Release Notes for Cisco 8000 Series Routers, IOS XR Release 7.11.1

Revised: July 17, 2024

Cisco 8100, 8200, 8600, and 8800 Series Routers

What's New in Cisco IOS XR Release 7.11.1

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

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
Application Hosting	
Docker Application Management using IPv6 Address	In this release, you gain the ability to manage Docker applications within containers using IPv6 addresses via the router's management interface. Leveraging IPv6 addresses provides expanded addressing options, enhances network scalability, and enables better segmentation and isolation of applications within the network. Prior to this update, only IPv4 addresses could be used to manage docker applications.
Programmability	
Automatic Resynchronization of OpenConfig Configuration	OpenConfig infrastructure can now reapply all the OpenConfig configurations automatically if there are any discrepancies in the running configuration. With this feature, there is no need for manual replacement of the OpenConfig configuration using Netconf or gNMI. The re-sync operation is triggered if the running configurations and the OpenConfig configuration go out of sync after any system event that removes some running configurations from the system. A corresponding system log gets generated to indicate the re-sync status.
gRPC Network Security Interface	This release implements authorization mechanisms to restrict access to gRPC applications and services based on client permissions. This is made possible by introducing an authorization protocol buffer service for gRPC Network Security Interface (gNSI). Prior to this release, the gRPC services in the gNSI systems could be accessed by unauthorized users. This feature introduces the following change: **CLI**: • **gnsi load service authorization policy** • **show gnsi service authorization policy** To view the specification of gNSI, see Github repository.
BGP	

Feature	Description
BGP Labeled Unicast over RSVP-TE	You can now steer the MPLS traffic as per your requirement instead of relying on what the IGP directs. This feature extends the BGP Labeled Unicast (LU) functionality over RSVP-TE protocol. BGP LU advertises label bindings while RSVP-TE establishes the traffic engineering paths that you specify. This feature allows the provider Edge (PE) routers to forward incoming traffic using the label bindings along the specific path reserved using RSVP-TE. This ability to provide explicit routing ensures optimal use of your network resources. The feature introduces these changes: **CLI:** • **hw-module profile cef bgplu-over-rsvpte enable** **YANG Data Models:** • `Cisco-IOS-XR-npu-hw-profile-cfg.yang` (see GitHub, YANG Data Models Navigator)

Peering Between BGP Routers Within the Same Confederation	You can now enable BGP peering between routers in the sub-autonomous system (AS) within a confederation to advertise specific router updates using iBGP. This capability ensures that the mesh of routers between sub-ASes in a confederation maintains consistent routing tables, ensuring proper network reachability. Enabling this feature helps improve preventing performance reduction and traffic management challenges.
	
	The feature introduces these changes:
	
	CLI:
	
	New Command:
	
	• **allowconfedas-in**
	
	YANG Data Models
	
	• New XPaths for
	
	    • `Cisco-IOS-XR-ipv4-bgp-cfg.yang`
	
	    • `Cisco-IOS-XR-um-router-bgp-cfg`
	
	(see GitHub, YANG Data Models Navigator)

Feature	Description

Virtual Routing Forwarding Next Hop Routing Policy	You can now enable a route policy at the BGP next-hop attach point to limit notifications delivered to BGP for specific prefixes, which equips you with better control over routing decisions, and allows for precise traffic engineering and security compliance for each VRF instance, and helps establish redundant paths specific to each VRF.
	The feature introduces these changes:
	CLI:
	Modified Command:
	• The **nexthop route-policy** command is extended to VRF address-family configuration mode.
	YANG Data Model
	• New XPaths for
	  • `Cisco-IOS-XR-ipv4-bgp-cfg.yang`
	  • `Cisco-IOS-XR-um-router-bgp-cfg`
	(see GitHub, YANG Data Models Navigator)

Interface and Hardware Component	

Feature	Description
Diagnostic Parameters for Optical Transceivers	You can analyze the diagnostic parameters for optical transceivers installed on a network device and detect potential issues with the optical transceivers, such as excessive power levels, abnormal temperature readings, or degradation of the optical signal. Such analysis is possible because the **show controllers optics** command now displays the following diagnostic parameters: • Effective Signal to Noise Ratio (eSNR) • Pulse Amplitude Modulation with Four Levels (PAM4) Level Transition Parameter (LTP) • Pre-Forward Error Correction (FEC) and Post-FEC Bit Error Rate (BER) • Frame Error Count (FERC) • Laser age • Thermoelectric Cooler (TEC) current • Laser frequency • Laser temperature For additional information on VDM (Versatile Diagnostics Monitoring), see the Common Management Interface Specification. The feature introduces these changes: **CLI:** • The **observable-info** keyword is added to the show controller optics command. **YANG Data Model:** • New XPath for `Cisco-IOS-XR-controller-optics-oper.yang` (see GitHub, YANG Data Models Navigator)
Disable Auto-Squelching	This release introduces support to disable Auto squelching. This helps to detect weak signals that are hidden within the laser source noise. By disabling Auto squelch, you can reduce the processing overhead in systems that have stable laser sources and minimal noise, helping you optimize the performance of your system. When the Auto squelch function is enabled, the optical module will generate a local fault signal on the host side if it detects a fault on the media side. By default, Auto squelch is enabled. The feature introduces these changes: **CLI:** • **host auto-squelch disable** **YANG DATA models:** • New XPaths for `Cisco-IOS-XR-controller-optics-cfg` (see Github, YANG Data Models Navigator)

<table>
<tr><th>Feature</th><th>Description</th></tr>
<tr><td>Loopback on Optical Transceivers</td><td>
You can now easily detect link failures between the optical transceiver and an external device such as a router by creating a loopback within the transceiver itself. Enabling loopback detects the fault in the physical or network connections, such as, traffic loss or a faulty optical transceiver.
The loopback configuration allows incoming traffic within the transceiver to be redirected back to its source. By analyzing the loopback signals received at the source, it becomes possible to detect physical connectivity failures or network issues, such as packet loss or a malfunctioning transceiver.
The feature introduces these changes:
CLI:
Modified the controller optics command by adding the following keywords:

host loopback internal
host loopback line
loopback internal
loopback line

The information loopback keyword is added to the show controller optics command.
YANG Data Model:

New XPaths for <code>Cisco-IOS-XR-controller-optics-cfg.yang</code>

(see GitHub, YANG Data Models Navigator)
</td></tr>
<tr><td>Outer IP Header-Driven Hash Computation for Incoming GUE Packets</td><td>
We now offer you the flexibility of using only the outer IP header to calculate the hashing for incoming Generic UDP Encapsulation (GUE) packets. On enabling this feature, only the outer IP source and destination addresses are used for hashing calculations. The inner IP addresses are not considered, providing a simpler method of distribution. Previously, both inner IP and outer IP headers were used for ECMP hashing the incoming GUE packets.
The feature introduces these changes:
CLI:

hw-module profile gue underlay-hash

YANG Data Models:

New XPaths for <code>Cisco-IOS-XR-npu-hw-profile-cfg.yang</code> (see GitHub, YANG Data Models Navigator)

The command is supported on Q200-based ASICs.
</td></tr>
<tr><td colspan="2">IP Addresses and Services</td></tr>
</table>

<table>
<tr><th>Feature</th><th>Description</th></tr>
<tr><td>Unicast VRRP</td><td>We have now enabled Layer 3 unicast transport mode in VRRP, allowing it to enhance its capacity to send data to other networks, including cloud networks. Pairwise router redundancy enables high availability in cloud network scenarios. However, a virtual IP (VIP) address is required by the default route of the cloud native function because there is no pre-designated active member in paired routers. HSRP can provide a VIP, but cloud networks do not support Layer 2 multicast or broadcast transports. You can configure VRRP to support Layer 3 unicast transport to overcome the limitation of Layer 2 multicast and broadcast transports.

The feature introduces these changes:

New Command:

CLI:

• unicast-peer

Modified Commands:

• show vrrp command is modified to support new fields: Mcast packet in Ucast mode , IPv4 Unicast Peer , and IPv4 Unicast Peer.

YANG Data Model:

New Xpaths for:

• <code>Cisco-IOS-XR-ipv4-vrrp-cfg.yang</code>

• <code>Cisco-IOS-XR-ipv4-vrrp-oper.yang</code>

(see GitHub, YANG Data Models Navigator)</td></tr>
<tr><td colspan="2">MPLS</td></tr>
<tr><td>Auto-enable LDP on all TE Tunnel Interfaces</td><td>You can now automatically enable all the configured LDP tunnels over IPv4 traffic-engineering (TE) with upto 2000 unique destinations to achieve time efficiency and consistency of LDP tunnel configurations in routers within an MPLS network.

Earlier, you could enable the LDP tunnels over TE manually.

This feature introduces the following changes:

CLI: mpls ldp address-family ipv4 traffic-eng tunnels command.

YANG Data Model: Cisco-IOS-XR-mpls-ldp-cfg

(see GitHub, YANG Data Models Navigator)</td></tr>
</table>

Feature	Description

GMPLS User Network Interface (UNI) to Manage Optical Networks	We have improved the dynamic optical transport connection provisioning between IP routers and optical network elements to reduce operational time and administrative overhead needed for new connectivity setup by enabling support for Generalized Multiprotocol Label Switching (GMPLS) User Network Interface (UNI), which enables advanced traffic engineering capabilities.
	This feature introduces the following changes:
	• **CLI**
	  • New **gmpls optical-uni** command.
	• **YANG Data Model**
	  • New XPaths for `Cisco-IOS-XR-um-mpls-te-cfg.yang` (see GitHub, YANG Data Models Navigator).

Teardown and Reestablishment of RSVP-TE Tunnels	You can now teardown and reestablish the existing tunnels of headend, midend, or tailend router tunnels of an MPLS network for optimized distribution of the traffic across MPLS and RSVP-TE to improve network performance and enhance resource utilization. Previously, you could reestablish tunnels only at the headend router using the mpls traffic-eng resetup command. The feature introduces these changes: **CLI**: mpls traffic-eng teardown **YANG Data Model**: Cisco-IOS-XR-mpls-te-act.yang (see GitHub, YANG Data Models Navigator)
EVPN	
BUM Ingress Replication for EVPN Single-Homing	You can optimize Broadcast, Unknown Unicast, and Multicast (BUM) traffic by ensuring that traffic that a single-homed device receives is replicated and forwarded to only those CE devices in an EVPN network, if and when they require it. This reduction in the unnecessary forwarding of BUM traffic prevents the flooding of BUM traffic to all devices on the EVPN network. This feature is supported only on Q200-based line cards. This feature is enabled by default.
Core Isolation by Interface Tracking for EVPN Single-Homing	You can now monitor the connectivity of the customer-facing interface on the PE router using object tracking (OT). If the interface fails or becomes unavailable, the router isolates the customer site from the rest of the EVPN network. Isolating the core from the network prevents the customer site from advertising its routes to other sites on the EVPN single-home network, ensuring that traffic isn't sent to the failed PE router. Object tracking involves continuous monitoring of network interfaces, including links or ports on routers. By actively observing the status of these interfaces, administrators can dynamically adjust the network configuration based on their availability and health. This feature is supported only on Q200-based line cards. Use Object Tracking commands to track and monitor the connected interfaces.

Feature	Description
Detect and Block Duplicate MAC Addresses	You can now effectively mitigate traffic disruptions, packet loss, and potential network outages in your network operations by detecting and freezing duplicate MAC addresses and blocking all associated routes. This feature is supported only on Q200-based line cards. The feature introduces the **host mac-address duplicate-detection** command.
EVPN Core Isolation through Peer Failure Detection	You can now isolate the provider edge (PE) device from the network when there is a core link failure, preventing traffic disruptions and data leakage that could result from a compromised or malfunctioning peer. Upon detecting a link failure, the affected PE device is isolated from the core network, and the EVPN brings down the PE's Ethernet Segment (ES), which is associated with the access interface attached to the customer edge (CE) device. This feature is supported only on Q200-based line cards. The feature introduces the **core-isolation-group** command.
EVPN E-Tree	We now enable efficient forwarding of ethernet traffic in a tree-like topology where a root PE router broadcasts or multicasts traffic to all the leaf PE routers while the leaf PE routers only forward traffic destined for the respective customer sites connected to them. This feature is supported only on Q200-based line cards. The feature introduces the **etree rt-leaf** command.
MAC Mobility for EVPN Single-Homing	Now, it is now possible to seamlessly move MAC addresses between various network devices or locations while preserving their connectivity and associated network services. This ensures uninterrupted communication for devices or virtual machines frequently changing their physical or virtual location within the network. The L2 gateway dynamically updates its forwarding table when a MAC address moves from one device to another within the EVPN E-LAN network, guaranteeing that packets destined for that MAC address are correctly forwarded to its new location. This feature is supported only on Q200-based line cards.
Seamless Migration of VPLS Network to EVPN Network	You can now provision EVPN service on existing VPLS-enabled PEs individually, thus ensuring a seamless VPLS-to-EVPN migration without traffic disruption. This feature is supported only on Q200-based line cards.
Split-Horizon Groups for EVPN Single-Homing	You can prevent unnecessary BUM traffic flooding and conserve bandwidth for single-homed EVPN scenarios by ensuring that the traffic isn't sent back to the CE device from which it originated. Depending on the type of traffic you need to be forwarded or distributed, you can configure split-horizon group 0 (SG 0), SG 1, or SG 2. This feature is supported only on Q200-based line cards. The feature introduces the **split-horizon group** command.
VRF Leaking for EVPN Single-Homing	We now allow for seamless intercommunication between different VRF instances in an EVPN domain, thus enabling controlled inter-VRF communication and resource-sharing, which is helpful in multi-tenancy environments, data center deployments, and hybrid cloud scenarios. This feature is supported only on Q200-based line cards.

<table>
<tr><th>Feature</th><th>Description</th></tr>
<tr><td>EVPN E-LAN L2 Gateway Single-Homing</td><td>We now offer a cost-effective and simplified solution for seamless communication between various customer sites connected to the same service provider network using Ethernet Virtual Private Network (EVPN) single-homing mode. EVPN LAN (E-LAN) is a service to bridge Ethernet data traffic among different sites across the MPLS network connecting a Layer 2 gateway device to a single access network.

In the single-homing mode, a device is connected to one router in the MPLS core through physical ports or bundle ports, and in the event of a failure on those links, the traffic over the links is not protected by links to another router on the core.

This feature is supported only on Q200-based line cards.

The feature introduces the evpn commands.</td></tr>
<tr><td colspan="2">Segment Routing</td></tr>
<tr><td>Configure Flow Labels in SRv6 Header for PM Liveness</td><td>You can now monitor the activeness of multiple paths for a given segment list using flow labels in the SRv6 header.

In earlier releases, the SRv6 header didn't include flow labels.

The feature introduces these changes:

CLI:

• The flow-label keyword is introduced in the performance-measurement liveness-profile command.

YANG Data Models:

• <code>Cisco-IOS-XR-um-performance-measurement-cfg.yang</code>

• <code>Cisco-IOS-XR-perf-meas-oper.yang</code>

See (GitHub, Yang Data Models Navigator)</td></tr>
<tr><td>Configure Segment Lists to Activate Candidate Paths in SRv6 for PM Liveness</td><td>You can now enable a candidate path to be up by configuring the minimum number of active segment lists associated with the candidate path. The head-end router determines that a candidate path is up based on the minimum number of active segment lists configured.

In earlier releases, the head-end router identified a candidate path as up only when all the segment lists associated with the path were active.

The feature introduces these changes:

CLI:

• The validation-cp minimum-active segment-lists option is introduced in the performance-measurement liveness-detection command.

YANG Data Models:

• <code>Cisco-IOS-XR-infra-xtc-agent-cfg.yang</code>

See (GitHub, Yang Data Models Navigator)</td></tr>
</table>

Feature	Description
IS-IS Flexible Algorithm with Exclude Maximum Delay Constraint	This feature enables you to configure topologies that exclude links that have delays over a specific threshold. This is especially critical for high-frequency trading applications, in satellite networks, or wherever there are fluctuations in link delays. This feature introduces these changes: **CLI**: • The **router isis** *instance* **flex-algo** *algo* command is modified with the new **maximum-delay** *value* option. **YANG Data Model:** • This feature extends the native Cisco-IOS-XR-clns-isis-cfg.yang model (see GitHub, YANG Data Models Navigator)
IS-IS Flexible Algorithm with Exclude Minimum Bandwidth Constraint	Traffic engineering in networks can be optimized by avoiding low-bandwidth links that may not be capable of handling high volumes of traffic. This feature allows you to use Flexible Algorithm to create topologies in your network that explicitly exclude high bandwidth traffic from utilizing links below a specified capacity. This constraint is achieved by introducing a new bandwidth-based metric type within the Flexible Algorithm framework. Links that do not satisfy the constraint are ignored when computing the associated Flexible Algorithm topology. This feature introduces these changes: **CLI**: • The **router isis** *instance* **flex-algo** *algo* command is modified with the new **minimum-bandwidth** *value* option. **YANG Data Model:** • This feature extends the native `Cisco-IOS-XR-clns-isis-cfg.yang` model (see GitHub, YANG Data Models Navigator)
Maximum Paths Per IS-IS Flexible Algorithm Per Prefix	Previously, you could configure a maximum number of Equal-Cost Multi-path (ECMP) to be set for individual Flex Algorithms. This feature provides additional granularity to the IS-IS Maximum Paths Per-Algorithm feature by allowing you to specify a set of prefixes for Flexible Algorithm. Now you can achieve a balance between path diversity and computational and memory requirements by controlling the number of paths for each specific algorithm and destination prefix combination. This feature introduces these changes: **CLI:** • **maximum-paths route-policy** *name* YANG Data Models: • This feature extends the native `Cisco-IOS-XR-clns-isis-cfg.yang` model See GitHub, Yang Data Models Navigator

Feature	Description
Microloop Avoidance for IS-IS with Per-Prefix Filtering	Currently, when SR Microloop Avoidance for IS-IS is enabled, it applies to all prefixes. This feature allows you to selectively allow or deny specific IPv4 or IPv6 prefixes or routes that may cause microloops, which allows for efficient use of hardware resources and ensures overall network stability. This feature introduces these changes: **CLI**: • The microloop avoidance segment-routing command is modified with the new **route-policy** *name* option for IS-IS. **YANG Data Model:** • This feature extends the native `Cisco-IOS-XR-um-router-isis-cfg.yang` model (see GitHub, YANG Data Models Navigator)
SR Policy Liveness Monitoring on Segment Routing over IPv6 (SRv6)	In segment routing over IPv6 (SRv6), you can now verify end-to-end traffic forwarding over an SR policy candidate path by periodically sending probe messages. Performance monitoring on an SRv6 network enables you to track and monitor traffic flows at a granular level. Earlier releases supported SR policy liveness monitoring over an SR policy candidate path on MPLS.
SR-TE Application Programming Interface (API)	This feature introduces an API solution that simplifies the task of building SR-TE controllers and managing SRTE policies. It does so by defining gRPC API services that allow applications to request SR policy operations. The solution leverages the gRPC Service API and GPB Data models, providing a unified, scalable, and secure method for network programming. This feature introduces these changes: **New CLI** • grpc segment-routing traffic-eng policy-service **YANG Data Models:** EMSD Yang model is updated to have this config under "segment-routing" container. • Native model: `Cisco-IOS-XR-man-ems-cfg.yang` • UM model: `Cisco-IOS-XR-um-grpc-cfg.yang` (see GitHub, YANG Data Models Navigator)

Feature	Description
SR-TE: Per Flow Automated Steering	This feature extends the SR-TE automated steering capabilities with per-flow granularity. Before this feature, per-destination automated steering (AS) dynamically steered all traffic flows destined to a BGP service prefix over a single path of an SR policy. With this feature, Per-Flow AS dynamically steers traffic flows destined to a BGP service prefix over different paths across the network. Traffic flows are determined based on the attributes of incoming packets (for example, source/destination IP address or QoS markings). Per-flow AS is realized using a Per-Flow SR policy (PFP). PFPs offer the user the flexibility to deliver the desired transport paths for different traffic flows.
SRv6-Services: L3 Services with Local SIDs from W-LIB	This feature enables an SRv6 headend node to allocate and advertise local SIDs with Wide (32-bit) functions (Local W-LIB). The headend router utilizes the local W-LIB functionality to define and implement SR policies using SRv6 SIDs. The Local W-LIB is supported for Layer 3 (VPNv4/VPNv6/BGPv4/BGPv6 global) services. This feature introduces the **usid allocation wide-local-id-block** command.
Support for mixed SR-TE Policy Autoroute paths, unprotected native paths, and protected (LFA/TI-LFA) native paths	When an SR-TE policy is autoroute announced, an IGP route can use it as one of its nexthops, as well as other native paths for load balancing. If protection is configured under IGP, some of these native paths may have LFA or TI-LFA backup paths. In earlier releases, this mix of SR-TE policy paths and protected native paths wasn't supported. This feature adds support for protected (LFA/TI-LFA) native paths. This functionality is enabled by default.
Support for uDT46 SRv6 Endpoint Behavior	This feature adds support for the “Endpoint with decapsulation and specific IP table lookup” SRv6 end-point behavior (uDT46). The End.DT46 behavior is used for dual-stack L3VPNs. This behavior is equivalent to the single per-VRF VPN label (for IPv4 and IPv6) in MPLS.
Two-Way Active Measurement Protocol Light Source Address Filtering	You can now restrict unauthorized users from sending packets to the network and prevent compromising the network security and reliability. For a destination UDP port, you can configure the list of IP addresses that can send Two-Way Active Measurement Protocol (TWAMP)-light packets to responder or querier nodes. In earlier releases, the responder or querier node accepted TWAMP-light packets from all IP addresses. The feature introduces these changes: **CLI:** • The **querier** and **responder** keywords are introduced in the **performance-measurement protocol twamp-light measurement delay** command. **YANG Data Models:** • `Cisco-IOS-XR-um-performance-measurement-cfg.yang` • `Cisco-IOS-XR-perf-meas-oper.yang` See (GitHub, Yang Data Models Navigator)

Feature	Description
VRF Allocation Mode for uDT46 Endpoint Behavior	This feature introduces a new VRF allocation mode for uDT46 SIDs for the following BGP-based services: • IPv4 Layer-3 VPNs • IPv6 Layer-3 VPNs • IPv4 BGP global • IPv6 BGP global • L3 EVPN When this allocation mode is configured under an address family, CE-learned routes, redistributed routes, aggregated routes, local routes, and imported routes will use uDT46 SID when advertised to remote peers.
System Management	
Ability to Set Maximum Power Limit for the Router	We are introducing functionality to set the maximum power limit for a router to improve power management and distribution in the PSUs. It prevents a router from using more than the configured power and also gives the ability to limit the reservation pool regardless of how many power supplies are present. In the previous releases, the ability to prevent a router from using more than a configured amount of power was unavailable. This feature introduces the following change: **CLI** • **power-mgmt configured-power-capacity**
NTP-PTP Interworking	We have improved NTP synchronization and reliability to achieve nanosecond-level accuracy for applications that require high-precision timing. This is achieved by enabling NTP-PTP interworking which allows the use of PTP as the reference clock. As in previous releases, the NTP client continues to support polling NTP protocol-based external time servers to synchronize the local system clock and achieve accuracy within the millisecond range.
On-demand transfer of Redundant Power Modules to Power Reservation Pool	The Cisco 8800 Series Modular Routers now have a functionality that allows them to transfer their redundant Power Supply Units (PSUs) to the power reservation pool when there is inadequate power supply. This capability helps prevent the router from shutting down hardware components due to a lack of power in the reservation pool, which used to occur due to the router prioritizing redundancy over power availability in the power reservation pool. Consequently, the router now raises an alarm indicating redundancy loss when it transfers PSUs to the power reservation pool. This feature ensures that the router components reserve the necessary power, even when redundancy is enabled.
PTP on 8000-RP2 Route Processor	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 system With this release, support for 1G, 10G PTP ports and BITs are extended to the route processor 8000-RP2

<table>
<tr><th>Feature</th><th>Description</th></tr>
<tr><td>PTP and SyncE on 88-LC0-36FH-M and 8800-LC-36FH</td><td>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. And, 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.

Support for PTP telecom profiles G8273.2 and G8275.1, SyncE and BITs are extended to the following line cards:
• 88-LC0-36FH-M
• 8800-LC-36FH</td></tr>
<tr><td colspan="2">System Monitoring</td></tr>
<tr><td>System Logging Message Count</td><td>Instead of calculating the bytes consumed by Syslog as you did previously, you can now easily and effectively manage the buffer size of the system log messages by specifying the number of entries the system log displays.

The feature introduces these changes:

CLI:
• The entries-count keyword is added to the logging buffered command.

YANG Data Model:
• New Xpaths for Cisco-IOS-XR-infra-syslog-cfg
• New Xpaths for Cisco-IOS-XR-um-logging-cfg</td></tr>
<tr><td colspan="2">System Security</td></tr>
</table>

Feature	Description
MACsec Encryption on Layer 3 Subinterfaces	You can now configure MACsec policy on Layer 3 subinterfaces, which gives you the flexibility to apply MACsec policies to different L3 subinterfaces that belong to the same main physical interface. This capability is possible because we've enabled the router to keep the VLAN tags unencrypted, enabling the L3 subinterfaces to be the MACsec endpoints. When you apply MACsec policies on these subinterfaces, you can enhance the overall security of your network by adding an extra layer of security to the communication between different subnets. This feature is supported on Cisco 8202-32FH-M fixed port routers and 88-LC0-36FH-M line cards. The feature introduces these changes: **CLI:** • **vlan-tags-in-clear** **YANG Data Models:** • `Cisco-IOS-XR-um-macsec-cfg` • Cisco-IOS-XR-crypto-macsec-mka-cfg See GitHub, YANG Data Models Navigator
MACsec Policy Exception for Link Layer Discovery Protocol Packets	We have added a MACsec policy exception that ensures improved router identification when MACsec is enabled for Link Layer Discovery Protocol (LLDP) packets. This exception allows you to configure MACsec policies to accommodate Link Layer Discovery Protocol (LLDP) packets to bypass encryption. When LLDP packets are unencrypted, they effectively convey router identification, configuration details, and capabilities to peer devices expediting the router discovery by peer devices in the Local Area Network (LAN). Using this also helps in troubleshooting configuration issues in the network. Previously, MACsec automatically encrypted LLDP packets, regardless of whether the peer devices applied encryption, resulting in delays when identifying new devices within the LAN. The feature introduces these changes: **CLI:** • The **lldp-in-clear** keyword is introduced in the **allow** command. • The **lldp-in-clear** status is displayed in the **show macsec policy detail** command. • The **lldp-in-clear** status is displayed in the **show macsec mka interface detail** command. **YANG Data Models:** • `Cisco-IOS-XR-crypto-macsec-mka-cfg.yang` • `Cisco-IOS-XR-crypto-macsec-mka-oper.yang` • `Cisco-IOS-XR-um-macsec-cfg.yang` (See GitHub, YANG Data Models Navigator)

Feature	Description
Multiple Public Keys per User for Public Key-based Authentication	We provide greater flexibility to access secure routers by allowing four public keys to be used for authentication. With the ability to associate multiple public keys with your user account on the router, we've also simplified the authentication process by eliminating the need to create unique users for each SSH client device. The feature introduces these changes: **CLI:** • The **second** , **third** , and **fourth** keywords are introduced in the **crypto key import authentication rsa** command. • The **second** , **third** , and **fourth** keywords are introduced in the **crypto key zeroize authentication rsa** command. • The **second** , **third** , and **fourth** keywords are introduced in the **keystring** command. **YANG Data Models:** • `Cisco-IOS-XR-crypto-act` • `Cisco-IOS-XR-um-ssh-cfg` (See GitHub, YANG Data Models Navigator)

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	
openconfig-system.yang Version 0.13.1	This OpenConfig data model is revised from version 0.6.0 to 0.13.1. There are no functional changes between these two versions.
openconfig-vlan.yang Version 3.2.2	This OpenConfig data model is revised from version 3.2.0 to 3.2.2. There are no functional changes between these two versions.
openconfig-mpls-static.yang Version 3.3.0	The OpenConfig data model is revised from version 3.2.2 to 3.3.0. There are no functional changes between these two versions.

Feature	Description
openconfig-network-instance.yang Version 1.3.0	This OpenConfig data model introduces the following changes to the BGP container: • Enable the parameters related to the use of multiple paths for the same Network Layer Reachability Information (NLRI) using use-multiple-paths leaf. The router uses this information in Address Family Indicator (AFI) and Subsequent Address Family Indicator (SAFI) in multi-protocol extensions during exchange of neighbor capabilities when loading the peers. • Enable the route dampening to minimize the propagation of flapping routes across an internetwork and learn the dampened routes from neighbor or peers using route-flap-damping leaf. • Configure the default metric within the RIB for entries that are installed by the protocol instance using default-metric leaf. The lower the metric specified the more preferable the RIB entry is to be selected for use within the network instance. • Specify the type of extended community to be sent to the neighbor group or address family group using send-community leaf. • Specify the number of occurrences to allow the BGP speaker to accept the BGP updates even if its own BGP autonomous system (AS) number is in the AS-Path attribute using allow-own-as leaf. • Replace occurrences of the peer's AS in the AS_Path with the local AS number using replace-peer-as leaf. • Use disable-peer-as-filter for filtering the routes. When set to true, the system advertises routes to a peer even if the peer's AS was in the AS-Path. The default behavior (false) suppresses advertisements to peers if their AS number is in the AS-Path of the route. • Ignore the Interior Gateway Protocol (IGP) metric to the next-hop when calculating the best-path using ignore-next-hop-igp-metric leaf. The default is to select the route for which the metric to the next-hop is lowest.

Feature	Description
openconfig-lldp.yang	This OpenConfig data model supports streaming model-driven telemetry (MDT) data for the leaves deviated in the previous releases. You can stream cadence-driven telemetry data for the following nodes: • Retrieve the counters cleared and the number number of valid TLVs received using last-clear and tlv-accepted leaves • Gather data about LLDP interface counters using frame-in, frame-out, frame-error-in, frame-discard, tlv-discard, tlv-unknown, last-clear, and frame-error-out leaves • Stream operational state data for LLDP neighbors using age and last-update leaves You can stream event-driven telemetry (EDT) data for system-name, system-description, chassis-id, and chassis-id-type leaves.
openconfig-mpls-igp.yang Version 3.3.0	This OpenConfig data model is revised from version 2.3.0 to 3.3.0. There are no functional changes between these two versions.
openconfig-platform.yang	This OpenConfig data model supports the following enhancements: • Improved cadence of under 30 seconds to stream cadence-driven telemetry data for the operational state of the following components—power supply, fan, software modules, linecards and subcomponents. Event-driven telemetry is already supported for these components in the previous releases. • Introduces cadence-driven telemetry support to obtain the Peripheral Component Interconnect Express (PCIe) error statistics about fatal, non-fatal and correctable errors. This container was deviated in the previous releases. Event-driven telemetry is not supported for the PCIe container.
openconfig-p4rt.yang Version 0.4.0	This OpenConfig data model introduces augments with the following changes: • For non-channelized interfaces, references the hardware port corresponding to the base interface using hardware-port leaf • Defines operational state data for the pluggable optics using transceivers leaf

Feature	Description
openconfig-qos.yang Version 0.8.0	This OpenConfig data model is revised from version 0.5.0 to 0.8.0 to support the following enhancements: • Configure the queue limit using dedicated-buffer leaf • Configure address and protocol matching conditions in the classifier using source-address, destination-address and protocol leaves for IPv4 and IPv6 address families • Specify the remark actions to be applied for packets matching the specified classification rules using set-dscp, set-dot1p, and set-mpls-tc leaves • Configure the hardware to map the named queue to a hardware queue using queue-id leaf • Configure the single rate, two color policer (1R2C) traffic shaping mechanism to manage and control network traffic based on different levels of priority and traffic behavior using cir, cir-pct, queuing-behavior, max-queue-depth-bytes, max-queue-depth-packets, and max-queue-depth-percent leaves • Configure the dual-rate, three-color policer (2R3C) traffic shaping mechanism using cir, cir-pct, pir, and pir-pct leaves • Configure Weighted Random Early Detection (WRED) threshold for queue depth using max-drop-probability-percent leaf • Retrieve the operational state of input interfaces using transmit-pkts, transmit-octets, dropped-pkts leaves, and dropped-octets leaf for both input and output interfaces • Retrieve the operational state of schedulers within the applied scheduler-policy using conforming-pkts, conforming-octets, exceeding-pkts, exceeding-octets, violating-pkts, and violating-octets leaves • Retrieve the operational state of the list of match terms in the classifier associated with the interface using matched-packets and matched-octets leaves
Cisco-IOS-XR-controller-optics-oper.yang	This Cisco native data model is enhanced to display the diagnostics parameters of the optical transceiver.
Cisco-IOS-XR-controller-optics-cfg.yang	The following new leaves are added to this Cisco native data model to enable loopback on the optical modules: • optics-loopback • optics-host-loopback

Feature	Description
openconfig-mpls-te.yang Version 3.3.0	This OpenConfig data model, which is part of the openconfig-network-instance.yang data model is revised from version 3.0.1 to 3.3.0. There are no functional changes between these two versions.
openconfig-mpls-rsvp.yang Version 4.0.0	This OpenConfig data model, which is part of the openconfig-network-instance.yang data model is revised from version 3.0.2 to 4.0.0. There are no functional changes between these two versions.
openconfig-procmon.yang version 0.4.0	This OpenConfig data model is revised from version 0.3.1 to 0.4.0. It is used to retrieve the operational data for processes running on a node. It is introduced to support the openconfig-system.yang data model to configure the following xpaths: • Fetch the process related information using the the pid leaf. • View the process name using the name leaf. • Fetch the current process command line arguments using args leaf. • View the time at which the process started using start-time leaf. • Check the CPU time consumed by the process in user mode using the cpu-usage-user leaf. • Check the CPU time consumed by this process in kernel mode using cpu-usage-system leaf. • Check the percentage of CPU that is being used by the process using cpu-utilization leaf. • Check the bytes allocated and still in use by the process using memory-usage leaf. • View the percentage of RAM that is being used by a process using memory-utilization leaf.
openconfig-mpls.yang Version 3.3.0	This OpenConfig data model is revised from version 3.2.2 to 3.3.0. It is a part of the openconfig-network-instance.yang data model and introduces the following leaves: • Enable Time To Live (TTL) propagation in the MPLS domain using the ttl-propagation leaf. • Enable MPLS forwarding capability on an interface using mpls-enabled leaf. You can stream model-driven telemetry data (MDT) for the operational state of the nodes.

Feature	Description
openconfig-mpls-types.yang Version 3.4.0	This OpenConfig data model, which is part of the openconfig-network-instance.yang data model is revised from version 3.2.0 to 3.4.0. There are no functional changes between these two versions.
Cisco-IOS-XR-mpls-te-act.yang	This Cisco native YANG data model enables you to teardown and re-establish LSP tunnels at head-end, mid-end, and tail-end routers of the MPLS network.
Cisco-IOS-XR-mpls-ldp-cfg	This Cisco native YANG data model lets you to auto-configure all named and numbered tunnels in an MPLS network. It also lets you to provide a regular expression that is auto-enabled if the tunnel name or number matches with the regular expression.
openconfig-network-instance.yang	This OpenConfig data model introduces cadence-driven telemetry support to obtain and monitor the total active route counts on IPv4 or IPv6 default tables in a route processor using `installed-routes` leaf. Model-driven telemetry (MDT) sensor subscription can be enabled. Event-driven telemetry and Netconf protocol for default VRF table are not supported.
Cisco-IOS-XR-um-performance-measurement-cfg.yang	This unified data model is enhanced as follows: • New containers *allow-querier* and *allow-responder*, to configure the list of IP addresses that can send TWAMP-light packets to responder or querier nodes. • A new container, *flow-label*, to monitor the liveness of multiple paths for a given segment list.
Cisco-IOS-XR-perf-meas-oper.yang	This native data model is enhanced as follows: • New containers, *allowed-responder-summary* and *allowed-querier-summary*, to configure the list of IP addresses that can send TWAMP-light packets to responder or querier nodes. • new container, *usid-info*, and new leaves such as *sid-value, usid-length, sid-format*, and *sid-behavior* in the *PM-USID-INFO* grouping, to monitor the liveness of a SRv6 candidate path.
Cisco-IOS-XR-infra-xtc-agent-cfg.yang	This native data model is enhanced with a new leaf, *minimum-active-segment-lists*, to configure the minimum number of active segment lists associated with the candidate path.
Cisco-IOS-XR-npu-hw-profile-cfg	This native data model is enhanced with a new leaf, underlay-hash, to enable GUE underlay hash feature.

Feature	Description
Cisco-IOS-XR-crypto-macsec-mka-cfg.yang	This native data model is enhanced with a new node, `lldp-in-clear` under MACsec policy exceptions xpath *Cisco-IOS-XR-crypto-macsec-mka-cfg:/macsec/policy-names/policy-name/allow/*, to retain the LLDP packets unencrypted when MACsec encryption is enabled.
Cisco-IOS-XR-um-macsec-cfg.yang	This unified data model is enhanced as follows: • A new node, *lldp-in-clear* under MACsec policy exceptions xpath `Cisco-IOS-XR-um-macsec-cfg:/macsec-policy/policy-names/policy-name/allow/lldp-in-clear`, to retain the LLDP packets unencrypted when MACsec encryption is enabled. • A new node, `vlan-tags-in-clear` under xpath `Cisco-IOS-XR-um-macsec-cfg:/macsec-policy/policy-names/policy-name/`to retain the VLAN tags unencrypted to apply MACsec policies individually to different L3 subinterfaces that belong to the same main physical interface.
Cisco-IOS-XR-crypto-macsec-mka-oper.yang	This unified data model is enhanced as follows: • A new leaf, `lldp-in-clear`, to the `MKA-EDM-POLICY` container to retain the LLDP packets unencrypted when MACsec encryption is enabled. • A new leaf, `vlan-tags-in-clear` under xpath `Cisco-IOS-XR-crypto-macsec-mka-cfg: /macsec-policy/policy-names/policy-name/` to retain the VLAN tags unencrypted to apply MACsec policies individually to different L3 subinterfaces that belong to the same main physical interface.

Feature	Description
Cisco-IOS-XR-crypto-act.yang	This native data model is enhanced with a new leaf, *`key-num`*, under the following containers: *`key-import-authentication-rsa`: To import SSH public keys* to the router for the currently logged-in user *`key-import-authentication-rsa-username`: To import SSH public keys* to the router for a specific user *`key-zeroize-authentication-rsa`: To delete SSH public keys* in the router for the currently logged-in user *`key-zeroize-authentication-rsa-username`: To delete SSH public keys* in the router for a specific user The data model supports the following values for the key-num leaf: • 2: second key • 4: third key • 8: fourth key
Cisco-IOS-XR-um-ssh-cfg.yang	This unified data model is enhanced with the following new leaves under the `ssh server username` container to add up to 4 multiple public keys per user for public key-based authentication. `keystring-second`: Adds a second SSH public key for a user in the router. `keystring-third`: Adds a third SSH public key for a user in the router. `keystring-fourth`: Adds a fourth SSH public key for a user in the router.

Feature	Description
openconfig-aft.yang Revision 0.9.0	The Abstract Forwarding Table (AFT) OpenConfig data model is enhanced to support the following features: • The gRPC Network Management Interface (gNMI) proto is revised from version 0.7.0 to 0.8.0 to set the atomic flag to send AFT next-hop group notifications in JSON and PROTO encodings using gNMI subscribe RPC. Network events can be represented as multiple updates in the data models. The atomic flag allows NMS to interpret those multiple updates as a single event. • Stream telemetry data for conditional next-hop groups (CNHG) to provide DSCP information per prefix and list of input interfaces. This model helps to monitor the DSCP-based policy routing configuration at the forwarding layer. It now eliminates multiple lookups to map an IP prefix to an outgoing interface and IP address when internal labels are involved in that route. This is accomplished internally by reducing the hierarchy levels or flattening the nested next-hop telemetry updates. You can stream Event-driven telemetry (EDT) data.

Hardware Introduced

Cisco IOS XR Release 7.11.1 introduces the following hardware support:

Hardware Feature	Description
Route Processor Card 8800-RP2	This release introduces support for a new route processor card, 8800-RP2, on Cisco 8800 Series routers. It provides a capacity of 8-core x86 CPU at 2.7GHz with 64GB RAM. For more information, see the Cisco 8800 section in the Datasheet here.

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

Release 7.11.1 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
 Package                                                                  Version
---------------------------------------------------- ---------------------------
xr-8000-af-ea                                                      7.11.1v1.0.0-1
xr-8000-aib                                                        7.11.1v1.0.0-1
xr-8000-bfd                                                        7.11.1v1.0.0-1
xr-8000-buffhdr-ea                                                 7.11.1v1.0.0-1
xr-8000-bundles                                                    7.11.1v1.0.0-1
xr-8000-card-support                                               7.11.1v1.0.0-1
xr-8000-cdp-ea                                                     7.11.1v1.0.0-1
xr-8000-cem-driver                                                 7.11.1v1.0.0-1
xr-8000-cfm                                                        7.11.1v1.0.0-1
xr-8000-common-otn                                                 7.11.1v1.0.0-1
xr-8000-core                                                       7.11.1v1.0.0-1
xr-8000-cpa                                                        7.11.1v1.0.0-1
xr-8000-cpa-devobj-misc                                            7.11.1v1.0.0-1
xr-8000-cpa-npu                                                    7.11.1v1.0.0-1
xr-8000-cpa-sb-data                                                7.11.1v1.0.0-1
xr-8000-dot1x                                                      7.11.1v1.0.0-1
xr-8000-dsm                                                        7.11.1v1.0.0-1
xr-8000-dyinggasp-pd                                               7.11.1v1.0.0-1
xr-8000-encap-id                                                   7.11.1v1.0.0-1
xr-8000-ether-ea                                                   7.11.1v1.0.0-1
xr-8000-fabric                                                     7.11.1v1.0.0-1
xr-8000-feat-mgr                                                   7.11.1v1.0.0-1
xr-8000-fib-ea                                                     7.11.1v1.0.0-1
xr-8000-forwarder                                                  7.11.1v1.0.0-1
xr-8000-fpd                                                        7.11.1v1.0.0-1
xr-8000-fwd-tools                                                  7.11.1v1.0.0-1
xr-8000-fwdlib                                                     7.11.1v1.0.0-1
xr-8000-gil-ea                                                     7.11.1v1.0.0-1
xr-8000-host-core                                                  7.11.1v1.0.0-1
xr-8000-l2fib                                                      7.11.1v1.0.0-1
xr-8000-l2mcast                                                    7.11.1v1.0.0-1
xr-8000-leabaofa                                                   7.11.1v1.0.0-1
xr-8000-libofaasync                                                7.11.1v1.0.0-1
xr-8000-lpts-ea                                                    7.11.1v1.0.0-1
xr-8000-mcast                                                      7.11.1v1.0.0-1
xr-8000-netflow                                                    7.11.1v1.0.0-1
xr-8000-npu                                                        7.11.1v1.0.0-1
xr-8000-oam                                                        7.11.1v1.0.0-1
xr-8000-optics                                                     7.11.1v1.0.0-1
xr-8000-os-oe                                                      7.11.1v1.0.0-1
xr-8000-os-oe-extra                                                7.11.1v1.0.0-1
xr-8000-pbr                                                        7.11.1v1.0.0-1
xr-8000-pd-port-mode                                               7.11.1v1.0.0-1
xr-8000-pfilter                                                    7.11.1v1.0.0-1
xr-8000-pidb                                                       7.11.1v1.0.0-1
xr-8000-pktio                                                      7.11.1v1.0.0-1
xr-8000-ple-sdk                                                    7.11.1v1.0.0-1
xr-8000-pm                                                         7.11.1v1.0.0-1
xr-8000-port-mapper                                                7.11.1v1.0.0-1
xr-8000-ppinfo                                                     7.11.1v1.0.0-1
xr-8000-pwhe-ea                                                    7.11.1v1.0.0-1
xr-8000-qos-ea                                                     7.11.1v1.0.0-1
xr-8000-span                                                       7.11.1v1.0.0-1
xr-8000-spio                                                       7.11.1v1.0.0-1
xr-8000-spp-ea                                                     7.11.1v1.0.0-1
xr-8000-timing                                                     7.11.1v1.0.0-1
xr-8000-tunnel-ip                                                  7.11.1v1.0.0-1
xr-8000-utapp-blaze                                                7.11.1v1.0.0-1
xr-8000-vether                                                     7.11.1v1.0.0-1
xr-8000-ztp-ea                                                     7.11.1v1.0.0-1
xr-aaa                                                             7.11.1v1.0.0-1
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xr-acl	7.11.1v1.0.0-1
xr-apphosting	7.11.1v1.0.0-1
xr-appmgr	7.11.1v1.0.0-1
xr-bcdl	7.11.1v1.0.0-1
xr-bfd	7.11.1v1.0.0-1
xr-bgp	7.11.1v1.0.0-1
xr-bgputil	7.11.1v1.0.0-1
xr-bng-stubs	7.11.1v1.0.0-1
xr-bundles	7.11.1v1.0.0-1
xr-cal-pi	7.11.1v1.0.0-1
xr-cdp	7.11.1v1.0.0-1
xr-cds	7.11.1v1.0.0-1
xr-cfgmgr	7.11.1v1.0.0-1
xr-cfm	7.11.1v1.0.0-1
xr-cofo	7.11.1v1.0.0-1
xr-core	7.11.1v1.0.0-1
xr-core-calv	7.11.1v1.0.0-1
xr-cpa-common	7.11.1v1.0.0-1
xr-cpa-common-optics	7.11.1v1.0.0-1
xr-cpa-common-psu	7.11.1v1.0.0-1
xr-cpa-driver-devobj-gnss	7.11.1v1.0.0-1
xr-cpa-driver-devobj-misc	7.11.1v1.0.0-1
xr-cpa-driver-devobj-npu	7.11.1v1.0.0-1
xr-cpa-driver-devobj-phy	7.11.1v1.0.0-1
xr-cpa-driver-devobj-sensors	7.11.1v1.0.0-1
xr-cpa-driver-devobj-storage	7.11.1v1.0.0-1
xr-cpa-driver-devobj-test	7.11.1v1.0.0-1
xr-cpa-driver-devobj-timing	7.11.1v1.0.0-1
xr-cpa-driver-fpgalib-access	7.11.1v1.0.0-1
xr-cpa-driver-fpgalib-common	7.11.1v1.0.0-1
xr-cpa-driver-fpgalib-infra	7.11.1v1.0.0-1
xr-cpa-driver-fpgalib-kmod-oe	7.11.1v1.0.0-1
xr-cpa-driver-fpgalib-misc	7.11.1v1.0.0-1
xr-cpa-driver-fpgalib-optics	7.11.1v1.0.0-1
xr-cpa-driver-optics	7.11.1v1.0.0-1
xr-cpa-ethsw	7.11.1v1.0.0-1
xr-cpa-idprom	7.11.1v1.0.0-1
xr-cpa-tamlib	7.11.1v1.0.0-1
xr-ctc	7.11.1v1.0.0-1
xr-debug	7.11.1v1.0.0-1
xr-dhcp	7.11.1v1.0.0-1
xr-diags	7.11.1v1.0.0-1
xr-diskboot	7.11.1v1.0.0-1
xr-drivers	7.11.1v1.0.0-1
xr-eem	7.11.1v1.0.0-1
xr-elmi-stubs	7.11.1v1.0.0-1
xr-ema	7.11.1v1.0.0-1
xr-enhancedmanageability	7.11.1v1.0.0-1
xr-erp	7.11.1v1.0.0-1
xr-featurecapability	7.11.1v1.0.0-1
xr-fib	7.11.1v1.0.0-1
xr-filesysinv	7.11.1v1.0.0-1
xr-foundation-8000	7.11.1v1.0.0-1
xr-fpd	7.11.1v1.0.0-1
xr-gil	7.11.1v1.0.0-1
xr-ha-infra	7.11.1v1.0.0-1
xr-healthcheck	7.11.1v1.0.0-1
xr-host-core	7.11.1v1.0.0-1
xr-httpclient	7.11.1v1.0.0-1
xr-icpe-eth	7.11.1v1.0.0-1
xr-icpe-opt	7.11.1v1.0.0-1
xr-identifier	7.11.1v1.0.0-1
xr-infra-sla	7.11.1v1.0.0-1
xr-install	7.11.1v1.0.0-1

```
xr-ip-apps                                                              7.11.1v1.0.0-1
xr-ip-core                                                              7.11.1v1.0.0-1
xr-ip-infra-vrf                                                         7.11.1v1.0.0-1
xr-ip-mibs                                                              7.11.1v1.0.0-1
xr-ip-static                                                            7.11.1v1.0.0-1
xr-ipc                                                                  7.11.1v1.0.0-1
xr-ipsla                                                                7.11.1v1.0.0-1
xr-is-is                                                                7.11.1v1.0.0-1
xr-k9sec                                                                7.11.1v1.0.0-1
xr-l2snooptransport                                                     7.11.1v1.0.0-1
xr-l2vpn                                                                7.11.1v1.0.0-1
xr-ldp                                                                  7.11.1v1.0.0-1
xr-licensing                                                            7.11.1v1.0.0-1
xr-link-oam                                                             7.11.1v1.0.0-1
xr-linuxnetworking                                                      7.11.1v1.0.0-1
xr-linuxsecurity                                                        7.11.1v1.0.0-1
xr-lldp                                                                 7.11.1v1.0.0-1
xr-lpts                                                                 7.11.1v1.0.0-1
xr-manageabilityxml                                                     7.11.1v1.0.0-1
xr-mandatory                                                            7.11.1v1.0.0-1
xr-mcast                                                                7.11.1v1.0.0-1
xr-mcastl2snoop                                                         7.11.1v1.0.0-1
xr-mda                                                                  7.11.1v1.0.0-1
xr-mpls                                                                 7.11.1v1.0.0-1
xr-mpls-oam                                                             7.11.1v1.0.0-1
xr-mpls-oam-client                                                      7.11.1v1.0.0-1
xr-mpls-static                                                          7.11.1v1.0.0-1
xr-netflow                                                              7.11.1v1.0.0-1
xr-networkboot                                                          7.11.1v1.0.0-1
xr-nosi                                                                 7.11.1v1.0.0-1
xr-ntp                                                                  7.11.1v1.0.0-1
xr-ofa                                                                  7.11.1v1.0.0-1
xr-ops-script-repo                                                      7.11.1v1.0.0-1
xr-optics                                                               7.11.1v1.0.0-1
xr-orrspf                                                               7.11.1v1.0.0-1
xr-os-oe-apps                                                           7.11.1v1.0.0-1
xr-os-oe-core                                                           7.11.1v1.0.0-1
xr-os-oe-hardware                                                       7.11.1v1.0.0-1
xr-ospf                                                                 7.11.1v1.0.0-1
xr-p4rt                                                                 7.11.1v1.0.0-1
xr-perf-meas                                                            7.11.1v1.0.0-1
xr-perfmgmt                                                             7.11.1v1.0.0-1
xr-pfi                                                                  7.11.1v1.0.0-1
xr-pird-stubs                                                           7.11.1v1.0.0-1
xr-pkt-trace                                                            7.11.1v1.0.0-1
xr-platforms-ras                                                        7.11.1v1.0.0-1
xr-pm-alarm                                                             7.11.1v1.0.0-1
xr-portmode                                                             7.11.1v1.0.0-1
xr-procmgr                                                              7.11.1v1.0.0-1
xr-python                                                               7.11.1v1.0.0-1
xr-qos                                                                  7.11.1v1.0.0-1
xr-rid-mgr                                                              7.11.1v1.0.0-1
xr-routing                                                              7.11.1v1.0.0-1
xr-rpl                                                                  7.11.1v1.0.0-1
xr-rsvp-te                                                              7.11.1v1.0.0-1
xr-sanitizer-tools                                                      7.11.1v1.0.0-1
xr-security                                                             7.11.1v1.0.0-1
xr-security-tams                                                        7.11.1v1.0.0-1
xr-secy-driver                                                          7.11.1v1.0.0-1
xr-servicelayer                                                         7.11.1v1.0.0-1
xr-snmp                                                                 7.11.1v1.0.0-1
xr-snmp-hw                                                              7.11.1v1.0.0-1
xr-span                                                                 7.11.1v1.0.0-1
xr-spi-core                                                             7.11.1v1.0.0-1
```

```
xr-spi-hw                                                           7.11.1v1.0.0-1
xr-spp                                                              7.11.1v1.0.0-1
xr-sr                                                               7.11.1v1.0.0-1
xr-stats                                                            7.11.1v1.0.0-1
xr-stp                                                              7.11.1v1.0.0-1
xr-stubs                                                            7.11.1v1.0.0-1
xr-sysdb                                                            7.11.1v1.0.0-1
xr-syslog                                                           7.11.1v1.0.0-1
xr-telemetry                                                        7.11.1v1.0.0-1
xr-telnet                                                           7.11.1v1.0.0-1
xr-tftp                                                             7.11.1v1.0.0-1
xr-timing                                                           7.11.1v1.0.0-1
xr-tmpdir-cleanup                                                   7.11.1v1.0.0-1
xr-track                                                            7.11.1v1.0.0-1
xr-transports                                                       7.11.1v1.0.0-1
xr-tty                                                              7.11.1v1.0.0-1
xr-tunnel-ip                                                        7.11.1v1.0.0-1
xr-tunnel-nve                                                       7.11.1v1.0.0-1
xr-upgradematrix                                                    7.11.1v1.0.0-1
xr-utils                                                            7.11.1v1.0.0-1
xr-vether                                                           7.11.1v1.0.0-1
xr-vpnmib                                                           7.11.1v1.0.0-1
xr-xmlinfra                                                         7.11.1v1.0.0-1
xr-xrlibcurl                                                        7.11.1v1.0.0-1
xr-ztp                                                              7.11.1v1.0.0-1
```

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
CSCwh42439	For the 88-LC0-34H14FH line card, you must breakout only 3 ports instead of 4 ports to avoid the `QOS-DPA_QOSEA-2-TMPORT_PROG_ERROR` issue, which creates partial interfaces during configuration mode.

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 7.11.1 LNT
Copyright (c) 2013-2023 by Cisco Systems, Inc.
```

```
Build Information:
 Built By     : deenayak
 Built On     : Sun Dec 03 03:52:54 UTC 2023
 Build Host   : iox-ucs-037
 Workspace    : /auto/srcarchive14/prod/7.11.1/8000/ws/
 Version      : 7.11.1
 Label        : 7.11.1

cisco 8000 (Intel(R) Xeon(R) CPU D-1530 @ 2.40GHz)
cisco 8202-32FH-M (Intel(R) Xeon(R) CPU D-1530 @ 2.40GHz) processor with 32GB of memory
R1 uptime is 2 days, 10 hours, 20 minutes
Cisco 8200 2RU 32x400G QSFP56-DD w/IOS XR HBM MACsec
```

Determine Firmware Support

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

Cisco 8100 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

=================== ========================== ====== ======= ======== =========

--------------------------------------------------------------------------------

8102-64H             Bios                      YES     1.15     1.15      0.0

                     BiosGolden                YES     1.15     1.13      0.0

                     IoFpga                    YES     1.04     1.04      0.0

                     IoFpgaGolden              YES     1.04     1.04      0.0

                     SsdIntelS3520             YES     1.21     1.21      0.0

                     SsdIntelS4510             YES    11.32    11.32      0.0

                     SsdMicron5100             YES     7.01     7.01      0.0

                     SsdMicron5300             YES     0.01     0.01      0.0

                     x86Fpga                   YES     1.88     1.88      0.0

                     x86FpgaGolden             YES     1.88     1.06      0.0

                     x86TamFw                  YES     6.13     6.13      0.0

                     x86TamFwGolden            YES     6.13     6.05      0.0

--------------------------------------------------------------------------------
```

```
8102-64H-O           Bios                          YES     0.241      0.241      0.0

                     BiosGolden                    YES     0.241      0.241      0.0

                     IoFpga                        YES     1.04       1.04       0.0

                     IoFpgaGolden                  YES     1.04       1.04       0.0

                     SsdIntelS3520                 YES     1.21       1.21       0.0

                     SsdIntelS4510                 YES    11.32      11.32       0.0

                     SsdMicron5100                 YES     7.01       7.01       0.0

                     SsdMicron5300                 YES     0.01       0.01       0.0

                     x86Fpga                       YES     1.88       1.88       0.0

                     x86FpgaGolden                 YES     1.88       1.06       0.0

                     x86TamFw                      YES     6.13       6.13       0.0

                     x86TamFwGolden                YES     6.13       6.05       0.0
--------------------------------------------------------------------------------
PSU650W-ACPE         LI-SecMCU                     NO      2.55       2.55       0.0
--------------------------------------------------------------------------------
PSU650W-ACPI         LI-SecMCU                     NO      2.54       2.54       0.0
--------------------------------------------------------------------------------
PSU930W-DCPE         LI-SecMCU                     NO      2.03       2.03       0.0
--------------------------------------------------------------------------------

PSU930W-DCPI         LI-SecMCU                     NO      3.03       3.03       0.0
```

Cisco 8200 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
=================== ========================== ====== ======= ======== =========
--------------------------------------------------------------------------------
8201                 Bios                          YES     1.29       1.29       0.0
                     BiosGolden                    YES     1.29       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
                     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
                     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     1.29      1.29      0.0
                    BiosGolden                 YES     1.29      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
                    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
                    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
--------------------------------------------------------------------------------
PSU1.4KW-ACPI       DT-PrimMCU                 NO      3.01      3.01      0.0
                    DT-SecMCU                  NO      2.02      2.02      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      3.01      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
--------------------------------------------------------------------------------
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      1.02       1.02       0.1
                     IoFpgaGolden               NO       1.02       1.00       0.1
------------------------------------------------------------------------------
86-MPA-24Z-M         IoFpga                     YES      1.02       1.02       0.1
                     IoFpgaGolden               NO       1.02       1.00       0.1
------------------------------------------------------------------------------
86-MPA-4FH-M         IoFpga                     YES      1.02       1.02       0.1
                     IoFpgaGolden               NO       1.02       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      1.09       1.09       0.0
                     BiosGolden                 YES      1.09       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
                     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       8.04       1.04       0.0
                     DT-PrimMCU                 NO       8.02       1.02       0.0
                     DT-SecMCU                  NO       8.02       1.02       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      1.15       1.15       0.0
                     BiosGolden                 YES      1.15       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
                     SsdMicron5100              YES      7.01       7.01       0.0
                     SsdMicron5300              YES      0.01       0.01       0.0
                     x86Fpga                    YES      0.91       0.91       0.1
                     x86FpgaGolden              YES      0.91       0.78       0.1
```

```
                     x86TamFw                    YES     6.13      6.13      0.1
                     x86TamFwGolden              YES     6.13      6.10      0.1
--------------------------------------------------------------------------------
88-LC0-34H14FH-O     Bios                        YES     0.241     0.241     0.0
                     BiosGolden                  YES     0.241     0.241     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
                     SsdMicron5100               YES     7.01      7.01      0.0
                     SsdMicron5300               YES     0.01      0.01      0.0
                     x86Fpga                     YES     0.91      0.91      0.1
                     x86FpgaGolden               YES     0.91      0.78      0.1
                     x86TamFw                    YES     6.13      6.13      0.1
                     x86TamFwGolden              YES     6.13      6.10      0.1
--------------------------------------------------------------------------------
88-LC0-36FH          Bios                        YES     1.15      1.15      0.0
                     BiosGolden                  YES     1.15      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
                     IoFpgaGolden                YES     1.14      1.00      0.1
                     SsdIntelS3520               YES     1.21      1.21      0.0
                     SsdIntelS4510               YES    11.32     11.32      0.0
                     SsdMicron5100               YES     7.01      7.01      0.0
                     SsdMicron5300               YES     0.01      0.01      0.0
                     x86Fpga                     YES     1.46      1.46      0.1
                     x86FpgaGolden               YES     1.46      1.04      0.1
                     x86TamFw                    YES     6.18      6.18      0.1
                     x86TamFwGolden              YES     6.18      6.05      0.1
--------------------------------------------------------------------------------
88-LC0-36FH-M        Bios                        YES     1.15      1.15      0.0
                     BiosGolden                  YES     1.15      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
                     IoFpgaGolden                YES     1.14      1.00      0.1
                     SsdIntelS3520               YES     1.21      1.21      0.0
                     SsdIntelS4510               YES    11.32     11.32      0.0
                     SsdMicron5100               YES     7.01      7.01      0.0
                     SsdMicron5300               YES     0.01      0.01      0.0
                     x86Fpga                     YES     1.46      1.46      0.1
                     x86FpgaGolden               YES     1.46      1.04      0.1
                     x86TamFw                    YES     6.18      6.18      0.1
                     x86TamFwGolden              YES     6.18      6.05      0.1
--------------------------------------------------------------------------------
88-LC0-36FH-MO       Bios                        YES     0.241     0.241     0.0
                     BiosGolden                  YES     0.241     0.241     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
                     IoFpgaGolden                YES     1.14      1.00      0.1
                     SsdIntelS3520               YES     1.21      1.21      0.0
                     SsdIntelS4510               YES    11.32     11.32      0.0
                     SsdMicron5100               YES     7.01      7.01      0.0
                     SsdMicron5300               YES     0.01      0.01      0.0
                     x86Fpga                     YES     1.46      1.46      0.1
                     x86FpgaGolden               YES     1.46      1.04      0.1
                     x86TamFw                    YES     6.18      6.18      0.1
                     x86TamFwGolden              YES     6.18      6.05      0.1
--------------------------------------------------------------------------------
88-LC0-36FH-O        Bios                        YES     0.241     0.241     0.0
```

	BiosGolden	YES	0.241	0.241	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
	IoFpgaGolden	YES	1.14	1.00	0.1
	SsdIntelS3520	YES	1.21	1.21	0.0
	SsdIntelS4510	YES	11.32	11.32	0.0
	SsdMicron5100	YES	7.01	7.01	0.0
	SsdMicron5300	YES	0.01	0.01	0.0
	x86Fpga	YES	1.46	1.46	0.1
	x86FpgaGolden	YES	1.46	1.04	0.1
	x86TamFw	YES	6.18	6.18	0.1
	x86TamFwGolden	YES	6.18	6.05	0.1
8800-LC-36FH	Bios	YES	1.29	1.29	0.0
	BiosGolden	YES	1.29	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
	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
	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	1.29	1.29	0.0
	BiosGolden	YES	1.29	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
	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
                     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     1.29      1.29      0.0
                     BiosGolden                  YES     1.29      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
                     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     1.38      1.38      0.0
                     x86FpgaGolden               YES     1.38      0.24      0.0
                     x86TamFw                    YES     5.17      5.17      0.0
                     x86TamFwGolden              YES     5.17      5.05      0.0
--------------------------------------------------------------------------------
8800-RP-E            Bios                        YES     1.29      1.29      0.0
                     BiosGolden                  YES     1.29      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
                     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     1.38      1.38      0.0
                     x86FpgaGolden               YES     1.38      0.24      0.0
                     x86TamFw                    YES     5.17      5.17      0.0
                     x86TamFwGolden              YES     5.17      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
                     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     1.38      1.38      0.0
                     x86FpgaGolden               YES     1.38      0.24      0.0
                     x86TamFw                    YES     5.17      5.17      0.0
                     x86TamFwGolden              YES     5.17      5.05      0.0
--------------------------------------------------------------------------------
8800-RP2             Bios                        YES     1.09      1.09      0.3
                     BiosGolden                  YES     1.09      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
                     TimingFpga                  YES     1.01      1.01      0.0
                     TimingFpgaGolden            YES     1.01      1.00      0.0
```

```
                    x86Fpga                    YES     1.11       1.11       0.6
                    x86FpgaGolden              YES     1.11       1.02       0.6
                    x86TamFw                   YES     7.17       7.17       0.6
                    x86TamFwGolden             YES     7.17       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
                    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
                    IoFpgaGolden               YES     1.00       0.16       0.0
-------------------------------------------------------------------------------
8808-FAN            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
                    IoFpgaGolden               YES     1.00       0.16       0.0
-------------------------------------------------------------------------------
8808-FC1-G          IoFpga                     YES     1.05       1.05       0.0
                    IoFpgaGolden               YES     1.05       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
                    IoFpgaGolden               YES     1.00       0.16       0.0
                    Retimer                    YES     3.00       3.00       0.0
-------------------------------------------------------------------------------
PSU-4.8KW-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
```

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.

Supported Transceiver Modules

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

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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