0.11	0.0
	x86Fpga	YES	1.39	1.39	0.0
	x86FpgaGolden	YES	1.39	0.24	0.0
	x86TamFw	YES	5.19	5.19	0.0

	x86TamFwGolden	YES	5.19	5.05	0.0
8800-RP2	Bios	YES	1.20	1.20	0.3
	BiosGolden	YES	1.20	1.07	0.3
	EthSwitch	YES	1.03	1.03	0.0
	EthSwitchGolden	YES	1.03	0.07	0.0
	PcieSwitch	YES	120.14	120.14	0.7
	SsdMicron7300M2	YES	2.60	2.60	0.0
	SsdMicron7450M2	YES	11.00	11.00	0.0
	SsdSRMP8N2	YES	14.38	14.38	0.0
	TimingFpga	YES	1.01	1.01	0.0
	TimingFpgaGolden	YES	1.01	1.00	0.0
	x86Fpga	YES	1.14	1.14	0.6
	x86FpgaGolden	YES	1.14	1.02	0.6
	x86TamFw	YES	7.18	7.18	0.6
	x86TamFwGolden	YES	7.18	7.13	0.6
8800-RP2-O	Bios	YES	1.00	1.00	0.3
	BiosGolden	YES	1.00	1.00	0.3
	EthSwitch	YES	1.03	1.03	0.0
	EthSwitchGolden	YES	1.03	0.07	0.0
	SsdIntelS3520	YES	1.21	1.21	0.0
	SsdIntelS4510	YES	11.32	11.32	0.0
	ssdIntelS4520	YES	1.11	1.11	0.0
	SsdMicron5100	YES	7.01	7.01	0.0
	SsdMicron5300	YES	0.01	0.01	0.0
	TimingFpga	YES	1.01	1.01	0.0
	TimingFpgaGolden	YES	1.01	1.00	0.0
	x86Fpga	YES	0.128	0.128	0.3
	x86FpgaGolden	YES	0.128	0.128	0.3
	x86TamFw	YES	7.12	7.12	0.3
	x86TamFwGolden	YES	7.12	7.12	0.3
8804-FAN	FtFpga	NO	1.00	1.00	0.0
	FtFpgaGolden	NO	1.00	0.16	0.0
8804-FC0	IoFpga	YES	1.00	1.00	0.0
	IoFpga	YES	1.125	1.125	2.0
	IoFpgaGolden	YES	1.00	0.16	0.0
	IoFpgaGolden	YES	1.125	1.125	2.0
8804-FC1	IoFpga	YES	1.03	1.03	0.0
	IoFpgaGolden	YES	1.03	1.03	0.0
8808-FAN	FtFpga	NO	1.00	1.00	0.0
	FtFpgaGolden	NO	1.00	0.16	0.0
8808-FAN-V2	FtFpga	NO	1.00	1.00	0.0
	FtFpgaGolden	NO	1.00	0.16	0.0
8808-FC	IoFpga	YES	1.02	1.02	0.0
	IoFpgaGolden	YES	1.02	0.05	0.0
8808-FC0	IoFpga	YES	1.00	1.00	0.0
	IoFpga	YES	1.125	1.125	2.0
	IoFpgaGolden	YES	1.00	0.16	0.0
	IoFpgaGolden	YES	1.125	1.125	2.0
8808-FC1	IoFpga	YES	1.03	1.03	0.0
	IoFpgaGolden	YES	1.03	1.03	0.0
8808-FC1-G	IoFpga	YES	1.06	1.06	0.0
	IoFpgaGolden	YES	1.06	1.01	0.0

```
8812-FAN             FtFpga                  NO      1.00      1.00      0.0
                     FtFpgaGolden            NO      1.00      0.16      0.0
-------------------------------------------------------------------------------
8812-FC              IoFpga                  YES     1.02      1.02      0.0
                     IoFpgaGolden            YES     1.02      0.05      0.0
                     Retimer                 YES     3.00      3.00      0.0
-------------------------------------------------------------------------------
8818-FAN             FtFpga                  NO      1.00      1.00      0.0
                     FtFpgaGolden            NO      1.00      0.16      0.0
-------------------------------------------------------------------------------
8818-FC              IoFpga                  YES     1.02      1.02      0.0
                     IoFpgaGolden            YES     1.02      0.05      0.0
                     Retimer                 YES     3.00      3.00      0.0
-------------------------------------------------------------------------------
8818-FC0             IoFpga                  YES     1.00      1.00      0.0
                     IoFpga                  YES     1.125     1.125     2.0
                     IoFpgaGolden            YES     1.00      0.16      0.0
                     IoFpgaGolden            YES     1.125     1.125     2.0
                     Retimer                 YES     3.00      3.00      0.0
-------------------------------------------------------------------------------
PSU4.8KW-DC100       PO-PrimMCU              NO     51.85     51.85      0.0
                     PO-SecMCU               NO     51.85     51.85      0.0
-------------------------------------------------------------------------------
PSU6.3KW-20A-HV      DT-LogicMCU             NO      1.00      1.00      0.0
                     DT-PrimMCU              NO      1.00      1.00      0.0
                     DT-SecMCU               NO      1.00      1.00      0.0
-------------------------------------------------------------------------------
PSU6.3KW-HV          AB-LogicMCU             NO      3.08      3.08      0.0
                     AB-PrimMCU              NO      3.08      3.08      0.0
                     AB-SecMCU               NO      3.06      3.06      0.0
                     DT-LogicMCU             NO      4.11      4.11      0.0
                     DT-PrimMCU              NO      4.01      4.01      0.0
                     DT-SecMCU               NO      4.00      4.00      0.0
-------------------------------------------------------------------------------
PWR-4.4KW-DC-V3      DT-LogicMCU             NO      3.02      3.02      0.0
                     DT-Prim1MCU             NO      3.01      3.01      0.0
                     DT-Prim2MCU             NO      3.01      3.01      0.0
                     DT-Sec1MCU              NO      3.01      3.01      0.0
                     DT-Sec2MCU              NO      3.01      3.01      0.0
```

Compatibility Matrix for EPNM and Crosswork with Cisco IOS XR Software

The compatibility matrix lists the version of EPNM and Crosswork that are supported with Cisco IOS XR Release in this release.

Table 2: Compatibility Matrix

Cisco IOS XR	Crosswork	EPNM
Release 24.3.1	Crosswork Optimization Engine 6.0	Evolved Programmable Network Manager 7.1.1

Important Notes

- The warning message that the smart licensing evaluation period has expired is displayed in the console every hour. There is, however, no functionality impact on the device. The issue is seen on routers that don’t have the Flexible Consumption licensing

model enabled. To stop the repetitive messaging, register the device with the smart licensing server and enable the Flexible Consumption model. Later load a new registration token.

To register the device with the smart licensing server, see the Registering and Activating Your Router.

Licensing

Starting with Cisco IOS XR Release 24.1.1, Smart Licensing Using Policy (SLP) is the default Licensing model. When you upgrade to the Cisco IOS XR Release 24.1.1 release or later, the Smart Licensing Using Policy is enabled by default.

You can migrate your devices to Smart Licensing with Policy model, see *Migrating from Smart Licensing to Smart Licensing Using Policy*, Smart Licensing Using Policy on Cisco IOS XR Routers.

We recommend that you update to the latest version of SSM On-Prem or Cisco Smart Licensing Utility.

Note SSM On-Prem and CSSM both support SLP devices and SL devices. SLP devices and SL devices can coexist in a network. The Smart Licensing (SL) model is available in releases Cisco IOS XR Release 7.11.1 and earlier.

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.

Supported Transceiver Modules

To determine the transceivers that Cisco hardware device supports, refer to the Transceiver Module Group (TMG) Compatibility Matrix tool.

Cisco IOS XR Error messages

To view, search, compare, and download Cisco IOS XR Error Messages, refer to the Cisco IOS XR Error messages tool.

Cisco IOS XR MIBs

To determine the MIBs supported by platform and release, refer to the Cisco IOS XR MIBs tool.

Related Documentation

The most current Cisco 8000 router documentation is located at the following URL:

https://www.cisco.com/c/en/us/td/docs/iosxr/8000-series-routers.html

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