Release Notes for Cisco CRS Router, Release 6.1.2

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Revised: June 12, 2023

Supported Packages and System Requirements

Feature Set Table

Memory

Caution If you remove the media in which the software image or configuration is stored, the router may become unstable and fail.

Software Compatibility

Determining Installed Packages

To determine the version of Cisco IOS XR Software packages installed on your router, log in to the router and enter the **show install commit summary** command

Software Features Introduced in Cisco IOS XR Software Release

Unequal Cost Multipath for Static Routing

In a network where traffic has to be load balanced on two or more links, configuring equal metrics on the links would create Equal Cost Multipath (ECMP) next hops. Since the bandwidth of the links is not taken into consideration while load balancing, the higher bandwidth links are underutilized. To avoid this problem, you can configure Unequal Cost Multipath (UCMP), either locally (local UCMP), or natively (native UCMP) so that the higher bandwidth links carry traffic in proportion to the capacity of the links. UCMP supports IPv4 and IPv6 static VRF routes.

For more information, see the *Configuring Unequal Cost Multipath for Static Routing: Example* section in the http://www.cisco.com/c/en/us/td/docs/routers/crs/software/crs_r5-2/routing/configuration/guide/b_routing_cg52xcrs.html.

BGP Optimal Route Reflector

BGP-ORR (optimal route reflector) enables virtual route reflector (vRR) to calculate the best path from a route reflector (RR) client's point of view.

BGP ORR calculates the best path by:

1. Running SPF multiple times in the context of its RR clients or RR clusters (set of RR clients)
2. Saving the result of different SPF runs in separate databases
3. Using these databases to manipulate BGP best path decision and thereby allowing BGP to use and announce best path that is optimal from the client’s point of view

Note Enabling the ORR feature increases the memory footprint of BGP and RIB. With increased number of vRR configured in the network, ORR adversely impacts convergence for BGP.

In an autonomous system, a BGP route reflector acts as a focal point and advertises routes to its peers (RR clients) along with the RR's computed best path. Since the best path advertised by the RR is computed from the RR's point of view, the RR's placement becomes an important deployment consideration.

With network function virtualization (NFV) becoming a dominant technology, service providers (SPs) are hosting virtual RR functionality in a cloud using servers. A vRR can run on a control plane device and can be placed anywhere in the topology or in a SP data center. Cisco IOS XRv 9000 Router can be implemented as vRR over a NFV platform in a SP data center. vRR allows SPs to scale memory and CPU usage of RR deployments significantly. Moving a RR out of its optimal placement requires vRRs to implement ORR functionality that calculates the best path from a RR client's point of view.

BGP ORR offers these benefits:

- calculates the bestpath from the point of view of a RR client.
- enables vRR to be placed anywhere in the topology or in a SP data center.
- allows SPs to scale memory and CPU usage of RR deployments.

Seamless Bidirectional Forwarding Detection

Bidirectional forwarding detection (BFD) provides low-overhead, short-duration detection of failures in the path between adjacent forwarding engines. BFD allows a single mechanism to be used for failure detection over any media and at any protocol layer, with a wide range of detection times and overhead.

In BFD, each end of the connection maintains a BFD state and transmits packets periodically over a forwarding path. Seamless BFD (SBFD) is unidirectional, resulting in faster session activation. The BFD state and client context is maintained on the head-end (initiator) only. The tail-end (reflector) validates the BFD packet and responds, so there’s no need to maintain the BFD state on the tail-end.

Autoroute Destination

The autoroute destination feature allows you to automatically route traffic through a segment routing tunnel instead of manually configuring static routes. Static routes are always added with zero-cost metric, which can result in traffic that is mapped on multiple tunnels to always load-balance due to ECMP. This load-balancing may be undesirable when some of those tunnels have sub-optimal paths. With autoroute destination, only the tunnel whose IGP cost to its endpoint is lowest will be considered for carrying traffic.

Border Gateway Protocol Link-State

Border gateway protocol link-state (BGP LS) is an Address Family Identifier (AFI) and Sub-address Family Identifier (SAFI) defined to carry interior gateway protocol (IGP) link-state database through BGP. BGP LS delivers network topology information to topology servers and Application Layer Traffic Optimization (ALTO) servers. BGP LS supports IS-IS and OSPFv2.

Node and Shared Risk Link Groups Protection with Topology-Independent Loop-Free Alternate

The Topology-Independent Loop-Free Alternate (TI-LFA) node protection functionality provides protection from node failures. The neighbor node is excluded during the post convergence backup path calculation.

The TI-LFA Shared Risk Link Groups (SRLG) protection functionality attempts to find the post-convergence backup path, which excludes the SRLGs of the protected link. All local links that share any SRLG with the protecting link are excluded during the post convergence backup path calculation.

For more information, see the .

Segment Routing

Segment routing is a method of forwarding packets on the network based on the source routing paradigm. The source chooses a path and encodes it in the packet header as an ordered list of segments. Segments are an identifier for any type of instruction. For example, topology segments identify the next hop toward a destination. Each segment is identified by the segment ID (SID) consisting of a flat unsigned 32-bit integer.

Segment Routing Egress Peer Engineering

Segment routing egress peer engineering (EPE) uses a controller to instruct an ingress provider edge or a content source within the segment routing domain to use a specific egress provider edge and a specific external interface to reach a destination. BGP peer SIDs are used to express source-routed inter-domain paths. Controllers learn BGP peer SIDs and the external topology of the egress border router through BGP-LS EPE routes. EPE functionality is only required at EPE egress border router and EPE controller.

MVPN IPv6 over IPv4 GRE

MVPN IPv6 traffic can be carried over IPv4 GRE multicast tunnels using the standard GRE tunneling techniquethat is designed to provide the services to implement any standard point-to-point encapsulation scheme.

Named Tunnel

The named tunnel feature lets you name the TE tunnels in the network with unique tunnel IDs to be able to manage the network with more ease. This feature allows you to provision TE tunnels using STRING names.

Hardware Features and Enhancements Introduced in Cisco IOS XR Software Release

Firmware Support

To check the firmware code running on the , run the **show fpd package** command in admin mode.

Other Important Information

- Country-specific laws, regulations, and licenses—In certain countries, use of these products may be prohibited and subject to laws, regulations, or licenses, including requirements applicable to the use of the products under telecommunications and other laws and regulations; customers must comply with all such applicable laws in the countries in which they intend to use the products.
- Exceeding Cisco testing—If you intend to test beyond the combined maximum configuration tested and published by Cisco, contact your Cisco Technical Support representative to discuss how to engineer a large-scale configuration for your purpose.

Caveats

Caveats describe unexpected behavior in . Severity-1 caveats are the most critical caveats; severity-2 caveats are less critical.

Upgrading Cisco IOS XR Software

Troubleshooting

For information on troubleshooting Cisco IOS XR Software, see the and the

Related Documentation

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.

Communications, Services, and Additional Information

- To receive timely, relevant information from Cisco, sign up at Cisco Profile Manager.
- To get the business impact you're looking for with the technologies that matter, visit Cisco Services.
- To submit a service request, visit Cisco Support.
- To discover and browse secure, validated enterprise-class apps, products, solutions and services, visit Cisco Marketplace.
- To obtain general networking, training, and certification titles, visit Cisco Press.
- To find warranty information for a specific product or product family, access Cisco Warranty Finder.

Cisco Bug Search Tool

Cisco Bug Search Tool (BST) is a web-based tool that acts as a gateway to the Cisco bug tracking system that maintains a comprehensive list of defects and vulnerabilities in Cisco products and software. BST provides you with detailed defect information about your products and software.

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