



Configuring MPLS LDP Label Filtering

This chapter describes how to configure Multiprotocol Label Switching (MPLS) Label Distribution Protocol (LDP) label filtering on Cisco NX-OS devices.

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- [Finding Feature Information, page 8-1](#)
- [Information About MPLS LDP Label Filtering, page 8-1](#)
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Finding Feature Information

Your software release might not support all the features documented in this module. For the latest caveats and feature information, see the Bug Search Tool at <https://tools.cisco.com/bugsearch/> and the release notes for your 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 “New and Changed Information” chapter or the Feature History table below.

Information About MPLS LDP Label Filtering

The following topics provide information about MPLS LDP label filtering:

- [Local Label Allocation Filtering, page 8-2](#)
- [Outbound Label Filtering, page 8-4](#)
- [Inbound Label Filtering, page 8-4](#)

Local Label Allocation Filtering

This MPLS LDP feature enables you to configure filtering policies for selective local label binding assignments to improve LDP scalability and convergence. This section includes the following topics:

- [Overview of MPLS LDP Local Label Allocation Filtering, page 8-2](#)
- [Prefix Lists for MPLS LDP Local Label Allocation Filtering, page 8-3](#)
- [Local Label Allocation Filtering and LDP Actions, page 8-4](#)

Overview of MPLS LDP Local Label Allocation Filtering

LDP allocates a local label for every route that is learned from the Interior Gateway Protocol (IGP). In the absence of inbound and outbound label filtering, these local labels are advertised to and learned by all LDP peers.

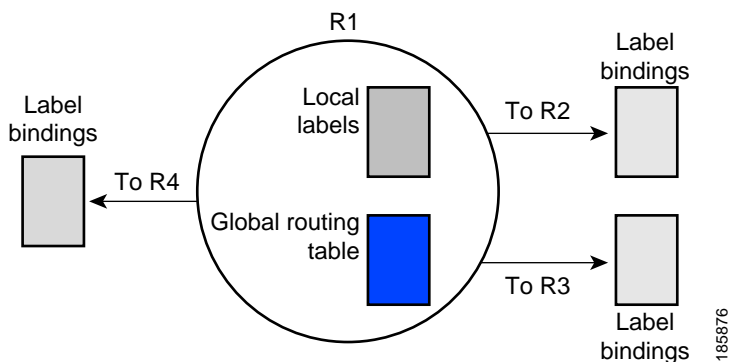
In most Layer 3 virtual private network (VPN) configurations, only the label switched paths (LSPs) created to reach the /32 host routes or Border Gateway Protocol (BGP) next hops between the provider edge (PE) routers carry traffic and are relevant to the Layer 3 VPNs. LSPs between the PE routers that are not members of a VPN use more memory and create additional processing in LDP across the core.

With load increases in the enterprise and service provider domains, scalability has become more important in enterprise and service provider networks. Controlling the local label allocation could offload LDP processing of non-VPN LSPs in the network core routers.

The MPLS LDP local label allocation filtering feature enables you to configure LDP to selectively allocate local labels for a subset of the prefixes learned from the IGP. You can select the LDP allocate local labels for prefixes configured in a prefix list in the global table or for host routes in the global table.

Local label allocation filtering reduces the number of local labels allocated and therefore the number of messages exchanged with peers, which improves LDP scalability and convergence. [Figure 8-1](#) and [Figure 8-2](#) show how controlling local label allocation can reduce the local label space size and greatly reduce the number of advertisements to peers. [Figure 8-1](#) shows the label allocation behavior when LDP allocates a local label for every route and advertises a label binding for every route that is learned from the IGP.

Figure 8-1 Default LDP Local Label Allocation Behavior



[Figure 8-2](#) shows the LDP behavior with local label allocation control configured. The size of the local label space and the number of label binding advertisements are reduced with local label allocation filtering through the use of a prefix list. The decrease in the number of local labels and label binding

advertisement messages reduces the amount of memory used and improves the convergence time for LDP. The MPLS LDP local label allocation filtering feature also allows for more efficient use of the label space.

Figure 8-2 LDP Behavior with Local Label Allocation Controls

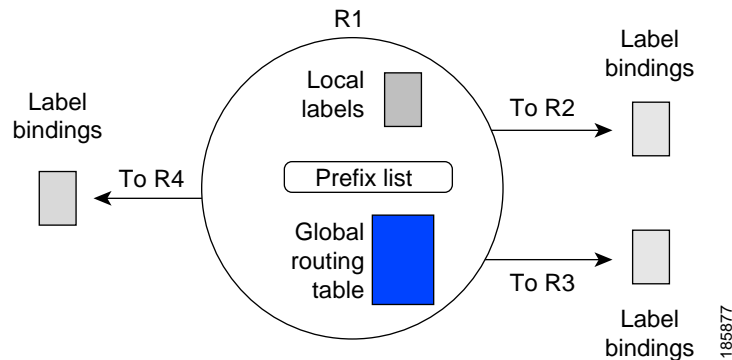


Figure 8-2 shows that router R1 learns the number of routes from its IGP neighbors on routers R2, R3, and R4. A prefix list that is defined on router R1 specifies the prefixes for which LDP allocates a local label.



Note

The number of label information base (LIB) entries remains the same regardless of the kind of label filtering used because the remote label bindings for the prefixes that are filtered are kept in the LIB. Memory use is reduced because local label filtering decreases the number of local labels allocated and the number of label bindings advertised to and stored by the peers of an LSR. When all neighboring LSRs are configured with the same local label allocation filter, the number of LIB entries can be reduced (that is, no, or few, LIB entries are created to store remote label bindings).

Prefix Lists for MPLS LDP Local Label Allocation Filtering

The local label allocation filtering feature allows you to configure LDP to allocate local labels for a subset of the learned prefixes. LDP accepts the prefix and allocates a local label if the prefix is permitted by a prefix list. If the prefix list is not defined, LDP accepts all prefixes and allocates local labels based on its default mode of operation.

The benefits of using prefix lists for LDP local label allocation filtering are as follows:

- Prefix lists provide more flexibility for specifying a subset of prefixes and masks.
- Prefix lists use a tree-based matching technique, which is more efficient than evaluating prefixes or host routes sequentially.
- Prefix lists are easy to modify.



Note

Prefix lists are also used for outbound label filtering and inbound label filtering. For information on configuring prefix lists, see the [“Creating a Prefix List for MPLS LDP Label Filtering”](#) section on page 8-6.

Local Label Allocation Filtering and LDP Actions

Local label allocation filtering modifies the LDP's local label allocation handling. This feature supports local label allocation filtering through the specification of a prefix list or host routes.

With this feature, LDP determines whether a prefix filter is already configured to control the local label allocation on the local node. If a prefix list exists, the local label allocation is confined to the list of prefixes permitted by the configured prefix list.

LDP also responds to local label allocation configuration changes and to configuration changes that affect the prefix list that is used by LDP. Any of the following configuration changes can trigger LDP actions:

- Creating a local label allocation configuration
- Deleting or changing a local label allocation configuration
- Creating a new prefix list for a local label allocation configuration
- Deleting or changing a prefix list for a local label allocation configuration

LDP responds to local label allocation configuration changes by updating the LIB and the forwarding table in the global routing table. To update the LIB after a local label filter configuration change without a session reset, LDP keeps all remote bindings.

If you create a local label allocation configuration without defining a prefix list, no LDP action is required. The local label allocation configuration has no effect because the prefix list is created and permits all prefixes.

If you create or change a prefix list and prefixes that were previously allowed are rejected, LDP goes through a label withdraw and release procedure before the local labels for these prefixes are deallocated.

If you delete a prefix, LDP goes through the label withdraw and release procedure for the LIB local label. If the associated prefix is one for which no LIB entry should be allocated, LDP bypasses this procedure.

**Note**

Local label allocation filtering has no impact on inbound or outbound label filtering because they all provide LDP filtering independently.

Outbound Label Filtering

MPLS LDP supports outbound label binding filtering. You can use this feature to control which label bindings are advertised to LDP neighbors.

Inbound Label Filtering

MPLS LDP supports inbound label binding filtering. You can use this feature to configure prefix lists for controlling the label bindings that an LSR accepts from its peer LSRs. You can limit LDP to accept a set of prefixes from a given LDP neighbor. By default, LDP accepts all labels for all prefixes from all LDP neighbors.

You can use the inbound label binding filtering feature to control the amount of memory used to store LDP label bindings advertised by other routers. For example, in a simple MPLS VPN environment, the VPN PE routers might require an LSP only to their peer PE routers (that is, they do not need LSPs to core routers). Inbound label filtering enables a PE router to accept labels only for other PE routers.

Licensing Requirements for MPLS LDP Label Filtering

| Product | License Requirement |
|-------------|--|
| Cisco NX-OS | MPLS LDP label filtering requires an MPLS license. For a complete explanation of the Cisco NX-OS licensing scheme and how to obtain and apply licenses, see the <i>Cisco NX-OS Licensing Guide</i> . |

Prerequisites for MPLS LDP Label Filtering

MPLS LDP label filtering has the following prerequisites:

- You must enable the MPLS LDP feature.

Guidelines and Limitations for MPLS LDP Label Filtering

MPLS LDP label filtering has the following configuration guidelines and limitations:

- The LDP local label allocation configuration for prefix lists or host routes is supported only in the global routing table.
- A maximum of one local label allocation filter is supported for the global table.
- Wildcard forwarding equivalence class (FEC) requests are not supported with local label allocation filtering.
- Remote label bindings are retained for prefixes even when the allocation of local labels for these prefixes is filtered out (local labels are not allocated).

MPLS LDP outbound label filtering has the following configuration guidelines and limitations:

- To prevent the distribution of any locally assigned labels, use the **no advertise-labels** command with no optional parameters. To reenable the distribution of all locally assigned labels to all LDP neighbors, use the **advertise-labels** command with no optional parameters.
- You can execute multiple **advertise-labels** commands. In the aggregate, such commands determine how the LSR advertises local labels. The following rules describe the effects of multiple commands:
 1. Every **advertise-labels** command has a prefix-pfxlist, peer-pfxlist pair associated with it. The prefix-list pair associated with the **advertise-labels** command (in the absence of both the **for** and **to** keywords) is none, none. The prefix-list pair associated with the **advertise-labels for prefix-pfxlist** command (in the absence of the **to** keyword) is prefix-pfxlist, none.
 2. A given prefix can have, at most, one prefix-pfxlist, peer-pfxlist pair that applies to it, as described as follows:
 - a. A given prefix-pfxlist, peer-pfxlist pair applies to a prefix only if the prefix-pfxlist matches the prefix. A match occurs if the prefix-pfxlist permits the prefix.
 - b. If more than one prefix-pfxlist, peer-pfxlist pair from multiple **advertise-labels** commands matches a prefix, the prefix-pfxlist, peer-pfxlist pair in the first such command (as determined by the **show running mpls ldp** command) applies to the prefix.
 3. When an LSR is ready to advertise a label for a prefix, the LSR does the following:
 - a. Determines whether a prefix-pfxlist, peer-pfxlist pair applies to the prefix.

- b. If none applies and the **no advertise-labels** command has been configured, the label for the prefix is not advertised to any peer; otherwise, the label is advertised to all peers.
- c. If a prefix-pfxlist, peer-pfxlist pair applies to the prefix and the prefix pfxlist denies the prefix, the label is not advertised to any peer.
- d. If the prefix pfxlist permits the prefix and the peer pfxlist is none (that is, the command that applies to the prefix is an **mpls ldp advertise-labels for prefix-list** command without the **to** keyword), the label is advertised to all peers.
- e. If the prefix pfxlist permits the prefix and there is a peer pfxlist, the label is advertised to all peers permitted by the peer pfxlist.

**Note**

Typically, LDP advertises labels only for IP prefixes that are in the routing table. You can use the **mpls ldp advertise-labels interface** command to force LDP to advertise a label for a prefix constructed from an interface address and a 32-bit mask. Such a prefix is not usually in the routing table. The output of the **show mpls ip binding detail** command includes the prefix-acl, peer-acl pairs that apply to each prefix.

Default Settings for MPLS LDP Label Filtering

Table 8-1 lists the default settings for MPLS LDP label filtering parameters.

Table 8-1 Default MPLS LDP Label Filtering Parameters

| Parameters | Default |
|---|--|
| MPLS LDP local label allocation filtering | Enabled. Allocate local labels for IGP-learned host routes (/32) only. |
| MPLS LDP outbound label filtering | Disabled. |
| MPLS LDP inbound label filtering | Disabled. |

Configuring MPLS LDP Label Filtering

This section includes the following topics:

- [Creating a Prefix List for MPLS LDP Label Filtering, page 8-6](#)
- [Configuring MPLS LDP Local Label Allocation Filtering, page 8-9](#)
- [Configuring MPLS LDP Outbound Label Filtering, page 8-10](#)
- [Configuring MPLS LDP Inbound Label Filtering, page 8-11](#)

Creating a Prefix List for MPLS LDP Label Filtering

You can create a prefix list for MPLS LDP local label allocation filtering, outbound filtering, or inbound filtering. A prefix list allows LDP to selectively allocate local labels for a subset of the routes learned from the IGP, restrict the advertisement of local labels to specific LDP peers, or control the label bindings that an LSR accepts from its peer LSRs.

Prerequisites

Ensure that you are in the correct VDC (or use the **switchto vdc** command).

SUMMARY STEPS

1. **configure terminal**
2. **ip prefix-list** *prefix-list* { **description** *description* | **seq** *number* [**deny** *network/length* [**eq** *eq-length* | **ge** *ge-length* | **le** *le-length*] | **permit** *network/length* [**eq** *eq-length* | **ge** *ge-length* | **le** *le-length*]] | **deny** *network/length* [**eq** *eq-length* | **ge** *ge-length* | **le** *le-length*] | **permit** *network/length* [**eq** *eq-length* | **ge** *ge-length* | **le** *le-length*]}
3. (Optional) **show ip prefix-list** [*prefix-list*]
4. (Optional) **copy running-config startup-config**

DETAILED STEPS

| | Command | Purpose |
|--------|---|-----------------------------------|
| Step 1 | configure terminal Example: switch# configure terminal switch(config)# | Enters global configuration mode. |

| Command | Purpose |
|---|--|
| <p>Step 2</p> <pre>ip prefix-list prefix-list {description description seq number [deny network/length [eq eq-length ge ge-length le le-length] permit network/length [eq eq-length ge ge-length le le-length]] deny network/length [eq eq-length ge ge-length le le-length] permit network/length [eq eq-length ge ge-length le le-length]}</pre> <p>Example: switch(config)# ip prefix-list p1 permit 10.0.0.2/32 ge 10</p> | <p>Creates a prefix list that you can use as a filter for MPLS LDP label filtering.</p> <ul style="list-style-type: none"> • The seq number keyword and argument apply a sequence number to a prefix-list entry. The range for sequence numbers is from 1 to 4,294,967,294. If a sequence number is not entered when this command is configured, a default sequence numbering is applied to the prefix list. The number 5 is applied to the first prefix entry, and subsequent unnumbered entries are incremented by 5. • The deny keyword denies access for a matching condition. • The permit keyword permits access for a matching condition. • The network and length arguments configure the network address and the length of the network mask in bits, respectively. The network number can be any valid IP address or prefix. The bit mask can be a number from 0 to 32. • The ge-length argument specifies the minimum prefix length to be matched. The ge keyword represents the greater than or equal to operator. • The le-length argument specifies the maximum prefix length to be matched. The le keyword represents the less than or equal to operator. • The eq-length argument specifies the exact prefix length to be matched. The eq keyword represents the equal to operator. |
| <p>Step 3</p> <pre>show ip prefix-list [prefix-list]</pre> <p>Example: switch(config)# show ip prefix-list p1</p> | <p>(Optional) Displays the contents of all current IP prefix lists or of a specified prefix list.</p> |
| <p>Step 4</p> <pre>copy running-config startup-config</pre> <p>Example: switch(config)# copy running-config startup-config</p> | <p>(Optional) Copies the running configuration to the startup configuration.</p> |

Configuring MPLS LDP Local Label Allocation Filtering

You can configure the Cisco NX-OS device for MPLS LDP local label allocation filtering. You can configure a prefix list, host routes, or all routes as a filter for local label allocation.

Prerequisites

Ensure that you are in the correct VDC (or use the **switchto vdc** command).

Ensure that LDP is enabled.

SUMMARY STEPS

1. **configure terminal**
2. **mpls ldp configuration**
3. **label allocate global {prefix-list *prefix-list* | host-routes | all-routes}**
4. (Optional) **show mpls ldp bindings detail**
5. (Optional) **copy running-config startup-config**

DETAILED STEPS

| | Command | Purpose |
|--------|--|--|
| Step 1 | configure terminal Example: switch# configure terminal switch(config)# | Enters global configuration mode. |
| Step 2 | mpls ldp configuration Example: switch(config)# mpls ldp configuration switch(config-ldp)# | Enters LDP configuration mode. |
| Step 3 | label allocate global {prefix-list <i>prefix-list</i> host-routes all-routes} Example: switch(config-ldp)# label allocate global prefix-list p1 | Configures local label allocation filters for MPLS LDP. <ul style="list-style-type: none"> • The prefix-list <i>prefix-list</i> keyword and argument specify a prefix list to be used as a filter for MPLS LDP local label allocation. • The host-routes keyword specifies that local label allocation be done for host routes only. This is the default configuration. • The all-routes keyword specifies that local label allocation be done for all routes. |

| | Command | Purpose |
|--------|--|---|
| Step 4 | show mpls ldp bindings detail Example: switch(config-ldp)# show mpls ldp bindings detail | (Optional) Displays the filter used for local label allocation. Note To see sample output from this command, see the “ Sample MPLS LDP Local Label Allocation Filtering Configuration Example ” section on page 8-14. |
| Step 5 | copy running-config startup-config Example: switch(config-ldp)# copy running-config startup-config | (Optional) Copies the running configuration to the startup configuration. |

Configuring MPLS LDP Outbound Label Filtering

You can configure the Cisco NX-OS device for MPLS LDP outbound label filtering.

Prerequisites

Ensure that you are in the correct VDC (or use the **switchto vdc** command).

Ensure that MPLS LDP is enabled.

SUMMARY STEPS

1. **configure terminal**
2. **ip prefix-list *prefix-list* permit *network/length***
3. **ip prefix-list *prefix-list* permit *network/length***
4. **mpls ldp configuration**
5. **advertise-labels [for *prefix-list* [to *prefix-list*] | interface *interface number*]**
6. (Optional) **show mpls ldp bindings detail**
7. (Optional) **copy running-config startup-config**

DETAILED STEPS

| | Command | Purpose |
|--------|--|--|
| Step 1 | configure terminal Example: switch# configure terminal switch(config)# | Enters global configuration mode. |
| Step 2 | ip prefix-list <i>prefix-list</i> permit <i>network/length</i> Example: switch(config)# ip prefix-list p1 permit 10.0.0.0/32 | Creates an IP prefix list and specifies the prefixes permitted by the prefix list. The <i>prefix-list</i> argument can be up to 63 characters. |

| | Command | Purpose |
|--------|--|--|
| Step 3 | <pre>ip prefix-list <i>prefix-list</i> permit <i>network/length</i></pre> <p>Example: switch(config)# ip prefix-list peer1 permit 35.0.0.55/32</p> | Creates an IP prefix list and specifies the prefixes permitted by the prefix list. The <i>prefix-list</i> argument can be up to 63 characters. |
| Step 4 | <pre>mpls ldp configuration</pre> <p>Example: switch(config)# mpls ldp configuration switch(config-ldp)#</p> | Enters LDP configuration mode. |
| Step 5 | <pre>advertise-labels [for <i>prefix-list</i> [to <i>prefix-list</i>] interface <i>interface number</i>]</pre> <p>Example: switch(config-ldp)# advertise-labels for p1 to peer1</p> | <p>Advertises local labels for some destination prefixes to some LDP peers or advertises local labels for a particular interface.</p> <p>Note To block label advertisements to the rest of the LDP peers, use the no advertise-labels command.</p> |
| Step 6 | <pre>show mpls ldp bindings detail</pre> <p>Example: switch(config-ldp)# show mpls ldp bindings detail</p> | (Optional) Displays the filter used for outbound labels. |
| Step 7 | <pre>copy running-config startup-config</pre> <p>Example: switch(config-ldp)# copy running-config startup-config</p> | (Optional) Copies the running configuration to the startup configuration. |

Configuring MPLS LDP Inbound Label Filtering

You can configure the Cisco NX-OS device for MPLS LDP inbound label filtering.

Prerequisites

Ensure that you are in the correct VDC (or use the **switchto vdc** command).

Ensure that MPLS LDP is enabled.

SUMMARY STEPS

1. **configure terminal**
2. **ip prefix-list *prefix-list* permit *network/length***
3. **mpls ldp configuration**
4. **neighbor *nbr-address* labels accept *prefix-list***
5. (Optional) **show mpls ldp neighbor [*address* | *interface*] [**detail**]**
6. (Optional) **copy running-config startup-config**

DETAILED STEPS

| | Command | Purpose |
|--------|--|--|
| Step 1 | <code>configure terminal</code> Example: switch# configure terminal switch(config)# | Enters global configuration mode. |
| Step 2 | <code>ip prefix-list prefix-list permit network/length</code> Example: switch(config)# ip prefix-list p1 permit 10.0.0.0/32 | Creates an IP prefix list and specifies the prefixes permitted by the prefix list. The <i>prefix-list</i> argument can be up to 63 characters. |
| Step 3 | <code>mpls ldp configuration</code> Example: switch(config)# mpls ldp configuration switch(config-ldp)# | Enters LDP configuration mode. |
| Step 4 | <code>neighbor nbr-address labels accept prefix-list</code> Example: switch(config-ldp)# neighbor 10.12.12.12 labels accept p1 | Specifies the prefix list to be used to filter label bindings for the specified LDP neighbor. |
| Step 5 | <code>show mpls ldp neighbor [address interface] [detail]</code> Example: switch(config-ldp)# show mpls ldp neighbor 10.12.12.12 detail | (Optional) Displays the filter used for inbound labels. |
| Step 6 | <code>copy running-config startup-config</code> Example: switch(config-ldp)# copy running-config startup-config | (Optional) Copies the running configuration to the startup configuration. |

Verifying the MPLS LDP Label Filtering Configuration

To display the MPLS LDP label filtering configuration, perform one of the following tasks:

| Command | Purpose |
|--|--|
| <code>show ip prefix-list [prefix-list]</code> | Displays the contents of all current IP prefix lists or of a specified prefix list. Note It is important that you enter this command to see how the prefix list is defined; otherwise, you cannot verify MPLS LDP label filtering. |

| Command | Purpose |
|--|--|
| show mpls ldp bindings | Displays whether the LSR has remote bindings only from a specified peer for prefixes permitted by the prefix list. Note To see sample output from this command, see the “Sample MPLS LDP Local Label Allocation Filtering Configuration Example” section on page 8-14. |
| show mpls ldp bindings detail | Displays the filter used for local label allocation or for outbound labels. |
| show mpls ldp neighbor [address interface] [detail] | Displays the filter used for inbound labels. |

For detailed information about the fields in the output from these commands, see the *Cisco Nexus 7000 Series NX-OS MPLS Command Reference*.

Configuration Examples for MPLS LDP Label Filtering

This section provides configuration examples for MPLS LDP label filtering and includes the following topics:

- [Examples: Creating a Prefix List for MPLS LDP Local Label Allocation Filtering, page 8-13](#)
- [Examples: Configuring MPLS LDP Local Label Allocation Filtering, page 8-14](#)
- [Sample MPLS LDP Local Label Allocation Filtering Configuration Example, page 8-14](#)
- [Examples: Configuring MPLS LDP Outbound Label Filtering, page 8-19](#)
- [Examples: Configuring MPLS LDP Inbound Label Filtering, page 8-19](#)

Examples: Creating a Prefix List for MPLS LDP Local Label Allocation Filtering

The following examples show how to configure a prefix list for MPLS LDP local label allocation filtering.

In the following example, prefix list List1 permits only 192.168.0.0/16 prefixes. LDP accepts 192.168.0.0/16 prefixes but does not assign local labels for the following prefixes: 192.168.0.0/24 and 192.168.2.0/24.

```
switch# configure terminal
switch(config)# ip prefix-list List1 permit 192.168.0.0/16
```

In the following example, prefix list List2 permits a range of prefixes from 192.168.0.0/16 to /20. LDP accepts 192.168.0.0/16 prefixes but does not assign local labels for the following prefixes: 192.168.0.0/24 and 192.168.2.0/24.

```
switch# configure terminal
switch(config)# ip prefix-list List2 permit 192.168.0.0/16 le 20
```

In the following example, prefix list List3 permits a range of prefixes greater than /18. LDP accepts 192.168.17.0/20 and 192.168.2.0/24 prefixes but does not assign a local label for 192.168.0.0/16.

```
switch# configure terminal
switch(config)# ip prefix-list List3 permit 192.168.0.0/16 ge 18
```

Examples: Configuring MPLS LDP Local Label Allocation Filtering

The following examples show how to configure an MPLS LDP local label allocation filter using a prefix list or host routes.

In the following example, a prefix list is configured as the local label allocation filter. Prefix list List3, which permits a range of prefixes greater than /18, is configured as the local label allocation filter for the router. LDP allows 192.168.17.0/20 and 192.168.2.0/24 prefixes but withdraws labels for prefixes not in the allowed range.

```
switch# configure terminal
switch(config)# ip prefix-list List3 permit 192.168.0.0/16 ge 18
switch(config)# mpls ldp configuration
switch(config-ldp)# label allocate global prefix-list List3
```

In the following example, host routes are configured as the local label allocation filter:

```
switch# configure terminal
switch(config)# mpls ldp configuration
switch(config-ldp)# label allocate global host-routes
```

In the following example, all local label allocation filters are removed, and the default LDP local label allocation is restored without a session reset:

```
switch# configure terminal
switch(config)# mpls ldp configuration
switch(config-ldp)# no label allocate global all-routes
```

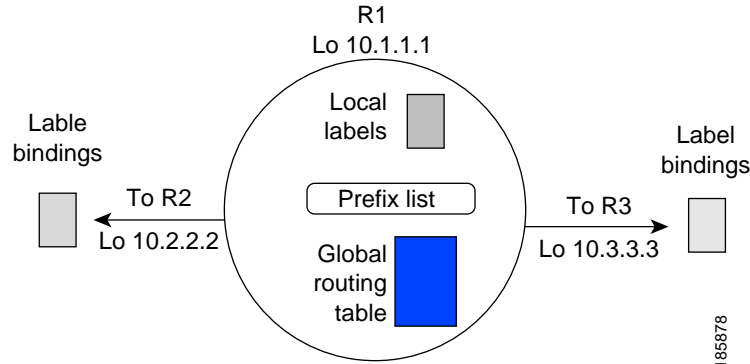
Sample MPLS LDP Local Label Allocation Filtering Configuration Example

Figure 8-3 is a sample configuration used to show how MPLS LDP local label allocation filtering works:

- Routers R1, R2, and R3 have loopback addresses 10.1.1.1, 10.2.2.2, and 10.3.3.3 defined and advertised by the IGP, respectively.
- 10.1.1.1 is the router ID of Router R1, 10.2.2.2 is the router ID of Router R2, and 10.3.3.3 is the router ID of Router R3.
- A prefix list is defined on Router R1 to specify the local labels for which LDP allocates a local label.

Router R1 learns a number of routes from its IGP neighbors on Routers R2 and R3.

Figure 8-3 Sample MPLS LDP Local Label Allocation Filtering Configuration Example



You can use LDP commands to verify the following:

- Router R1 has allocated a local label for the correct subset of the prefixes.
- Routers R2 and R3 did not receive any remote bindings for the prefixes for which Router R1 did not assign a local label.

Local Label Bindings on Router R1, Router R2, and Router R3

In the following examples, LDP uses the default behavior of allocating a local label for every route and advertising a label binding for every route learned from the IGP.

The following example shows the contents of the LIB on Router R1 based on the configuration in [Figure 8-3](#):

```
R1# show mpls ldp bindings

lib entry: 10.1.1.1/32, rev 7
  local binding:  label: imp-null
  remote binding: lsr: 10.3.3.3:0, label: 16
  remote binding: lsr: 10.2.2.2:0, label: 17
lib entry: 10.2.2.2/32, rev 13
  local binding:  label: 1000
  remote binding: lsr: 10.3.3.3:0, label: 18
  remote binding: lsr: 10.2.2.2:0, label: imp-null
lib entry: 10.3.3.3/32, rev 15
  local binding:  label: 1002
  remote binding: lsr: 10.3.3.3:0, label: imp-null
  remote binding: lsr: 10.2.2.2:0, label: 18
lib entry: 10.10.7.0/24, rev 8
  local binding:  label: imp-null
  remote binding: lsr: 10.3.3.3:0, label: 17
  remote binding: lsr: 10.2.2.2:0, label: imp-null
lib entry: 10.10.8.0/24, rev 11
  local binding:  label: 1001
  remote binding: lsr: 10.3.3.3:0, label: imp-null
  remote binding: lsr: 10.2.2.2:0, label: imp-null
lib entry: 10.10.9.0/24, rev 9
  local binding:  label: imp-null
  remote binding: lsr: 10.3.3.3:0, label: imp-null
  remote binding: lsr: 10.2.2.2:0, label: 16
```

For the first prefix list listed (10.1.1.1/32), Router R1 has received remote labels from Routers R2 and R3 (17 and 16, respectively). The local labels assigned to 10.2.2.2 and 10.3.3.3 on Router R1 (1000 and 1002, respectively) have been advertised to Routers R2 and R3.

The following example shows the contents of the LIB on Router R2 based on the configuration in [Figure 8-3](#):

```
R2# show mpls ldp bindings

lib entry: 10.1.1.1/32, rev 11
  local binding: label: 17
  remote binding: lsr: 10.3.3.3:0, label: 16
  remote binding: lsr: 10.1.1.1:0, label: imp-null
lib entry: 10.2.2.2/32, rev 7
  local binding: label: imp-null
  remote binding: lsr: 10.3.3.3:0, label: 18
  remote binding: lsr: 10.1.1.1:0, label: 1000
lib entry: 10.3.3.3/32, rev 15
  local binding: label: 18
  remote binding: lsr: 10.3.3.3:0, label: imp-null
  remote binding: lsr: 10.1.1.1:0, label: 1002
lib entry: 10.10.7.0/24, rev 8
  local binding: label: imp-null
  remote binding: lsr: 10.3.3.3:0, label: 17
  remote binding: lsr: 10.1.1.1:0, label: imp-null
lib entry: 10.10.8.0/24, rev 9
  local binding: label: imp-null
  remote binding: lsr: 10.3.3.3:0, label: imp-null
  remote binding: lsr: 10.1.1.1:0, label: 1001
lib entry: 10.10.9.0/24, rev 13
  local binding: label: 16
  remote binding: lsr: 10.3.3.3:0, label: imp-null
  remote binding: lsr: 10.1.1.1:0, label: imp-null
```

For the second prefix list listed (10.2.2.2/32), Router R2 has received remote labels from Routers R1 and R3 (1000 and 18, respectively). The local labels assigned to 10.1.1.1 and 10.3.3.3 on Router R2 (17 and 18, respectively) have been advertised to Routers R1 and R3.

The following example shows the contents of the LIB on Router R3 based on the configuration in [Figure 8-3](#):

```
R3# show mpls ldp bindings

lib entry: 10.1.1.1/32, rev 13
  local binding: label: 16
  remote binding: lsr: 10.2.2.2:0, label: 17
  remote binding: lsr: 10.1.1.1:0, label: imp-null
lib entry: 10.2.2.2/32, rev 15
  local binding: label: 18
  remote binding: lsr: 10.2.2.2:0, label: imp-null
  remote binding: lsr: 10.1.1.1:0, label: 1000
lib entry: 10.3.3.3/32, rev 7
  local binding: label: imp-null
  remote binding: lsr: 10.2.2.2:0, label: 18
  remote binding: lsr: 10.1.1.1:0, label: 1002
lib entry: 10.10.7.0/24, rev 11
  local binding: label: 17
  remote binding: lsr: 10.2.2.2:0, label: imp-null
  remote binding: lsr: 10.1.1.1:0, label: imp-null
lib entry: 10.10.8.0/24, rev 8
  local binding: label: imp-null
  remote binding: lsr: 10.2.2.2:0, label: imp-null
  remote binding: lsr: 10.1.1.1:0, label: 1001
lib entry: 10.10.9.0/24, rev 9
  local binding: label: imp-null
  remote binding: lsr: 10.2.2.2:0, label: 16
  remote binding: lsr: 10.1.1.1:0, label: imp-null
```


For the third prefix list listed (10.3.3.3/32), Router R3 has received remote labels from Routers R1 and R2 (1002 and 18, respectively). The local labels assigned to 10.1.1.1 and 10.2.2.2 on Router R3 (16 and 18, respectively) have been advertised to Routers R1 and R2.

Local Label Allocation Filtering Configuration on Router R1

The following examples show how to configure local label allocation filtering.

The following example shows the selection of host routes as the only filter on Router R1:

```
R1# configure terminal
R1(config)# mpls ldp configuration
R1(config-ldp)# label allocate global host-routes
```

The following example shows how to configure a local label allocation filter that allows or denies prefixes based on prefix list ListA:

```
R1# configure terminal
R1(config)# ip prefix-list ListA permit 0.0.0.0/32 ge 32
R1(config)# mpls ldp configuration
R1(config-ldp)# label allocate global prefix-list ListA
```

Local Label Allocation Filtering Changes Label Bindings on Router R1, Router R2, and Router R3

After configuring a local label allocation filter on Router R1, you can verify the changes in the local label bindings in the LIB on each router. Changes to the output in the LIB entries are highlighted in bold text.

The following example shows how the configuration of a local label allocation prefix-list filter changes the contents of the LIB on Router R1:

```
R1# show mpls ldp bindings

lib entry: 10.1.1.1/32, rev 7
  local binding: label: imp-null
  remote binding: lsr: 10.3.3.3:0, label: 16
  remote binding: lsr: 10.2.2.2:0, label: 17
lib entry: 10.2.2.2/32, rev 13
  local binding: label: 1000
  remote binding: lsr: 10.3.3.3:0, label: 18
  remote binding: lsr: 10.2.2.2:0, label: imp-null
lib entry: 10.3.3.3/32, rev 15
  local binding: label: 1002
  remote binding: lsr: 10.3.3.3:0, label: imp-null
  remote binding: lsr: 10.2.2.2:0, label: 18
lib entry: 10.10.7.0/24, rev 8
  no local binding
  remote binding: lsr: 10.3.3.3:0, label: 17
  remote binding: lsr: 10.2.2.2:0, label: imp-null
lib entry: 10.10.8.0/24, rev 11
  no local binding
  remote binding: lsr: 10.3.3.3:0, label: imp-null
  remote binding: lsr: 10.2.2.2:0, label: imp-null
lib entry: 10.10.9.0/24, rev 9
  no local binding
  remote binding: lsr: 10.3.3.3:0, label: imp-null
  remote binding: lsr: 10.2.2.2:0, label: 16
```

The following example shows how the configuration of a local label allocation prefix-list filter on Router R1 changes the contents of the LIB on Router R2:

```
R2# show mpls ldp bindings

lib entry: 10.1.1.1/32, rev 11
  local binding: label: 17
  remote binding: lsr: 10.3.3.3:0, label: 16
lib entry: 10.2.2.2/32, rev 7
  local binding: label: imp-null
  remote binding: lsr: 10.3.3.3:0, label: 18
  remote binding: lsr: 10.1.1.1:0, label: 1000
lib entry: 10.3.3.3/32, rev 15
  local binding: label: 18
  remote binding: lsr: 10.3.3.3:0, label: imp-null
  remote binding: lsr: 10.1.1.1:0, label: 1002
lib entry: 10.10.7.0/24, rev 8
  local binding: label: imp-null
  remote binding: lsr: 10.3.3.3:0, label: 17
lib entry: 10.10.8.0/24, rev 9
  local binding: label: imp-null
  remote binding: lsr: 10.3.3.3:0, label: imp-null
lib entry: 10.10.9.0/24, rev 13
  local binding: label: 16
  remote binding: lsr: 10.3.3.3:0, label: imp-null
```

The 10.10.7.0/24, 10.10.8.0/24, and 10.10.9.0/24 prefixes are no longer assigned with local labels. Therefore, Router R1 sends no label advertisement for these prefixes.

The following example shows how the configuration of a local label allocation prefix-list filter on Router R1 changes the contents of the LIB on Router R3:

```
R3# show mpls ldp bindings

lib entry: 10.1.1.1/32, rev 13
  local binding: label: 16
  remote binding: lsr: 10.2.2.2:0, label: 17
  remote binding: lsr: 10.1.1.1:0, label: imp-null
lib entry: 10.2.2.2/32, rev 15
  local binding: label: 18
  remote binding: lsr: 10.2.2.2:0, label: imp-null
  remote binding: lsr: 10.1.1.1:0, label: 1000
lib entry: 10.3.3.3/32, rev 7
  local binding: label: imp-null
  remote binding: lsr: 10.2.2.2:0, label: 18
  remote binding: lsr: 10.1.1.1:0, label: 1002
lib entry: 10.10.7.0/24, rev 11
  local binding: label: 17
  remote binding: lsr: 10.2.2.2:0, label: imp-null
lib entry: 10.10.8.0/24, rev 8
  local binding: label: imp-null
  remote binding: lsr: 10.2.2.2:0, label: imp-null
lib entry: 10.10.9.0/24, rev 9
  local binding: label: imp-null
  remote binding: lsr: 10.2.2.2:0, label: 16
```

The 10.10.7.0/24, 10.10.8.0/24, and 10.10.9.0/24 prefixes are no longer assigned with local labels. Again, Router R1 sends no label advertisement for these prefixes.

Examples: Configuring MPLS LDP Outbound Label Filtering

The following example shows how to configure the device to advertise the label for network 10.0.0.0 only to LSR 35.0.0.55 and the labels for all other prefixes to all LSRs:

```
switch# configure terminal
switch(config)# ip prefix-list pfx1 permit 10.0.0.0/32
switch(config)# ip prefix-list peer1 permit 35.0.0.55/32
switch(config)# mpls ldp configuration
switch(config)# no advertise-labels
switch(config-ldp)# advertise-labels for pfx1 to peer1
```

Examples: Configuring MPLS LDP Inbound Label Filtering

The following example shows how to configure a prefix list to filter label bindings received on sessions with the neighbor 10.0.0.31.

Label bindings for prefixes that match *10.b.c.d* are accepted, where *b* is less than or equal to 63, and *c* and *d* can be any integer between 0 and 128. Other label bindings received from 10.0.0.31 are rejected.

```
switch# configure terminal
switch(config)# ip prefix-list 1 permit 10.0.0.0/10 le 32
switch(config)# mpls ldp configuration
switch(config-ldp)# neighbor 10.0.0.31 labels accept 1
switch(config-ldp)# show mpls ldp neighbor 10.0.0.31 detail
```

```
Peer LDP Ident: 10.0.0.31:0; Local LDP Ident 10.0.0.30:0
TCP connection: 10.0.0.31.18303 - 10.0.0.30.646
Password: not required, none, in use
Adj pwd Rx/Tx: [nil]/[nil]
TCP pwd Rx/Tx: [nil]/[nil]
State: Oper; Msgs sent/rcvd: 28987/28988; Downstream; Last TIB rev sent 57
Up time: 2w3d; UID: 16; Peer Id 0
LDP discovery sources:
  Ethernet2/2; Src IP addr: 60.0.0.2
    holdtime: 15000 ms, hello interval: 5000 ms
Addresses bound to peer LDP Ident:
  10.0.0.31      3.3.151.13      60.0.0.2      61.0.0.1
Peer holdtime: 180000 ms; KA interval: 60000 ms; Peer state: estab
Capabilities Sent:
  [Dynamic Announcement (0x0506)]
  [Typed Wildcard (0x0970)]
Capabilities Received:
  [Dynamic Announcement (0x0506)]
  [Typed Wildcard (0x0970)]
```

The following example shows label bindings that were learned from 10.0.0.31. It verifies that the LIB does not contain label bindings for prefixes that have been excluded.

```
switch# show mpls ldp bindings neighbor 10.0.0.31

lib entry: 3.3.0.0/16, rev 57
  remote binding: lsr: 10.0.0.31:0, label: imp-null
lib entry: 10.0.0.30/32, rev 2
  remote binding: lsr: 10.0.0.31:0, label: 17
lib entry: 10.0.0.31/32, rev 39
  remote binding: lsr: 10.0.0.31:0, label: imp-null
lib entry: 10.0.0.32/32, rev 37
  remote binding: lsr: 10.0.0.31:0, label: 16
```

```
lib entry: 60.0.0.0/8, rev 55
    remote binding: lsr: 10.0.0.31:0, label: imp-null
lib entry: 61.0.0.0/8, rev 56
    remote binding: lsr: 10.0.0.31:0, label: imp-null
```

Additional References for MPLS LDP Label Filtering

For additional information related to implementing MPLS LDP label filtering, see the following sections:

- [Related Documents, page 8-20](#)
- [MIBs, page 8-20](#)

Related Documents

| Related Topic | Document Title |
|---------------|---|
| CLI commands | <i>Cisco Nexus 7000 Series NX-OS MPLS Command Reference</i> |

MIBs

| MIB | MIBs Link |
|------------------|--|
| MPLS-LDP-STD-MIB | To locate and download MIBs, go to the following URL: http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml |

Feature History for MPLS LDP Label Filtering

[Table 8-2](#) lists the release history for this feature.

Table 8-2 Feature History for MPLS LDP Label Filtering

| Feature Name | Releases | Feature Information |
|---|----------|------------------------------|
| MPLS LDP local label allocation filtering | 5.2(1) | This feature was introduced. |
| MPLS LDP outbound label filtering | 5.2(1) | This feature was introduced. |
| MPLS LDP inbound label filtering | 5.2(1) | This feature was introduced. |