BGP Unified MPLS iBGP Client

Unified Multiprotocol Label Switching (MPLS) provides an architecture that combines all the latest developments within MPLS to support simplified and highly scalable MPLS deployments. The BGP Unified MPLS for iBGP Client feature provides full mesh tunnel label-switched paths (LSPs) across all access/aggregation and edge/core areas, making the creation of end-to-end pseudowires significantly easier.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table at the end of this module.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Prerequisites for BGP Unified MPLS iBGP Client

- You are familiar with the concepts in the "Configuring Internal BGP Features" module.

# Information About BGP Unified MPLS iBGP Client

BGP and RFC 3107

RFC 3107 defines procedures for having Border Gateway Protocol (BGP) allocate labels to routes between BGP peers. This technique is useful in cases where Multiprotocol Label Switching (MPLS) networks must scale. RFC 3107 operation can be used to isolate much of the routing data that exists in an MPLS access domain from the core network. By implementing RFC 3107 at the aggregation point, where access networks are aggregated toward the core, BGP label allocation eliminates the need for core devices to learn all of the prefixes in the access domains as routes are summarized.

In the case of an RFC 3107 edge device used to scale deployment of MPLS services, the edge device receives a packet that has already had two labels applied. (These were appended by the device originating the MPLS service, such as a pseudowire.) The outer label again identifies the label-switched path (LSP), and the inner label identifies the MPLS service. In this case, the RFC 3107 edge device replaces the outer label with two labels, generating a three-label stack. The now outermost label is used to switch the packet across the core between RFC 3107 BGP peers. The second (middle) label is used to direct the packet towards the final edge device in the LSP (once it exits the core network), and the third (now innermost) label is the MPLS service label.

Unified MPLS iBGP Client

The BGP Unified MPLS iBGP Client feature extends the core MPLS across all access/aggregation and edge/core areas to allow for an end-to-end tunnel LSP, as shown in the figure below.

Figure 1: Unified MPLS iBGP Client
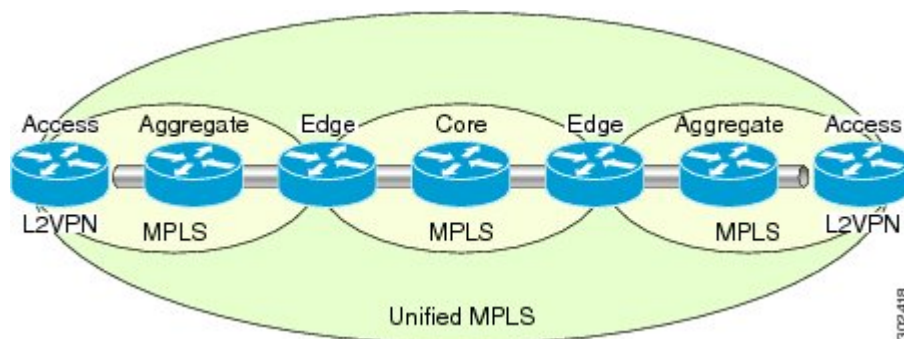
The figure above shows:

- RFC 3107 (internal BGP [iBGP] + label) is used as the inter-BGP MPLS domain protocol to carry all prefixes and labels.
- Unified MPLS clients (access and aggregation routers) will run iBGP + label toward the Area Border Router (ABR).
- Unified MPLS ABRs (edge routers) will be iBGP route reflectors set with next-hop self enabled on all sessions.

> • A pair of ABRs separating two intra-MPLS domains will have a unique cluster ID.
>
> • The BGP cluster list mechanism will prevent routing loops.

BGP Prefix Independent Convergence

BGP Prefix Independent Convergence (PIC) is the technology that enables RFC 3107 procedures to be implemented with dramatically improved reconvergence characteristics. Prior to BGP PIC, BGP convergence was slow, potentially resulting in minutes of outage. BGP PIC brings convergence into the range of 50 to 300 milliseconds, depending on topology, with no additional configuration required. BGP PIC is an algorithm enhancement implemented entirely within one routing device, so there are no interoperability issues with non-BGP PIC devices, just improved performance.

The basis of operation for BGP PIC is that the BGP routing process is modified to calculate not only the primary (best) path, but also a repair path in case this primary path to the BGP next hop becomes unavailable. Once the route to a primary next hop fails, the forwarding mechanism of the router points all next hops to the new repair path by updating just a single pointer. This process is quicker than doing a prefix-by-prefix calculation, as with the new mechanism, merely a single pointer must be updated for all the paths that will use that new next-hop address. This function of updating a single pointer shared by all prefixes using the same next hop makes this feature prefix-independent.

BGP Local Label Allocation for /32 Prefixes

A Cisco 7600 series router locally allocates labels for /32 prefixes learned from a remote provider edge (PE) router via a BGP send-label session, despite the prefixes not being advertised subsequently to any other BGP peers. This BGP label will then be used to stitch Layer 2 frames received on an ingress card on the Cisco 7600 series router and map an outgoing label to an egress card for transport through the MPLS cloud to the remote PE router. As a result, you can set up a pseudowire between two or more Layer 2 attachment circuits connected to either of the PE routers. Assigning the local label for an unadvertised BGP-learned /32 prefix is essential to setting up an LSP between the remote PE routers for routing Layer 2 frames.

Use the **bgp mpls-local-label** command on the Cisco 7600 series router to enable or disable local label allocation for unadvertised /32 prefixes.

Note Toggling the **bgp mpls-local-label** command will cause a session flap of all peers configured under that address family. A warning message also will be displayed to notify you that additional labels are required for /32 prefixes.

How to Configure BGP Unified MPLS iBGP Client

Configuring Local Label Allocation for /32 Prefixes

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **router bgp** *as-number*
4. **address-family ipv4**
5. **bgp mpls-local-label**
6. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**router bgp** *as-number* **Example:** `Device(config)# router bgp 100`	Enters router configuration mode and creates a BGP routing process.
Step 4	**address-family ipv4** **Example:** `Device(config-router)# address-family ipv4`	Enters address family configuration mode to configure BGP peers to accept specific address family configurations.
Step 5	**bgp mpls-local-label** **Example:** `Device(config-router-af)# bgp mpls-local-label`	Enables BGP local label installation for unadvertised /32 prefixes. **Note** The **bgp mpls-local-label** command is supported only on the Cisco 7600 series router.

	Command or Action	Purpose
Step 6	**end** **Example:** `Device(config-router-af)# end`	Exits address family configuration mode and enters privileged EXEC mode.

Configuration Examples for BGP Unified MPLS iBGP Client

Example: BGP Local Label Allocation for /32 Prefixes

The following example shows how to enable local label allocation for unadvertised /32 prefixes:

```
Device(config)# router bgp 100
Device(config-router)# address-family ipv4
Device(config-router-af)# bgp mpls-local-label
```

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Commands List, All Releases
BGP commands: complete command syntax, command modes, command history, defaults, usage guidelines, and examples	Cisco IOS IP Routing: BGP Command Reference
Configuring iBGP features	"Configuring Internal BGP Features" module

Standards and RFCs

Standard/RFC	Title
RFC 3107	*Carrying Label Information in BGP-4*

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for BGP Unified MPLS iBGP Client

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

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Table 1: Feature Information for BGP Unified MPLS iBGP Client

Feature Name	Releases	Feature Information
BGP Unified MPLS iBGP Client	15.2(4)S	Unified MPLS for iBGP client provides full mesh tunnel label-switched paths (LSPs) across all access/aggregation and edge/core areas making it significantly easier to create end-to-end pseudowires. The following command was introduced or modified: **bgp mpls-local-label**.