MPLS Static Labels

The MPLS static labels feature provides the means to configure the binding between a label and an IPv4 prefix statically. This module explains the basic concepts of MPLS static labels and how to configure it on Cisco Smart Switches.

Feature history for MPLS static labels

This table provides release and platform support information for the features explained in this module.

These features are available in all the releases subsequent to the one they were introduced in, unless noted otherwise.

Release	Feature name and description	Supported platform
Cisco IOS XE 17.18.2	MPLS static labels	Cisco C9350 Series Smart Switches
		Cisco C9610 Series Smart Switches

MPLS static labels

MPLS static label is a network configuration feature that

- provides the means to statically configure the binding between a label and an IPv4 prefix

- provides static and precise control over label assignments for packet forwarding, and

- serves as an alternative to protocol-based dynamic label distribution.

Generally, LSRs use label distribution protocols such as Label Distribution Protocol (LDP), Resource Reservation Protocol (RSVP), or Border Gateway Protocol (BGP) to dynamically learn and bind labels to network addresses. However, with MPLS static labels, the label-to-prefix association is set manually rather than learned through these protocols.

Once configured, the static label is installed in the Label Forwarding Information Base (LFIB) for use in label-switching packets.

Benefit of MPLS static labels

You can configure static bindings between labels and IPv4 prefixes to support MPLS hop-by-hop forwarding through neighbor routers that don't implement LDP label distribution.

Restrictions for MPLS static labels

The support for MPLS static labels is subjected to these restrictions:

- Does not support MPLS fragmentation

- Does not support MPLS maximum transmission unit (MTU) configuration

- Supports only the default mode—per-VRF MPLS label allocation mode. However, the devices can inter-operate with remote peers operating in the per-prefix mode.

Configure MPLS static label bindings

Procedure

Step 1 Specify a range of labels for static assignment.

Example:

```
Device> enable
Device# configure terminal
Device(config)# mpls label range 200 100000 static 16 199
```

By default, no label is reserved for static assignment.

Note
You must reload the switch for the new MPLS label range configuration to take effect.

Step 2 Specify static binding of labels to IP prefix.

Example:

```
Device(config)# mpls static binding ipv4 10.0.0.0 255.0.0.0 55
Device(config)# end
```

Example:

You can configure input (local) and output (remote) labels for various prefixes as shown in this example:

```
Device(config)# mpls static binding ipv4 10.0.0.0 255.0.0.0 55
Device(config)# mpls static binding ipv4 10.0.0.0 255.0.0.0 output 10.0.0.66 2607
Device(config)# mpls static binding ipv4 10.6.0.0 255.255.0.0 input 17
```

```
Device(config)# mpls static binding ipv4 10.0.0.0 255.0.0.0 output 10.13.0.8 explicit-null
Device(config)# end
```

Bindings specified are installed automatically in the MPLS forwarding table as routing demands.

Step 3 Verify MPLS static label bindings configuration on the switch.

a) Verify the MPLS static label range.

Example:

Before reload: The output shows that the new label range does not take effect until a reload occurs.

```
Device# show mpls label range

Downstream label pool: Min/Max label: 16/983039
   [Configured range for next reload: Min/Max label: 200/100000]
Range for static labels: Min/Max/Number: 16/199
```

Example:

After reload: The output indicates that the new label ranges are in effect.

```
Device# show mpls label range

Downstream label pool: Min/Max label: 200/100000
Range for static labels: Min/Max/Number: 16/199
```

b) View the configured static label bindings.

Example:

```
Device# show mpls static binding ipv4
10.17.17.17/32: Incoming label: 251 (in LIB)
  Outgoing labels:
    10.0.0.1                 18
10.18.18.18/32: Incoming label: 201 (in LIB)
  Outgoing labels:
    10.0.0.1 implicit-null
```

c) Check which static label bindings are currently in use for MPLS forwarding.

Example:

```
Device# show mpls forwarding-table
Local      Outgoing   Prefix          Bytes Label   Outgoing    Next Hop
Label      Label      or Tunnel Id    Switched      interface
20         No Label   IPv4 VRF[V]     0             aggregate/vrf1
24         explicit-n 5.5.5.5/32      0             Po18.19     118.118.1.2
28         20         2.2.2.2/32      0             Po18.19     118.118.1.2
525        No Label   IPv6 VRF[V]     1987078754344 aggregate/vrf1
29184      19         3.3.3.3/32      0             Po18.19     118.118.1.2
49024      explicit-n 109.1.1.0/24    0             Po18.19     118.118.1.2
49025      explicit-n 37.37.37.0/24   0             Po18.19     118.118.1.2
Device#
```

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Configure MPLS static label bindings