New Features for Cisco ASR 920 Series Routers

This chapter describes the new features supported on the Cisco ASR 920 Series Router for a specified release.

Content

New Hardware Features in Cisco IOS XE 3.18.9SP

There are no new hardware features in this release.

New Software Features in Cisco IOS XE 3.18.9SP

There are no new software features in this release.

New Hardware Features in Cisco IOS XE 3.18.8aSP

There are no new hardware features in this release.

New Software Features in Cisco IOS XE 3.18.8aSP

There are no new software features in this release.

New Hardware Features in Cisco IOS XE 3.18.7SP

There are no new hardware features in this release.

New Software Features in Cisco IOS XE 3.18.7SP

There are no new software features in this release.

New Hardware Features in Cisco IOS XE 3.18.6SP

There are no new hardware features in this release.

New Software Features in Cisco IOS XE 3.18.6SP

There are no new software features in this release.

New Hardware Features in Cisco IOS XE 3.18.5SP

There are no new hardware features in this release.

New Software Features in Cisco IOS XE 3.18.5SP

There are no new software features in this release.

New Hardware Features in Cisco IOS XE 3.18.4SP

There are no new hardware features in this release.

New Software Features in Cisco IOS XE 3.18.4SP

There are no new software features in this release.

New Hardware Features in Cisco IOS XE 3.18.3SP

There are no new hardware features in this release.

New Software Features in Cisco IOS XE 3.18.3SP

There are no new software features in this release.

New Hardware Features in Cisco IOS XE 3.18.2SP

There are no new hardware features in this release.

New Software Features in Cisco IOS XE 3.18.2SP

There are no new software features in this release.

New Hardware Features in Cisco IOS XE 3.18.1SP

There are no new hardware features in this release.

New Software Features in Cisco IOS XE 3.18.1SP

- **FlexLSP Inter-area support on non-corouted mode**

  Flex LSP supports inter-area tunnels with non co-routed mode.

  For more information on the restrictions for this feature and its configuration details, see *Flex LSP Overview*

- **Leap Second**

  In this release, you can configure the leap second event date and Offset value (+1 or -1) on master ordinary clock, hybrid boundary clock, dynamic ports, and virtual ports.

  The following two new keywords are added to the **utc-offset** command:

  - **leap second**
  - **offset**

  For more information, see *Configuring Clocking and Timing* and *G.8275.1 Telecom Profile*

- **Support for OC3/OC12 Smart SFP**

  The OC3/OC12 Smart SFP supporting CEP (VCoP Smart SFP) is a special type of optical transceiver which encapsulates SONET bit stream at STS1 or STS-3c or STS-12c level into packet format. The VCoP Smart SFP forwards the SONET signal in a transparent manner.

  For more information, see *Configuring VCoP Smart SFP*

- **Time Properties Holdover Time**

  In this release, you can configure time properties holdover time on boundary clock, hybrid boundary clock, and dynamic ports.

  The following new command is introduced:

  time-properties persist

  For more information, see *Configuring Clocking and Timing* and *G.8275.1 Telecom Profile*

New Hardware Features in Cisco IOS XE 3.18.3S

There are no new hardware features in this release.

New Software Features in Cisco IOS XE 3.18.3S

There are no new software features in this release.

New Hardware Features in Cisco IOS XE 3.18.2S

There are no new hardware features in this release.

New Software Features in Cisco IOS XE 3.18.2S

There are no new software features in this release.

New Hardware Features in Cisco IOS XE 3.18 SP

There are no new hardware features in this release.

New Software Features in Cisco IOS XE 3.18 SP

- **Flex LSP**

  Cisco ASR 920 Series Routers support Flex Label Switched Paths (Flex LSPs).

  Flex LSPs are LSP instances where the forward and the reverse direction paths are setup, monitored and protected independently and associated together during signaling. You use a RSVP Association object to bind the two forward and reverse LSPs together to form either a co-routed or non co-routed associated bidirectional TE tunnel.

  For more information, see *Flex LSP Overview*

- **FLEX LSP Layer 2 VPN PW CAC with persistent bandwidth**

  When you add the persistent keyword to the bandwidth number command, the pseudowire's bandwidth is recovered and is available when the VC is in down state.

  There are two ways to configure the persistent bandwidth, you can either configure through template, or under the interface pseudowire directly. If an interface pseudowire is configured with both template and the direct configuration, the direct configuration will overwrite the bandwidth configured through template.

  For more information, see *Configuring Bandwidth of the Pseudowire with Persistent keyword*.

- **Netflow with EFP Support**

  Netflow is supported on ASR 920 router. NetFlow provides data to enable network and security monitoring, network planning, traffic analysis, and IP accounting.

  The following features are supported for Netflow:

  - Netflow—IPv4 and IPv6 unicast flows
  - Netflow Export over IPv4 and IPv6 addresses

Netflow support is made available through a separate FPGA Image. This is applicable for ASR-920-12CZ-A, ASR-920-12CZ-D, ASR-920-4SZ-A, ASR-920-4SZ-D, and ASR-920-12SZ-IM routers.

To configure netflow and issue Netflow commands, select the template

- For Cisco ASR-920-12CZ-A, ASR-920-12CZ-D, ASR-920-4SZ-A, ASR-920-4SZ-D, ASR-920-12SZ-IM routers—**sdm prefer netflow-video** This sets the template to video, and also allows configuration of netflow monitoring options by upgrading the router with the netflow supported FPGA.
- For Cisco ASR-920-24SZ-IM, ASR-920-24SZ-M, ASR-920-24TZ-M routers—**sdm prefer video**.

The **sdm prefer netflow-video** command is introduced on the ASR 920 router. The **netflow-video** keyword is added. This keyword is introduced on the Cisco ASR 920 router (ASR-920-12CZ-A, ASR-920-12CZ-D, ASR-920-4SZ-A, ASR-920-4SZ-D, and ASR-920-12SZ-IM).

For more information, see *Flexible Netflow Configuration Guide (Cisco ASR 920 Series)*

- ## PTP Interoperability Improvements

  - Set Threshold Clock-class Value

    This release introduces the support to set the threshold clock-class value. This allows the PTP algorithm to use the time stamps from an upstream master clock, only if the clock-class sent by the master clock is less than or equal to the configured threshold clock-class. The following new command is introduced:

    min-clock-class

    For more information, see *Configuring a Hybrid Clock*.

  - Set Threshold QL Value for NetSync Algorithm

    This release introduces the support to set the threshold QL value for the input frequency source. The input frequency source, which is better than or equal to the configured threshold QL value is selected to recover the frequency. Otherwise, the internal clock is selected. The following new command is introduced:

    network-clock synchronization input-threshold

    For more information, see *Configuring a Hybrid Boundary Clock*.

  - Set UTC Offset Value

    This release introduces the support to set the UTC Offset value. The following new command is introduced:

    utc-offset

    For more information, see *Configuring a Master Ordinary Clock*.

- ## Support for G.8273.2 Telecom Recommendation

  Cisco ASR 920 Series Aggregation Services Routers (Cisco ASR-920-12CZ-A/D, ASR-920-4SZ-A/D, Cisco ASR 920-10SZ-PD and Cisco ASR-920-24SZ-IM, ASR-920-24SZ-M, ASR-920-24TZ-M) support the G.8273.2 telecom recommendation.

  For more information, see *G.8275.1 Telecom Profile*

- ## TWAMP Responder on IP VRF Interface

  Cisco ASR 920 routers support TWAMP responder on IP VRF interfaces.

The IETF Two-Way Active Measurement Protocol (TWAMP) defines a standard for measuring round-trip network performance between any two devices that support the TWAMP protocols. The TWAMP-Control protocol is used to set up performance measurement sessions. The TWAMP-Test protocol is used to send and receive performance-measurement probes.

For more information, see IP SLAs Configuration Guide (Cisco ASR 920 Series).

New Hardware Features in Cisco IOS XE 3.18.1S

There are no new hardware features in this release.

New Software Features in Cisco IOS XE 3.18.1S

There are no new software features in this release.

New Hardware Features in Cisco IOS XE 3.18S

There are no new hardware features in this release.

New Software Features in Cisco IOS XE 3.18S

- **Asymmetric Rewrite Rules**

  Effective Cisco IOS-XE Release 3.18S, this feature introduces new rewrite rules for the egress direction in the EFP. You can configure asymmetric rewrite rules in both ingress and egress directions of the EFP.

  For more information about asymmetric rewrite rules, see *Ethernet Virtual Connections Configuration*.

- **BGP PIC Support for TDM Pseudowires**

  Starting Cisco IOS XE Release 3.18S, BGP PIC is supported for all pseudowires on the Cisco ASR 900 RSP2 module.

  Starting Cisco IOS XE Release 3.18S, BGP PIC is supported with MPLS Traffic-engineering in the core on the Cisco ASR 900 RSP1 and RSP2 modules.

  For information, see *Configuring Pseudowires*.

- **CEMoUDP for 32 T1/E1**

  Effective Cisco IOS-XE Release 3.18S, CEMoUDP is supported on 32 T1/E1 interface module.

  For more information, see *Circuit Emulation Service over UDP*.

- **Clear Channel ATM (on OC-3 / STM1)**

  Effective Cisco IOS-XE Release 3.18S, Clear Channel ATM on OC-3 or STM1 is supported on Cisco ASR-920-24SZ-IM and Cisco ASR-920-12SZ-IM Aggregation Services Router.

  For more information, see *Configuring ATM*.

- **Delay and Jitter Support**

  Effective Cisco IOS-XE Release 3.18S, the delay and jitter are supported in service performance test.

  For more information, see *IP SLA - Service Performance Testing*.

- **EtherChannel Min-Links**

  The EtherChannel Min-Links feature is supported on LACP EtherChannels. This feature allows you to configure the minimum number of member ports that must be in the link-up state and bundled in the EtherChannel for the port channel interface to transition to the link-up state.

  For more information, see *Configuring IEEE 802.3ad Link Bundling*.

- **Ethernet Local Connect**

  Effective Cisco IOS-XE Release 3.18S, you can connect two end points (service instances) using the Local connect (Layer 2 point to point service), which is a point to point connection.

  For more information about EVC Local Connect, see *Ethernet Virtual Connections Configuration*.

- **Ethernet Loopback with Other Types of Encapsulation**

  Effective Cisco IOS-XE Release 3.18S, Ethernet loopback for default and untagged EFPS is available.

  For more information about Ethernet Loopback, see *Configuring Ethernet Dataplane Loopback*.

- **EVPN VPWS Single Homed**

  Effective Cisco IOS-XE Release 3.18S, this feature is a BGP control plane solution for point-to-point services. It has the ability to forward traffic from or to one network to another using the Ethernet Segment without MAC lookup.

  For more information about Ethernet Loopback, see *EPVN Virtual Private Wire Service (VPWS) Single Homed*.

- **Flexi License**

  This feature enables the flexi license on Cisco ASR 920 Series Routers beginning with Cisco IOS-XE Release 3.18S. For more information, see *Flexi License*.

- **IPSec**

  Starting with Cisco IOS-XE Release 3.18S, IPsec tunnel is supported only on the Cisco ASR920-12SZ-IM router with payload encryption (PE) images.

Note IPsec license must be acquired and installed on the router for IPsec to work.

Note NPE images shipped for Cisco ASR 920 routers do not support data plane encryptions. However, control plane encryption is supported with NPE images, with processing done in software, without the crypto engine.

The following features are supported for IPsec:

- Internet Key Exchange (IKE) for IPsec
- IKEv1 and IKEv2 Transform sets

- IPSec Virtual Tunnel Interfaces
- Encrypted Preshared Key
- IPSec Dead Peer Detection
- IPsec Anti-replay Window
- Public Key Infrastructure (PKI) support for IPSec

For more information, see *IPsec Configuration Guide, (Cisco ASR 920 Series)*.

Starting with Cisco IOS-XE Release 3.18S, Public Key Infrastructure (PKI) is supported on the ASR920-12SZ-IM router.

The following features are supported for PKI:

- Deploying RSA Keys for PKI
- Authorization and Enrollment of Certificates
- CRL Support for PKI
- Certificate Enrollment for PKI
- OCSP

For information on understanding and configuring PKI, see *Public Key Infrastructure Configuration Guide*.

- **LACP 1:1 Fast Switchover Support**

  The LACP 1:1 redundancy feature provides an EtherChannel configuration with one active link and fast switchover to a hot standby link.

  For this feature, the LACP EtherChannel must contain exactly two links, of which only one is active.

  For more information, see *Configuring IEEE 802.3ad Link Bundling*.

- **Larger String for EVC VLAN Encapsulation**

  Effective Cisco IOS-XE Release 3.18S, you can add or remove one or more VLAN tag values for matching criteria. You can use the **encapsulation dot1q add** command with **show run** command when the encapsulation configuration command is more than the terminal width and **Ethernet service multi-line** command is configured or if the encapsulation command is more than 255 characters.

  For more information about Larger string for VLAN encapsulation, see *Ethernet Virtual Connections Configuration*.

- **Layer 3 ATM**

  This feature enables the Asynchronous Transfer Mode Adaptation Layer 5 (AAL5) layer 3 termination on the interface module (IM) (T1/E1 and OC-3) cards on the Cisco ASR 920 Router. For more information, see *Configuring AAL5 L3 Termination*.

- **mLDP IPv6**

  The MLDPv6 based MVPN configuration enables IPv6 multicast packet delivery using MPLS. This feature enables the configuration of MLDPv6 based MVPN. For more information, see *MLDP-Based MVPN*.

- **Phase Profile G8275.1**

With upcoming technologies like LTE-TDD, LTE-A CoMP, LTE-MBSFN and Location-based services, eNodeBs (base station devices) are required to be accurately synchronized in time and phase. Having GNSS systems at each node is not only expensive, but also introduces vulnerabilities.

Effective Cisco IOS-XE Release 3.18S, Cisco ASR 920 Series Aggregation Services Routers (Cisco ASR-920-12CZ-A/D, ASR-920-4SZ-A/D, Cisco ASR 920-10SZ-PD and Cisco ASR-920-24SZ-IM, ASR-920-24SZ-M, ASR-920-24TZ-M) support the G.8275.1 telecom profile. This profile targets accurate time and phase distribution and requires boundary clocks at every node in the network

For more information, see *G.8275.1 Telecom Profile*.

- **Point-to-point Protocol over Ethernet Intermediate Agent**

  Point-to-point protocol over Ethernet Intermediate Agent (PPPoE IA) is supported from Cisco IOS-XE Release 3.18S.

  PPPoE IA helps the service provider Broadband Remote Access Server (BRAS) to distinguish between end hosts connected over Ethernet to an access switch.

  For more information about Point-to-point protocol over Ethernet Intermediate Agent, see *PPPoE Intermediate Agent*.

- **STM-4 TSoP**

  Effective Cisco IOS-XE Release 3.18S, STM-4 TSoP is supported on ASR 920 routers.

  STM-4 TSoP is compatible with the below SFPs supported on the OC-12 interface module:

  - ONS-SI-622-L2—For 40km cable length, use 2 dB attenuator; short distance use 10 dB attenuator to avoid receiver overload.
  - ONS-SI-622-L1—For 40km cable length, no attenuator; short distance use 10 dB attenuator to avoid receiver overload.
  - ONS-SI-622-I1—For 15km cable length, use 2 dB attenuator; short distance use 8 dB attenuator to avoid receiver overload.

  For more information, see *Transparent SONET or SDH over Packet (TSoP) Protocol*.

- **Synthetic Frame Loss Measurement (ETH-SLM)**

  Effective Cisco IOS-XE Release 3.18S, SLM is not supported with TEFP in access mode.

  For more information, see *Configuring an SLM*.

- **Y.1731 Performance Monitoring**

  Effective Cisco IOS-XE Release 3.18S, the Y.1731 Performance Monitoring feature has the following updates:

  - Is not supported on MEPs that are configured on TEFP and Port MEPs.
  - Uses ASIC-based time-stamping.
  - Supports the **rewrite** command. However, for the command to be successful, the Y.1731 PDUs should not be transmitted untagged.

  For more information, see *ITU-T Y.1731 Performance Monitoring in a Service Provider Network*.

New Hardware Features in Cisco IOS XE 3.17.2S

There are no new hardware features in this release.

New Software Features in Cisco IOS XE 3.17.2S

There are no new software features in this release.

New Hardware Features in Cisco IOS XE 3.17.1S

There are no new hardware features in this release.

New Software Features in Cisco IOS XE 3.17.1S

There are no new software features in this release.

New Hardware Features in Cisco IOS XE 3.17S

- **GPS Support**

  Effective Cisco IOS-XE Release 3.17, the Cisco ASR-920-12SZ-IM router uses a satellite receiver, also called the global navigation satellite system (GNSS), as a new timing interface. With the GNSS available on the router itself, the access networks can now directly estimate time measurements and clock errors from the satellites. In other words, the Cisco ASR-920-12SZ-IM can now act as a grandmaster clock.

  For more information, see *Cisco ASR 920 Series Aggregation Services Router Configuration Guide*.

New Software Features in Cisco IOS XE 3.17S

- **VLAN Scale with Convergence**

  The convergence value is improved from Cisco IOS XE 3.17 release.

  For more information, see *LAN Switching Configuration Guide (Cisco ASR 920 Series)*.

- **Layer 3 Access Control Lists on EVCs**

  Access Control Lists (ACLs) provide the capability to filter packets at a fine granularity. In Metro Ethernet networks, ACLs are directly applied on Ethernet virtual circuits (EVCs). Earlier, the layer 3 ACLs were only supported on the routed ports (physical ports or BDIs). Effective Cisco IOS-XE Release 3.17, the support of layer 3 ACLs on EVCs provides the capability to filter the layer 3 packets on layer 2 bridges that support Ethernet services.

  For more information, see *MPLS: Layer 3 VPNs Configuration Guide*.

- **VLAN Translation with QoS**

  Effective Cisco IOS-XE Release 3.17, VLAN translation provides flexibility in managing VLANs and Metro Ethernet-related services. The current implementation of the feature allows one or more 802.1Q tags to be replaced with other 802.1Q tags and thus the desired tag manipulation can be achieved. In a scenario with two EFPs egressing the same interface, each EFP can have a different VLAN rewrite operation, which is more flexible.

For more information, see *Carrier Ethernet Configuration Guide*.

- **Transparent CFM on C-VLAN**

  Transparent CFM is a mechanism to provide transparency on CFM frames between customer ends. Transparency helps the service provider network to pass the entire maintenance levels (0-7) of CFM frames from one customer end to another customer end by UP MEP that is configured on UNI-N port at any level.

  For more information, see *Carrier Ethernet Configuration Guide*.

- **Ethernet Fault Detection**

  Ethernet Fault Detection (EFD) is a mechanism that allows Ethernet OAM protocols, such as CFM, to control the “line protocol” state of an interface. Unlike many other interface types, Ethernet interfaces do not have a line protocol, whose state is independent from that of the interface. For Ethernet interfaces, this role is handled by the physical-layer Ethernet protocol itself, and therefore if the interface is physically up, then it is available and traffic can flow.

  EFD changes this to allow CFM to act as the line protocol for Ethernet interfaces. This allows CFM to control the interface state so that if a CFM defect (such as AIS or loss of continuity) is detected with an expected peer MEP, the interface can be shut down. This not only stops any traffic flowing, but also triggers actions in any higher-level protocols to route around the problem.

  For more information, see *Carrier Ethernet Configuration Guide*.

- **Configuring Multicast VPN**

  The Multicast VPN (MVPN) feature provides the ability to support multicast over a Layer 3 VPN. IP multicast is used to stream video, voice, and data to an MPLS VPN network core.

  For more information, see *IP Multicast: PIM Configuration Guide (Cisco ASR 920 Series)*.

- **Multicast VPN Extranet Support**

  The Multicast VPN Extranet Support feature enables service providers to distribute IP multicast content originated from one enterprise site to other enterprise sites.

  This feature enables service providers to offer the next generation of flexible extranet services, helping to enable business partnerships between different enterprise VPN customers.

  For more information, see *IP Multicast: PIM Configuration Guide (Cisco ASR 920 Series)*.

- **SLM/DMM over VPLS**

  Synthetic loss measurement (SLM) and Delay Measurement Message (DMM) are part of the ITU-T Y.1731 standard. SLM is used to periodically measure Frame Loss and Forward Loss Ratio (FLR) between a pair of point to point MEPs. DMM is used to periodically measure Frame Delay and Frame Delay Variation between a pair of point to point MEPs.This feature enables the configuration of SLM/DMM over VPLS.

  For more information, see *IP SLAs Configuration Guide*.

- **ATM/IMA**

  In Inverse Multiplexing over ATM (IMA), the originating stream of ATM cells is divided so that complete ATM cells are transmitted in round-robin order across the set of ATM links.

  For more information, see *Asynchronous Transfer Mode Configuration Guide, Cisco IOS XE Release 3S (Cisco ASR 920 Series)*.

- **MPLS TE over BDI**

Effective Cisco IOS-XE Release 3.17, the Cisco ASR-920-12SZ-IM router provides the option for enabling the MPLS TE tunnels over Bridge Domain Interfaces.

For more information, see *MPLS Basic Configuration Guide (Cisco ASR 920 Series)*.

New Hardware Features in Cisco IOS XE 3.16.10S

There are no new hardware features in this release.

New Software Features in Cisco IOS XE 3.16.10S

There are no new software features in this release.

New Hardware Features in Cisco IOS XE 3.16.9S

There are no new hardware features in this release.

New Software Features in Cisco IOS XE 3.16.9S

There are no new software features in this release.

New Hardware Features in Cisco IOS XE 3.16.8S

There are no new hardware features in this release.

New Software Features in Cisco IOS XE 3.16.8S

There are no new software features in this release.

New Hardware Features in Cisco IOS XE 3.16.7S

There are no new hardware features in this release.

New Software Features in Cisco IOS XE 3.16.7S

There are no new software features in this release.

New Hardware Features in Cisco IOS XE 3.16.6S

There are no new hardware features in this release.

New Software Features in Cisco IOS XE 3.16.6S

There are no new software features in this release.

New Hardware Features in Cisco IOS XE 3.16.5S

There are no new hardware features in this release.

New Software Features in Cisco IOS XE 3.16.5S

There are no new software features in this release.

New Hardware Features in Cisco IOS XE 3.16.4S

There are no new hardware features in this release.

New Software Features in Cisco IOS XE 3.16.4S

There are no new software features in this release.

New Hardware Features in Cisco IOS XE 3.16.3aS

There are no new hardware features in this release.

New Software Features in Cisco IOS XE 3.16.3aS

There are no new software features in this release.

New Hardware Features in Cisco IOS XE 3.16.2aS

There are no new hardware features in this release.

New Software Features in Cisco IOS XE 3.16.2aS

There are no new software features in this release.

New Hardware Features in Cisco IOS XE 3.16.1aS

The Cisco ASR-920-12SZ-IM Aggregation Services Router was introduced in this release.

New Software Features in Cisco IOS XE 3.16.1aS

There are no new software features in this release.

New Hardware Features in Cisco IOS XE 3.16S

There are no new hardware features in this release.

New Software Features in Cisco IOS XE 3.16S

- ## Access Switch Device Manager Template

  The Switch Device Manager (SDM) templates are used to optimize system resources in the router to support specific features, depending on how the router is used in the network. The SDM templates allocate Ternary Content Addressable Memory (TCAM) resources to support different features.

Note SDM templates are supported only by the Metro Aggregation Services license.

For more information, see *SDM Template Configuration Guide, Cisco IOS XE Release (Cisco ASR 920 Series)*.

- ## Circuit Emulation over UDP

  Circuit Emulation Service over Packet-Switched Network (CESoPSN) and Structure-agnostic TDM over Packet (SAToP) are supported as a part of Circuit Emulation Service over UDP (CEMoUDP).

  The feature is supported on 8T1/E1 interface module, 16T1/E1 interface module, and OC3 interface module on the router.

Note 8T1/E1, 16 T1/E1, and OC3 are supported only on the Cisco ASR-920-24SZ-IM and ASR-920-12SZ-IM Aggregation Services Router.

  Circuit Emulation Service over UDP is not supported for 32 T1/E1 interface module (A900-IMA32D).

  For more information, see *MPLS Basic Configuration Guide (Cisco ASR 920 Series).*

- ## ECMP Load Balancing

Starting with Cisco Release 3.16, a maximum of 8 Equal-cost multi-path routing (ECMP) paths are supported.

For more information, see *MPLS: Layer 3 VPNs Configuration Guide (Cisco ASR 920 Series).*

- ## IGMP Snooping

  This feature is only supported on the EFP, Trunk EFPs, port-channel EFP, and port-channel Trunk EFPs. The feature is not supported on pseudowires.

  IGMP snooping is supported on Metro IP and Metro Aggregate licenses on the Cisco ASR 920 Series Routers. It is supported with MSTP, REP, G.8032, and on the port-channel interfaces.

  For more information, see *IP Multicast: PIM Configuration Guide (Cisco ASR 920 Series)*.

- ## IP SLA - Service Performance Testing

  This feature, Y.1564, is an Ethernet service activation test methodology, and is the standard for turning up, installing, and troubleshooting Ethernet and IP based services. Y.1564 is the only standard test methodology that allows a complete validation of Ethernet service-level agreements (SLAs) in a single test. Service performance testing is designed to measure the ability of a Device Under Test (DUT) or a network under test to properly forward traffic in different states.

  For more information, see *IP SLAs Configuration Guide (Cisco ASR 920 Series)*.

- ## Microwave ACM Extensions

  Starting with Cisco Release 3.16, adaptive bandwidth with multi-hop extensions are supported. Multi-hop extensions help identify the degraded links in the topology.

  The following command is modified: **event ethernet microwave sd interface**.

  For more information, see *Carrier Ethernet Configuration Guide (Cisco ASR 920 Series)*.

- ## Policy-Based Routing

  This feature provides a way for a device to put packets through a route map before routing them.

  The route map determines which packets are routed to which device. You might enable policy-based routing (PBR) if you want some packets to be routed a way other than the obvious shortest path. PBR provides control over routing by extending and complementing the existing mechanisms provided by routing protocols. Possible applications for PBR are to provide equal access, protocol-sensitive routing, source-sensitive routing, routing based on interactive versus batch traffic, and routing based on dedicated links.

  For more information, see *IP Routing: Protocol-Independent Configuration Guide, Cisco IOS XE Release 3S (Cisco ASR 920 Series).*

- ## Power Over Ethernet

  Effective Cisco IOS XE Release 3.16S, the Cisco ASR-920-12SZ-IM Aggregation Services Router supports Power over Ethernet (PoE). PoE is the ability for any LAN switching infrastructure to provide power over a copper Ethernet cable to an endpoint or powered device.

  For more information, see *Cisco ASR 920 Series Aggregation Services Router Configuration Guide.*

- ## Priority Shaper

  This feature helps to prioritize the packets when multiple steams egress out of an interface. Priority Shaper can be applied or supported only on egress QoS policy.

  For more information, see *QoS: Policing and Shaping Configuration Guide (Cisco ASR 920 Series)*.

- ## Pseudowire Group Status Generation

  This release introduces support for pseudowire group status generation.

The Pseudowire Group Message Generation feature assigns pseudowire group id for a group of pseudowires and sends wildcard status notifications or label withdrawal messages for a group.

For more information, see *Time Division Multiplexing Configuration Guide, Cisco IOS XE Release 3S (Cisco ASR 920 Series).*

- **Segment Routing (IS-IS)**

  The Segment Routing—ISIS v4 node SID feature provides support for segment routing on IS-IS networks.

  For more information, see *IP Routing: Protocol-Independent Configuration Guide, Cisco IOS XE Release 3S (Cisco ASR 920 Series).*

- **uRPF for IPv6 (Strict and Loose mode)**

  Unicast Reverse Path Forwarding for IPv6 feature mitigates the problems caused by malformed or forged IPv6 source addresses that pass through an IPv6 device. Malformed or forged source addresses can indicate denial-of-service (DoS) attacks based on source IPv6 address spoofing.

  For more information, see *IPv6 Addressing and Basic Connectivity Configuration Guide, Cisco IOS XE Release 3S (Cisco ASR 920 Series)*.

New Hardware Features in Cisco IOS XE 3.15.1S

There are no new hardware features in this release.

New Software Features in Cisco IOS XE 3.15.1S

There are no new software features in this release.

New Hardware Features in Cisco IOS XE 3.15S

The Cisco 8x1G + 10x1G IM was introduced in this release for Cisco ASR-920-24SZ-IM Aggregation Services Router.

New Software Features in Cisco IOS XE 3.15S

Table 2-1 Supported Features

Cisco IOS-XE Release	Supported Features
3.15.0S	• 32 T1/E1 Support for MLP and Serial • BGP PIC Edge/Core IPv6/VPNv6 • Configurable Ether Type • DHCP Server v6 • Dying Gasp • EVC Priority Propagation • EVC Push with full CoS • Hierarchal color aware policer • Hybrid BMCA • IPV6 DHCP client • mLACP • Multicast with mLDP • PMIPv6 Protocol on USB Modem Interface • Point-to-Multipoint Traffic Engineering • PPPoE support • Precision Time Protocol (PTP) version 4 Timing Clock • Redundancy for hop-by-hop accuracy • Routed pseudowire and VPLS • TDM • VRRPv3 High Scale

New Hardware Features in Cisco IOS XE 3.14S

- The Cisco ASR-920-24SZ-IM, ASR-920-24SZ-M, and ASR-920-24TZ-M Routers were introduced in this release
- BX optics
- CWDM SFP+
  For more information, see the *Cisco ASR 900 Series Aggregation Services Router Interface Modules Data Sheet* at
  http://www.cisco.com/c/en/us/products/routers/asr-903-series-aggregation-services-routers/datasheet-listing.html
- 8 Port T1/E1 Interface Module (A900-IMA8D) - supported only on Cisco ASR-920-24SZ-IM

New Software Features in Cisco IOS XE 3.14S

Note Effective Cisco IOS-XE Release 3.14S, the Cisco ASR 920 Series Routers can act as controller for the Cisco ME 1200 NID. For more information on how to configure the NID, see *http://www.cisco.com/c/en/us/td/docs/switches/metro/me1200/controller/guide/b_nid_controller_book.html.*

Table 2-2 Supported Features

Cisco IOS XE Release	Supported Features
3.14S	**Note** Only Cisco ASR920-24SZ-IM supports IM and associated features. • Circuit Emulation Service over Packet Switched Network (CESoPSN) (ASR920-24SZ-IM) • Structure-Agnostic TDM over Packet (SAToP) (ASR920-24SZ-IM) • Circuit Emulation (CEM) (ASR920-24SZ-IM) • 12/1G Bundle (ASR920-24SZ-IM, ASR920-24SZ-M, ASR920-24-TZ-M) • 1588 BC over MPLS • ACL- Access Control List Source and Destination Address Matching • Auto-IP • Autonomic Networking • BGP Support for TCP Path MTU Discovery per Session • CFM-802.1ad • Control Plane Security • DHCP - DHCPv6 Relay Agent notification for Prefix Delegation • DHCPv6 - Relay chaining for Prefix Delegation • E2E Transparent Clocking • EFP Policer without Ingress TCAM • E-OAM: Multi UNI MEP in the same VPN • Ethernet Data Plane Loopback • IGMP Snooping • IGMP State Limit • IPv6 QoS ACL • IPv6 SDM Template • IPv6 Services: Extended Access Control Lists

Table 2-2 Supported Features (continued)

Cisco IOS XE Release	Supported Features
3.14S	• ITU-T Telecom Profile G.8265.1 • Multicast Source Discovery Protocol (MSDP) • Multi NNI CFM • onePK (AAA, AppRouting, RIB and Infra)
3.14S	• PIMV6/MLD • PTP over Native Ethernet • Remote SPAN (RSPAN) • Source Specific Multicast (SSM) • SSM Mapping • Static MAC binding to EVCs and Psuedowires • Table map • TCAM Threshold • Time of Day Selection • VRRP and LLDP MED support for ZTP • VRRPv3 • ZTP

New Hardware Features in Cisco IOS XE 3.13.9S

There are no new hardware features introduced in this release.

New Software Features in Cisco IOS XE 3.13.9S

There are no new software features introduced in this release.

New Hardware Features in Cisco IOS XE 3.13.7S

There are no new hardware features introduced in this release.

New Software Features in Cisco IOS XE 3.13.7S

There are no new software features introduced in this release.

New Hardware Features in Cisco IOS XE 3.13.4S

There are no new hardware features introduced in this release.

New Software Features in Cisco IOS XE 3.13.4S

There are no new software features introduced in this release.

New Hardware Features in Cisco IOS XE 3.13.2S

There are no new hardware features introduced in this release.

New Software Features in Cisco IOS XE 3.13.2S

There are no new software features introduced in this release.

New Hardware Features in Cisco IOS XE 3.13.00zS

- The Cisco ASR-920-10SZ-PD was introduced in this release.

New Software Features in Cisco IOS XE 3.13.00zS

There are no new software features introduced in this release.

New Hardware Features in Cisco IOS XE 3.13S

- The Cisco ASR 920 Series Router was introduced in this release.
- Supported SFPs for this release are documented in the *Cisco ASR 920 Series Router Hardware Installation Guide*.

New Software Features in Cisco IOS XE 3.13S

The following table lists the other features supported on Cisco ASR 920 Series Router in Cisco IOS XE Release 3.13S:.

Table 2-3 Supported Features

Cisco IOS XE Release	Supported Features
3.13S	• 10G/1G Dual Rate • 1588 BC over MPLS • 1588-2008 Boundary Clock • 6PE support • 802.1ad • 802.1ag-2007 compliant CFM (D8.1) on EFP with xconnect • 802.3ad (LACP) • ACL - Access Control List Source and Destination Address Matching • ACL - DSCP Matching • ACL - ICMP-code (0-255) or code name • ACL - IP Protocol • ACL - IPv4 Protocol Match • ACL - Source and Destination Address Matching • ACL- DSCP Matching • Any Transport over MPLS: Ethernet over MPLS (EoMPLS) • E-OAM: Synthetic Frame Loss Measurement (ETH-SLM) • Auto-MDIX • AutoInstall Using DHCP for LAN Interfaces • BFD - BFD Hardware Offload Support • BFD Deterministic Hardware Offload • BFD Hardware Offload Support • BFD IPv6 Encapsulation Support • BFD Support for HSRP • BFD: BGP multihop client Support and cBit (IPv4/IPv6) • BGP - Accumulated IGP • BGP - MP-iBGP NSR • BGP - RTC for legacy PE • BGP - VPLS BGP Signaling • BGP GSHUT enhancement • BGP Monitoring Protocol • BGP PIC (edge and core) - for RFC-3107 labeled iBGP • BGP PIC Edge for IP/MPLS • BGP Support for 4-byte ASN • BGP Support for TCP Path MTU Discovery per Session

Table 2-3 Supported Features (continued)

Cisco IOS XE Release	Supported Features
3.13S	• BGP: Graceful Shutdown (GSHUT) • Broadcast/Multicast Suppression / Storm-control • Call Home • CDP (Cisco Discovery Protocol) Version 2 • CFM • CFM (802.1ag D1.0) on UEA • CFM 1+1 HSBY Extension • CFM Support with integrated OAM HW offload • Cisco Secure Licensing • Cisco-BGP-MIBv2 • CISL – SNMP Support • Class Based Weighted Fair Queuing (CBWFQ) • Class-based QoS MIB • Configurable Per VLAN MAC Learning (PVL) • CSL Support /UEA platform • CWDM SFP Support • DAI (Dynamic ARP Inspection) • DHCP - DHCPv6 Relay Agent notification for Prefix Delegation • DHCP Option 82 Configurable Circuit ID and Remote ID • DHCP Snooping • DHCPv6 - Relay chaining (for Prefix Delegation) and route insertion in FIB • Diffserv Compliant WRED • DWDM XFP support • Dying Gasp • Dynamic ARP Inspection • Dynamic VPLS over MPLS-TP • E-OAM - CFM CCM Hardware Offload (802.1ag within ms accuracy) (Xconnect and BD Up MEP) • Egress Policing and Marking Support • Egress QoS policies on main physical interface for port shaping + H-policies on EFP

Table 2-3 Supported Features (continued)

Cisco IOS XE Release	Supported Features
3.13S	• Egress QoS policies on Main Physical Interface for port-shaping + class-based policy • Embedded Event Manager (EEM) 4.0 • Enhanced Ingress Hierarchical Policing on Engine 5 • Etherchannel Min-Links • Ethernet Connectivity Fault Management (E-CFM) • Ethernet Local Management Interface (LMI) at Provider Edge (PE) • Ethernet Operations, Administration, and Maintenance (OAM) • EVC 2.0 - Advanced VLAN translations and service mapping based on 802.1ah (4500) • EVC 2.0 - MAC address limiting per EVC for K5-Metro • EVC and BD MIB support for trunk EFP • EVC Default Encapsulation for QinQ and xconnect • Extended LFA support • FCS: Trunk EFP support • FHRP - Enhanced Tracking • Flexlink • FP initialization fails with QoS policies and with huge range of BD on TEFP • FPD Image Upgrade Software • G.8032 • G.8032 (3.3 ms CCM) • H-VPLS N-PE Redundancy for MPLS Access • H-VPLS Support • HSRP • HSRP Support • Hybrid Clocking Support • IEEE 1588-2008 • IEEE 802.1ab LLDP (Link Layer Discovery Protocol) • IEEE 802.1ag (CFM) Support on Port-Channel Interface • IEEE 802.1p Support • IEEE 802.1Q VLAN Support • IEEE 802.3ad Link Aggregation (LACP) • IEEE 802.3ah Ethernet Link Layer OAM • IEEE 802.3x Flow Control • Interfaces MIB: SNMP context based access

Table 2-3 Supported Features (continued)

Cisco IOS XE Release	Supported Features
3.13S	• IOS ISIS - uLoop local avoidance • IOS OSPF - Autoroute announce and forwarding adjacencies for OSPFv3 • IP 16-way Equal-Cost Multipath • IP FRR (IPv4 Loop Free Alternate Fast ReRoute) • IP FRR over BDI • IP FRR/Remote LFA FRR with L2VPN • IP SLAs TWAMP Responder v1.0 • IPSLA Y1731 SLM Feature Enhancements • IPv4 Loop Free Alternate Fast ReRoute • IPv4 Unicast Routing Support • IPv6 ACL • IPv6 ACLs Support • IPv6 QoS: MQC Packet Classification • IPv6 Routing: IS-IS Support for IPv6 • IPv6 Routing: OSPF for IPv6 (OSPFv3) • IPv6 Routing: Static Routing • IPv6 Routing: Unicast Routing • IPv6 Switching: CEF/dCEF Support • IPv6 Switching: Provider Edge Router over MPLS (6PE) • IPv6 VPN over MPLS (6VPE) • IS-IS - MPLS LDP Autoconfiguration • IS-IS Support for BFD over IPv6 • ISIS - BFD Support for IPv4 • ITU-T G.8032 Ethernet Ring Protection Switching • Jumbo Frames • Kerberos V Client Support • L2 ACL on EVC • L2 ACL on Service Instance on Port-channel • L2PT - Layer 2 Protocol Tunneling • L2PT on Trunk EFP • L2VPN Componentization • L2VPN Protocol CLI Phase 2 (L2TPv3, mLACP) • L2VPN Protocol-based CLI • L2VPN support for MPLS Transport Profile (MPLS-TP)

Table 2-3 Supported Features (continued)

Cisco IOS XE Release	Supported Features
3.13S	• LACP 1:1 fast switchover Support • LDP ISIS Autoconfiguration • Link Path Through • LMM Support for Smart SFP • MAC Address Security for EVC Bridge-Domain • MAC Limiting per VFI and BD • match any QoS classification • match/set exp • MFI - VPLS BGP Signaling • MIB support • Modular QoS CLI (MQC) • MPLS -TP: IP Less trace support (NodeId, LinkId) • MPLS Forwarding Infrastructure Scalability • MPLS LDP - IGP Synchronization • MPLS Multiprotocol Label Switching (Tag Switching) • MPLS Support for Multi-Segment PWs - MPLS OAM/VCCV (MPLS OAM Support for Multisegment Pseudowires) • MPLS TE - Bundled Interface Support (EtherChannel and MLP) • MPLS TE Link and Node Protection, with RSVP Hellos Support • MPLS TP: IP-less configuration of MPLS TP tunnels • MPLS Virtual Private Networks (VPN) • MPLS VPN - Inter-Autonomous System Support • MPLS-TP Linear Protection with PSC (RFC-6378) • MPLS-TP MIB • MPLS-TP OAM: Continuity Check via BFD • MPLS-TP OAM: Fault Management • MPLS-TP OAM: GACH • MPLS-TP OAM: Ping/Trace • MPLS-TP Path Protection • MPLS-TP: IP addresses for MPLS TP interfaces • MPLS-TP: LDP signaling over MPLS TP LSPs • MPLS-TP: MS-PW with Static and Dynamic PW Support • MPLS-TP: PW Redundancy for Static PWs • MPLS-TP: PW Status for Static PWs • MQC - Multi-Level Priority Queue

Table 2-3 Supported Features (continued)

Cisco IOS XE Release	Supported Features
3.13S	• MQC MIB Support • MST on EVC Bridge-Domain • Multi-Level Priority Queue • Multi-protocol BGP - MPLS VPN • Multi-Topology BGP with VRF enhancement • Network Time Protocol (NTP) • NTP Timestamping • NTPv4 hardening through import of open source version 4.2.6p2 (July 2010) • Offloading IPv4 Asynchronous BFD sessions with 3.3ms timers • OSPF - BFD Support for IPv4 • OSPF TTL Security Check • PIC Edge - IPv4 • PIC with FRR over BDI • Port-Shaper and LLQ in the presence of EFPs • QoS ACLs • QoS Classification based on EFPQoS Packet Marking • QOS Match EFP • QoS Packet Marking • QoS Support • QoS Support for Ether Channels • QoS: Class Based Policing • QoS: Global CLI for CoS to EXP table mapping • RADIUS • Remote LFA FRR and labeled BGP FRR integration • Remote Monitoring MIB Update • Resilient Ethernet Protocol (REP) • REP Configurable Timers or REP Fast Hellos • REP-AG Enhancements • Resilient Ethernet Protocol-no-edge-neighbor-enhancement • RFC 4293 IP-MIB (IPv6 only) and RFC 4292 IP-FORWARD-MIB (IPv6 only) • RSVP - Resource Reservation Protocol • Secure Copy (SCP) • Secure Shell SSH Version 2 Client Support

Table 2-3 Supported Features (continued)

Cisco IOS XE Release	Supported Features
3.13S	• Secure Shell SSH Version 2 Server Support • SFP-10G-LR • SFP-GE-T Support • SFP-GE-x support • SFP+ optics • Show Interface Capabilities • Smart Licensing Client for IOS and IOS XE • SNMP (Simple Network Management Protocol) • SNMP over IPv6 • SNMPv3 - 3DES and AES Encryption Support • SNMPv3 (SNMP Version 3) • SPAN • Spanning Tree Protocol (STP) • Static MAC (multicast) on EFP • Static MAC (unicast) on EFP • Static Routes for BFD • Static VPLS over MPLS-TP • Storm Control • STP Syslog Messages • Support for SFP and SFP+ modules. See the Cisco ASR 920 Series Aggregation Services Router Hardware Installation Guide. • Support sending PW Grouping ID TLV • Switch Port Analyzer (SPAN) support • Sync-E Support • Synchronous Ethernet (SyncE): ESMC and SSM • Synthetic Frame Loss Measurement (ETH-SLM) • TACACS+ • Temperature and Voltage Monitoring • Time of Day Selection • Trunk EFP support • Trunk EFP Support on Ether-Channel Interfaces • TWAMP accuracy enhancements • TWAMP RFC compliance • TWAMP with RFC Compliance

Table 2-3 Supported Features (continued)

Cisco IOS XE Release	Supported Features
3.13S	• UDLD Support • Unicast Reverse Path Forwarding (uRPF) Loose mode • Unicast Reverse Path Forwarding (uRPF) Strict mode • Virtual Private LAN Services (VPLS) • VPLS • VPLS Autodiscovery, BGP-based • VPLS MAC Address Withdrawal • VPLS over MPLS-TP • VPLS over remote LFA • VPN Inter-AS (Interprovider) • VRF aware BGP translate-update • Weighted RED Support for Differentiated Services Code Point (DSCP) • Y.1731 DMMv1 • Y.1731 enhancements (On-demand and Concurrent support) • Y.1731 Performance Monitoring • Y.1731-PM (Xconnect and Port-Channel Support)