IS-IS Support for Route Tags

The IS-IS Support for Route Tags feature provides the capability to tag IS-IS route prefixes and use those tags in a route map to control Intermediate System-to-Intermediate System (IS-IS) route redistribution or route leaking.

History for the IS-IS Support for Route Tags Feature

Release	Modification
12.3(2)T	This feature was introduced.
12.2(18)S	This feature was integrated into Cisco IOS Release 12.2(18)S.
12.2(27)SBC	This feature was integrated into Cisco IOS Release 12.2(27)SBC.

Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at http://www.cisco.com/go/fn. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

Contents

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Prerequisites to Using IS-IS Route Tags

- You must have integrated IS-IS configured.
- Because the IS-IS route tag will be used in a route map, you must understand how to configure a route map.
- In order to use the route tag, you must configure the **metric-style wide** command. (The **metric-style narrow** command is configured by default). The tag value is set into sub-TLV 1 for TLV (Type Length Value) Type 135.
- You must understand the task for which you are using the route tag, such as route redistribution, route summarization, or route leaking.

Information About IS-IS Route Tags

You should understand at least the first two concepts before implementing IS-IS route tags, and you should understand the third concept if you plan to configure route leaking:

- Benefits of IS-IS Route Tags, page 2
- IS-IS Route Tag Characteristics, page 2
- IS-IS Route Leaking Based on a Route Tag, page 3

Benefits of IS-IS Route Tags

- The IS-IS Support for Route Tags feature allows you to tag IP addresses of an interface and use the tag to apply administrative policy with a route map.
- You can tag IS-IS routes to control their redistribution. You can configure a route map to set a tag for an IS-IS IP prefix (route) and/or match on the tag (perhaps on a different router) to redistribute IS-IS routes. Although the **match tag** and **set tag** commands existed for other protocols before this feature, they were not implemented for IS-IS, so they did nothing when specified in an IS-IS network until now.
- You can tag a summary route and then use a route map to match the tag and set one or more attributes for the route.

IS-IS Route Tag Characteristics

An IS-IS route tag number can be up to 4 bytes long. The tag value is set into a sub-TLV 1 for TLV (Type Length Value) Type 135. For more information about TLV Type 135, refer to the "*Intermediate System-to-Intermediate System (IS-IS) TLVs*" document referenced in the "Additional References" section.

Only one tag can be set to an IS-IS IP route (prefix).The tag is sent out in link-state packets (LSPs) advertising the route. Setting a tag to a route alone does nothing for your network. You can use the route tag at area or Level 1/Level 2 boundaries by matching on the tag and then applying administrative policies such as redistribution, route summarization, or route leaking.

Configuring a tag for an interface (with the **isis tag** command) triggers the generation of new LSPs from the router because the tag is new information for the packets.

IS-IS Route Leaking Based on a Route Tag

The IS-IS Support for Route Tags feature provides a new way to configure route leaking (redistribution). If you configure route leaking and you want to match on a tag, use a route map (not a distribute list). For more information on route leaking, refer to *IS-IS Route Leaking Overview* at: http://www.cisco.com/warp/public/97/route-leak.html

How to Use IS-IS Route Tags

There are two general steps to using IS-IS route tags: tagging routes and referencing the tag to set values for the routes and/or redistribute routes. This section describes the following tasks:

- Tagging IS-IS Routes, page 3 (required)
- Using the Tag to Set Values and/or Redistribute Routes, page 9 (required)

Tagging IS-IS Routes

There are three ways to tag IS-IS routes: tag routes for networks directly connected to an interface, set a tag in a route map, or tag a summary route. All three methods are described in this section. The tagging method is independent of how you use the tag.

After you tag the routes, you can use the tag to set values (such as a metric or next hop, and so on) and/or redistribute routes. You might tag routes on one router, but reference the tag on other routers, depending on what you want to achieve. For example, you could tag the interface on Router A with a tag, match the tag on Router B to set values, and redistribute routes on Router C based on values using a route map.

Prerequisites

Before you tag any IS-IS routes, you need to decide on the following:

1. Your goal to set values for routes or redistribute routes (or both).
2. Where in your network you want to tag routes.
3. Where in your network you want to reference the tags.
4. Which tagging method you will use, which determines which task in this section to perform.

After you know which tagging method suits your need, proceed to one of the following tasks:

- Tagging Routes for Networks Directly Connected to an Interface, page 3
- Tagging Routes Using a Route Map, page 5
- Tagging a Summary Address, page 8

Tagging Routes for Networks Directly Connected to an Interface

Perform this task if you want to tag routes for networks directly connected to an interface.

SUMMARY STEPS

1. **enable**
2. **configure terminal**

3. **interface** *type number*
4. **ip address** *ip-address mask*
5. **ip address** *ip-address mask* **secondary**
6. **isis tag** *tag-number*
7. **end**
8. **show isis database verbose**
9. **show ip route** [[*ip-address* [*mask*] [**longer-prefixes**]] | [*protocol* [*process-id*]] | [**list** *access-list-number* | *access-list-name*]]

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface** *type number* **Example:** `Router(config)# interface ethernet 0`	Configures an interface.
Step 4	**ip address** *ip-address mask* **Example:** `Router(config-if)# ip address 10.1.1.1 255.255.255.0`	Sets a primary IP address for an interface. • In this example, the network 10.1.1.0 will be tagged.
Step 5	**ip address** *ip-address mask* **secondary** **Example:** `Router(config-if)# ip address 10.2.2.1 255.255.255.0 secondary`	(Optional) Sets a secondary IP address for an interface. • In this example, the network 10.2.2.0 will be tagged.
Step 6	**isis tag** *tag-number* **Example:** `Router(config-if)# isis tag 120`	Sets a tag on the IP addresses configured under this interface when those IP prefixes are put into an IS-IS LSP. • The tag must be an integer.
Step 7	**end** **Example:** `Router(config-if)# end`	(Optional) Exits configuration mode and returns to privileged EXEC mode.

	Command or Action	Purpose
Step 8	**show isis database verbose** **Example:** `Router# show isis database verbose`	(Optional) Displays details about the IS-IS link-state database, including the route tag. • Perform this step if you want to verify the tag.
Step 9	**show ip route** [[*ip-address* [*mask*] [**longer-prefixes**]] | [*protocol* [*process-id*]] | [**list** *access-list-number* | *access-list-name*]] **Example:** `Router# show ip route 10.1.1.1 255.255.255.0`	(Optional) Displays the current state of the routing table. • Perform this step if you want to verify the tag.

What to Do Next

Applying the tag does nothing for your network until you use the tag by referencing it in a route map, either to set values, to redistribute routes, or to do both. Proceed to the "Using the Tag to Set Values and/or Redistribute Routes, page 9."

Tagging Routes Using a Route Map

Perform this task when you want to redistribute connected routes, static routes or routes from other routing protocols using a route map. You can optionally set some new values for the redistributed routes. You should create the route map first, and then reference the tag (shown in a separate task).

It is possible that you might configure some commands on one router and other commands on another router. For example, you might have a route map that matches on a tag and sets a different tag on a router at the edge of a network, and on different routers configure the redistribution of routes based on the route map.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **route-map** *map-tag* [**permit** | **deny**] [*sequence-number*]
4. **match tag** *tag-number* [*...tag-number*]
5. Use an additional **match** command for each match criterion that you want.
6. **set tag** *tag-number*
7. Set another value, depending on what else you want to do with the tagged routes.
8. Repeat Step 7 for each value that you want to set.
9. Repeat Steps 3 through 8 for each route-map statement that you want.
10. **end**
11. **show isis database verbose**
12. **show ip route** [[*ip-address* [*mask*] [**longer-prefixes**]] | [*protocol* [*process-id*]] | [**list** *access-list-number* | *access-list-name*]]

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**route-map** *map-tag* [**permit** | **deny**] [*sequence-number*] **Example:** `Router(config)# route-map static-color permit 15`	Defines the conditions for redistributing routes from one routing protocol into another or from one IS-IS level to another. • This command causes the router to enter route-map configuration mode.
Step 4	**match tag** *tag-number* [...*tag-number*] **Example:** `Router(config-route-map)# match tag 15`	(Optional) Matches routes tagged with the specified tag numbers. • If you are setting a tag for the first time, you cannot match on tag; this step is an option if you are changing tags.
Step 5	Use an additional **match** command for each match criterion that you want.	(Optional) Refer to the appropriate **match** commands in the "IP Routing Protocol-Independent Commands" chapter of the *Cisco IOS IP Command Reference, Volume 2 of 4: Routing Protocols*. • Repeat this step for each match criterion you want.
Step 6	**set tag** *tag-number* **Example:** `Router(config-route-map)# set tag 10`	Specifies the tag number to set.

	Command or Action	Purpose
Step 7	Set another value, depending on what else you want to do with the tagged routes.	(Optional) Reference the appropriate **set** commands in the "IP Routing Protocol-Independent Commands" chapter of the *Cisco IOS IP Command Reference, Volume 2 of 4: Routing Protocols*, such as: • **set default interface** • **set interface** • **set ip default next-hop** • **set default interface** • **set ip next-hop** • **set ip next-hop verify-availability** • **set ip precedence** • **set level** • **set local-preference** • **set metric** • **set metric-type** • **set next-hop**
Step 8	Repeat Step 7 for each value that you want to set.	(Optional)
Step 9	Repeat Steps 3 through 8 for each route-map statement that you want.	(Optional)
Step 10	**end** **Example:** `Router(config-route-map)# end`	(Optional) Exits configuration mode and returns to privileged EXEC mode.
Step 11	**show isis database verbose** **Example:** `Router# show isis database verbose`	(Optional) Displays details about the IS-IS link-state database, including the route tag. • Perform this step if you want to verify the tag.
Step 12	**show ip route** [[*ip-address* [*mask*] [**longer-prefixes**]] | [*protocol* [*process-id*]] | [**list** *access-list-number* | *access-list-name*]] **Example:** `Router# show ip route 10.1.1.1 255.255.255.0`	(Optional) Displays the current state of the routing table. • Perform this step if you want to verify the tag.

What to Do Next

Applying the tag does nothing for your network until you use the tag by referencing it in a route map, either to set values, to redistribute routes, or to do both. Proceed to the "Using the Tag to Set Values and/or Redistribute Routes, page 9."

Tagging a Summary Address

Perform this task if you want to summarize IS-IS routes at an area boundary or level boundary and tag the summarized route. You will later use the tag to set values for the summarized route.

Note If a tagged route is summarized and the tag is not explicitly configured in the **summary-address** command, then the tag is lost.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **router isis**
4. **metric-style wide**
5. **summary-address** *address mask* {**level-1** | **level-1-2** | **level-2**} [**tag** *tag-number*] [**metric** *metric-value*]
6. **end**
7. **show isis database verbose**
8. **show ip route** [[*ip-address* [*mask*] [**longer-prefixes**]] | [*protocol* [*process-id*]] | [**list** *access-list-number* | *access-list-name*]]

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**router isis** **Example:** `Router(config)# router isis`	Enables the IS-IS routing protocol and specifies an IS-IS process.
Step 4	**metric-style wide** **Example:** `Router(config-router)# metric-style wide`	Configures a router running IS-IS so that it generates and accepts Type, Length, and Value object (TLV) 135 for IP addresses.

	Command or Action	Purpose
Step 5	**summary-address** *address mask* {**level-1** | **level-1-2** | **level-2**} [**tag** *tag-number*] [**metric** *metric-value*] **Example:** `Router(config-router)# summary-address 192.168.0.0 255.255.0.0 tag 12345 metric 321`	Creates aggregate addresses for IS-IS.
Step 6	**end** **Example:** `Router(config-router)# end`	(Optional) Exits configuration mode and returns to privileged EXEC mode.
Step 7	**show isis database verbose** **Example:** `Router# show isis database verbose`	(Optional) Displays details about the IS-IS link-state database, including the route tag. • Perform this step if you want to verify the tag.
Step 8	**show ip route** [[*ip-address* [*mask*] [**longer-prefixes**]] | [*protocol* [*process-id*]] | [**list** *access-list-number* | *access-list-name*]] **Example:** `Router# show ip route 10.1.1.1 255.255.255.0`	(Optional) Displays the current state of the routing table. • Perform this step if you want to verify the tag.

What to Do Next

Applying the tag does nothing for your network until you use the tag by referencing it in a route map to set value. It is unlikely that you will redistribute summary routes. Proceed to the "Using the Tag to Set Values and/or Redistribute Routes" section on page 9."

Using the Tag to Set Values and/or Redistribute Routes

Now that you have applied a tag to one or more routes, you can use that tag to set various values for routes or to redistribute the routes, or both. This task shows you how to set values and redistribute routes. Note that it is likely you are using the tag on a different router from the router on which you applied the tag.

Prerequisites

You must have already applied a tag either on the interface, in a route map, or on a summary route. See the section "Tagging IS-IS Routes, page 3."

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **route-map** *map-tag* [**permit** | **deny**] [*sequence-number*]
4. **match tag** *tag-number*

5. Specify a **match** command for each match criterion you want.
6. Set a value, depending on what you want to do with the tagged routes.
7. Repeat Step 6 for each value you want to set.
8. Repeat Steps 3 through 7 for each route-map statement you want.
9. **exit**
10. **exit**
11. **router isis**
12. **metric-style wide**
13. **redistribute** *protocol* [*process-id*] [**level-1** | **level-1-2** | **level-2**] [**metric** *metric-value*] [**metric-type** *type-value*] [**route-map** *map-tag*]

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**route-map** *map-tag* [**permit** | **deny**] [*sequence-number*] **Example:** `Router(config)# route-map static-color permit 15`	Defines the conditions for redistributing routes from one routing protocol into another or from one IS-IS level to another. • This command causes you to enter route-map configuration mode.
Step 4	**match tag** *tag-number* **Example:** `Router(config-route-map)# match tag 120`	(Optional) Applies the subsequent set commands to routes that match routes tagged with this tag number.
Step 5	Specify a **match** command for each match criterion you want.	(Optional) Reference the appropriate **match** commands in the "IP Routing Protocol-Independent Commands" chapter of the *Cisco IOS IP Command Reference, Volume 2 of 4: Routing Protocols*.

	Command or Action	Purpose
Step 6	Set a value, depending on what you want to do with the tagged routes.	(Optional) Reference the appropriate **set** commands in the "IP Routing Protocol-Independent Commands" chapter of the *Cisco IOS IP Command Reference, Volume 2 of 4: Routing Protocols*, such as • **set default interface** • **set interface** • **set ip default next-hop** • **set default interface** • **set ip next-hop** • **set ip next-hop verify-availability** • **set ip precedence** • **set level** • **set local-preference** • **set metric** • **set metric-type** • **set next-hop** • **set tag**
Step 7	Repeat Step 6 for each value you want to set.	(Optional)
Step 8	Repeat Steps 3 through 7 for each route-map statement you want.	(Optional)
Step 9	**exit** **Example:** `Router(config-route-map)# exit`	(Optional) Returns to the next higher configuration mode.
Step 10	**exit** **Example:** `Router(config-router)# exit`	(Optional) Returns to the next higher configuration mode.
Step 11	**router isis** **Example:** `Router(config)# router isis`	(Optional) Enables the IS-IS routing protocol and specifies an IS-IS process.

	Command or Action	Purpose
Step 12	**metric-style wide** **Example:** `Router(config-router)# metric-style wide`	Configures a router running IS-IS so that it generates and accepts Type, Length, and Value object (TLV) 135 for IP addresses.
Step 13	**redistribute** *protocol* [*process-id*] [**level-1** | **level-1-2** | **level-2**] [**metric** *metric-value*] [**metric-type** *type-value*] [**route-map** *map-tag*] **Example:** `Router(config-router)# redistribute static ip metric 2 route-map static-color`	(Optional) Redistributes routes from one routing domain into another routing domain.

Configuration Examples for IS-IS Support for Route Tags

This section provides the following examples:

Tagging Routes for Networks Directly Connected to an Interface and Redistributing Them: Example

In this example, two interfaces are tagged with different tag values. By default, these two IP addresses would have been put into the IS-IS Level 1 and Level 2 database. However, by using the **redistribute** command with a route map to match tag 110, only IP address 20.1.1.1 255.255.255.0 is put into the Level 2 database.

```
interface ethernet 1/0
 ip address 10.1.1.1 255.255.255.0
 ip router isis
 isis tag 120
interface ethernet 1/1
 ip address 20.1.1.1 255.255.255.0
 ip router isis
 isis tag 110
router isis
 net 49.0001.0001.0001.0001.00
 redistribute isis ip level-1 into level-2 route-map match-tag
 route-map match-tag permit 10
 match tag 110
```

Redistributing IS-IS Routes Using a Route-Map: Example

In a scenario using route tags, you might configure some commands on one router and other commands on another router. For example, you might have a route map that matches on a tag and sets a different tag on a router at the edge of a network, and on different routers configure the redistribution of routes based on a tag in a different route map.

Figure 1 Example of Redistributing IS-IS Routes Using a Route Tag

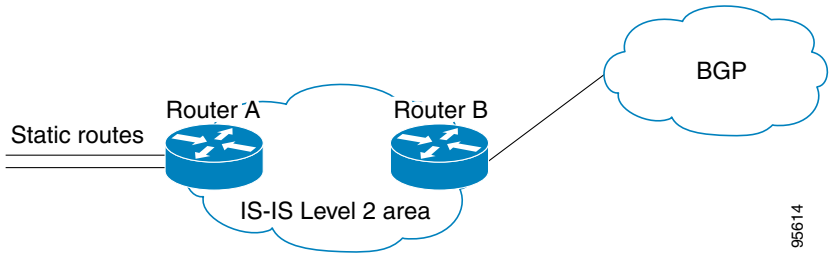


Figure 1 illustrates a flat Level 2 IS-IS area. On the left edge are static routes from Router A to reach some IP prefixes. Router A redistributes the static routes into IS-IS. Router B runs BGP and redistributes IS-IS routes into BGP and then uses the tag to apply different administrative policy based on different tag values.

Router A

```
router isis
 net 49.0000.0000.0001.00
 metric-style wide
 redistribute static ip route-map set-tag
!
route-map set-tag permit 5
 set tag 10
```

Router B

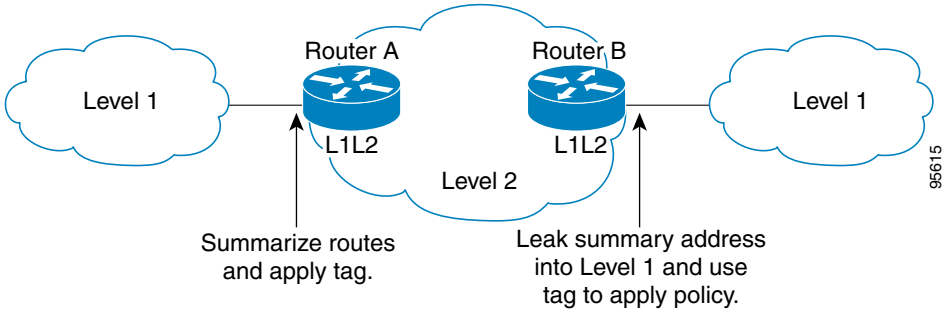
```
router bgp 100
 redistribute isis level-2 route-map tag-policy
route-map tag-policy permit 20
 match tag 10
 set metric 1000
```

Tagging a Summary Address and Applying a Route Map: Example

Figure 2 illustrates two Level 1 areas and a Level 2 area between them. Router A and Router B are Level 1/Level 2 edge routers in the Level 2 area. On edge Router A, a summary address is configured to reduce the number of IP addresses put into the Level 2 IS-IS database. Also, a tag value of 100 is set to the summary address.

On Router B, the summary address is leaked into the Level 1 area and administrative policy is applied based on the tag value.

Figure 2 Tag on a Summary Address



Router A

```
router isis
 net 49.0001.0001.0001.00
 metric-style wide
 summary-address 10.0.0.0 255.0.0.0 tag 100
```

Router B

```
router isis
 net 49.0002.0002.0002.0002.0
 metric-style wide
 redistribute isis ip level-2 into level-1 route-map match-tag
route-map match-tag permit 10
 match tag 100
```

Filtering and Redistributing IS-IS Routes Using an Access List and a Route Map: Example

In this example, the first **redistribute isis ip** command controls the redistribution of Level 1 routes into Level 2. Only the routes with the tag of 90 and whose IP prefix is not 3.3.3.3/32 will be redistributed from Level 1 into Level 2.

The second **redistribute isis ip** command controls the route leaking from Level 2 into Level 1 domain. Only the routes tagged with 60 or 50 will be redistributed from Level 2 into Level 1.

```
interface ethernet 1
 ip address 3.3.3.3 255.255.255.0
 ip router isis
 isis tag 60
!
interface ethernet 2
 ip address 10.10.10.1 255.255.255.0
 ip router isis
 isis tag 90
!
interface ethernet 3
 ip address 20.20.20.20 255.255.255.0
 ip router isis
 isis tag 50
!
```

```
router isis
 net 49.0001.0001.0001.0001.00
 metric-style wide
 redistribute isis ip level-1 into level-2 route-map redist1-2
 redistribute isis ip level-2 into level-1 route-map leak2-1
!
access-list 102 deny ip host 3.3.3.3 host 255.255.255.255
access-list 102 permit ip any any
!
route-map leak2-1 permit 10
 match tag 60
!
route-map leak2-1 permit 20
 match tag 50
!
route-map redist1-2 permit 10
 match ip address 102
 match tag 90
```

Additional References

The following sections provide references related to IS-IS Support for Route Tags.

Related Documents

Related Topic	Document Title
IS-IS configuration tasks	"Configuring Integrated IS-IS" chapter of the *Cisco IOS IP Configuration Guide, Release 12.3*
IS-IS commands	"Integrated IS-IS Commands" chapter of the *Cisco IOS IP Command Reference, Volume 2 of 4: Routing Protocols*.
Route redistribution	*Redistributing Routing Protocols* at: http://www.cisco.com/warp/public/105/redist.html
Redistribute Routing Information configuration tasks	"Configuring Routing Protocol-Independent Features" chapter of the *Cisco IOS IP Configuration Guide, Release 12.3*
The **route-map** and **redistribute** (IP) commands	"IP Routing Protocol-Independent Commands" chapter of the *Cisco IOS IP Command Reference, Volume 2 of 4: Routing Protocols*.
IS-IS route leaking	*IS-IS Route Leaking Overview* at: http://www.cisco.com/warp/public/97/route-leak.html
IS-IS TLVs	*Intermediate System-to-Intermediate System (IS-IS) TLVs* at: http://www.cisco.com/warp/public/97/tlvs_5739.html

MIBs

MIBs	MIBs Link
None	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

Technical Assistance

Description	Link
Technical Assistance Center (TAC) home page, containing 30,000 pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	http://www.cisco.com/public/support/tac/home.shtml

Command Reference

This section documents new and modified commands only.

- **isis tag**
- **redistribute isis**
- **show ip route**
- **show isis database verbose**
- **summary-address (IS-IS)**

isis tag

To set a tag on the IP address configured for an interface when this IP prefix is put into an Intermediate System-to-Intermediate System (IS-IS) link-state packet (LSP), use the **isis tag** command in interface configuration mode. To stop tagging the IP address, use the **no** form of this command.

isis tag *tag-number*

no isis tag *tag-number*

Syntax Description

tag-number	Integer that serves as a tag on an IS-IS route.

Defaults

No route tag is associated for IP addresses configured for the interface.

Command Modes

Interface configuration

Command History

Release	Modification
12.3(2)T	This command was introduced.
12.2(27)SBC	This command was integrated into Cisco IOS Release 12.2(27)SBC.

Usage Guidelines

Tagging a route does nothing for you until you use the tag, for example, to redistribute routes or summarize routes.

Configuring the **isis tag** command triggers the router to generate new LSPs because the tag is a new piece of information in the packet.

Examples

In this example, two interfaces are tagged with different tag values. By default, these two IP addresses would have been put into the IS-IS Level 1 and Level 2 database. However, by using the **redistribute** command with a route map to match tag 110, only IP address 20.1.1.1 255.255.255.0 is put into the Level 2 database.

```
interface ethernet 1/0
 ip address 10.1.1.1 255.255.255.0
 ip router isis
 isis tag 120
interface ethernet 1/1
 ip address 20.1.1.1 255.255.255.0
 ip router isis
 isis tag 110
router isis
 net 49.0001.0001.0001.0001.00
 redistribute isis ip level-1 into level-2 route-map match-tag
 route-map match-tag permit 10
 match tag 110
```

redistribute isis

To redistribute Intermediate System-to-Intermediate System (IS-IS) routes specifically from Level 1 into Level 2 or from Level 2 into Level 1, use the **redistribute isis** command in router configuration mode. To disable the redistribution, use the **no** form of this command.

redistribute isis ip {**level-1** | **level-2**} **into** {**level-2** | **level-1**} [[**distribute-list** *list-number*] | [**route-map** *map-tag*]]

no redistribute isis ip {**level-1** | **level-2**} **into** {**level-2** | **level-1**}{[**distribute-list** *list-number*] | [**route-map** *map-tag*]}

Syntax Description

ip	Redistributes IS-IS IP routes (IS-IS Connectionless Network Service (CLNS) routes are unaffected).
level-1 | **level-2**	Level from which and to which you are redistributing IS-IS routes.
into	Keyword that separates the level of routes being redistributed from the level into which you are redistributing routes.
distribute-list *list-number*	(Optional) Number of a distribute list that controls the IS-IS redistribution. You may specify either a distribute list or a route map, but not both.
route-map *map-tag*	(Optional) Name of a route map that controls the IS-IS redistribution. You may specify either a distribute list or a route map, but not both.

Defaults

There are no default values for this command.

Command Modes

Router configuration

Command History

Release	Modification
12.0(5)T	This command was introduced.
12.3(2)T	The **route-map** *map-tag* keyword and argument were added.
12.2(27)SBC	This command was integrated into Cisco IOS Release 12.2(27)SBC.

Usage Guidelines

Specify either **level-l into level-2** or **level-2 into level-1**. You may optionally specify either a distribute list or a route map, but not both. You must also specify the **metric-style wide** command in order for the **redistribute isis** command to work.

In IS-IS, all areas are stub areas, which means that no routing information is leaked from the backbone (Level 2) into areas (Level 1). Level 1-only routers use default routing to the closest Level 1-Level 2 router in their area. This command enables you to redistribute Level 2 IP routes into Level 1 areas. This redistribution enables Level 1-only routers to pick the best path for an IP prefix to get out of the area. This is an IP-only feature, CLNS routing is still stub routing.

For more control and scalability, a distribute list or a route map can control which Level 2 IP routes can be redistributed into Level 1. This command allows large IS-IS-IP networks to use areas for better scalability.

Examples

In the following example, access list 100 controls the redistribution of IS-IS from Level 1 into Level 2:

```
router isis
 net 49.0000.0000.0001.00
 metric-style wide
 redistribute isis ip level-1 into level-2 distribute-list 100
access-list 100 permit ip 10.10.10.0 0.0.0.255 any
```

In the following example, the route map named “match-tag” controls the redistribution of IS-IS from Level 1 into Level 2 so that only routes tagged with 110 are redistributed:

```
router isis
 net 49.0000.0000.0001.00
 metric-style wide
 redistribute isis ip level-1 into level-2 route-map match-tag
route-map match-tag permit 10
 match tag 110
```

Related Commands

Command	Description
metric-style wide	Configures a router running IS-IS so that it generates and accepts only new-style TLVs.

show ip route

To display the current state of the routing table, use the **show ip route** command in user EXEC or privileged EXEC mode.

show ip route [*ip-address* [*mask*] [**longer-prefixes**] | *protocol* [*process-id*] | **list** [*access-list-number* | *access-list-name*] | **static download**]

Syntax Description

ip-address	(Optional) Address about which routing information should be displayed.
mask	(Optional) Argument for a subnet mask.
longer-prefixes	(Optional) Specifies that only routes matching the *ip-address* and *mask* pair should be displayed.
protocol	(Optional) The name of a routing protocol, or the keyword **connected**, **static**, or **summary**. If you specify a routing protocol, use one of the following keywords: **bgp**, **hello**, **eigrp**, **isis**, **ospf**, and **rip**.
process-id	(Optional) The number used to identify a process of the specified protocol.
list	(Optional) The list keyword is required to filter output by an access list name or number.
access-list-number	(Optional) Filters the displayed output from the routing table based on the specified access list name.
access-list-name	(Optional) Filters the displayed output from the routing table based on the specified access list number.
static	(Optional) All static routes.
download	(Optional) The route installed using the AAA route download function.

Command Modes

User EXEC
Privileged EXEC

Command History

Release	Modification
9.2	This command was introduced.
10.0	The “D—EIGRP, EX—EIGRP, N1—OSPF NSSA external type 1 route” and “N2—OSPF NSSA external type 2 route” codes were added to the command output.
10.3	The *process-id* argument was added.
11.0	The **longer-prefixes** keyword was added.
11.1	The “U—per-user static route” code was added to the command output.
11.2	The “o—on-demand routing” code was added to the command output.
11.3	The output from the **show ip route** *ip-address* command was enhanced to display the origination of an IP route in Intermediate System-to-Intermediate System (IS-IS) networks.

Release	Modification
12.0(1)T	The “M—mobile” code was added to the command output.
12.0(3)T	The “P—periodic downloaded static route” code was added to the command output.
12.0(4)T	The “ia—IS-IS” code was added to the command output.
12.2(2)T	The output from the **show ip route** *ip-address* command was enhanced to display information on the multipaths to the specified network.
12.2(13)T	The **egp** and **igrp** arguments were removed because the exterior gateway protocol (EGP) and the Interior Gateway Routing Protocol (IGRP) are no longer available in Cisco IOS software.
12.3(2)T	The output from the **show ip route** command was enhanced to display route tag information.
12.3(8)T	The output from the **show ip route** command was enhanced to display static routes using DHCP.
12.2(27)SBC	This command was integrated into Cisco IOS Release 12.2(27)SBC.

Usage Guidelines

The **show ip route static download** command provides a way to display all dynamic static routes with name and distance information, including active and inactive ones. You can display all active dynamic static routes with both the **show ip route** and **show ip route static** commands after these active routes are added in the main routing table.

Examples

Routing Table Examples

The following examples show the standard routing tables displayed by the **show ip route** command. Use the codes displayed at the beginning of each report and the information in Table 1 to understand the type of route.

The following is sample output from the **show ip route** command when entered without an address:

```
Router# show ip route

Codes: I - IGRP derived, R - RIP derived, O - OSPF derived,
       C - connected, S - static, E - EGP derived, B - BGP derived,
       * - candidate default route, IA - OSPF inter area route,
       i - IS-IS derived, ia - IS-IS, U - per-user static route,
       o - on-demand routing, M - mobile, P - periodic downloaded static route,
       D - EIGRP, EX - EIGRP external, E1 - OSPF external type 1 route,
       E2 - OSPF external type 2 route, N1 - OSPF NSSA external type 1 route,
       N2 - OSPF NSSA external type 2 route

Gateway of last resort is 10.119.254.240 to network 10.140.0.0

O E2 10.110.0.0 [160/5] via 10.119.254.6, 0:01:00, Ethernet2
E    10.67.10.0 [200/128] via 10.119.254.244, 0:02:22, Ethernet2
O E2 10.68.132.0 [160/5] via 10.119.254.6, 0:00:59, Ethernet2
O E2 10.130.0.0 [160/5] via 10.119.254.6, 0:00:59, Ethernet2
E    10.128.0.0 [200/128] via 10.119.254.244, 0:02:22, Ethernet2
E    10.129.0.0 [200/129] via 10.119.254.240, 0:02:22, Ethernet2
E    10.65.129.0 [200/128] via 10.119.254.244, 0:02:22, Ethernet2
E    10.10.0.0 [200/128] via 10.119.254.244, 0:02:22, Ethernet2
E    10.75.139.0 [200/129] via 10.119.254.240, 0:02:23, Ethernet2
E    10.16.208.0 [200/128] via 10.119.254.244, 0:02:22, Ethernet2
E    10.84.148.0 [200/129] via 10.119.254.240, 0:02:23, Ethernet2
```

```
E    10.31.223.0 [200/128] via 10.119.254.244, 0:02:22, Ethernet2
E    10.44.236.0 [200/129] via 10.119.254.240, 0:02:23, Ethernet2
E    10.141.0.0 [200/129] via 10.119.254.240, 0:02:22, Ethernet2
E    10.140.0.0 [200/129] via 10.119.254.240, 0:02:23, Ethernet2
```

The following is sample output that includes IS-IS Level 2 routes learned:

```
Router# show ip route

Codes: I - IGRP derived, R - RIP derived, O - OSPF derived,
       C - connected, S - static, E - EGP derived, B - BGP derived,
       * - candidate default route, IA - OSPF inter area route,
       i - IS-IS derived, ia - IS-IS, U - per-user static route,
       o - on-demand routing, M - mobile, P - periodic downloaded static route,
       D - EIGRP, EX - EIGRP external, E1 - OSPF external type 1 route,
       E2 - OSPF external type 2 route, N1 - OSPF NSSA external type 1 route,
       N2 - OSPF NSSA external type 2 route

Gateway of last resort is not set

     10.89.0.0 is subnetted (mask is 255.255.255.0), 3 subnets
C       10.89.64.0 255.255.255.0 is possibly down,
          routing via 0.0.0.0, Ethernet0
i L2    10.89.67.0 [115/20] via 10.89.64.240, 0:00:12, Ethernet0
i L2    10.89.66.0 [115/20] via 10.89.64.240, 0:00:12, Ethernet0
```

The following is sample output using the **longer-prefixes** keyword. When the **longer-prefixes** keyword is included, the address and mask pair becomes the prefix, and any address that matches that prefix is displayed. Therefore, multiple addresses are displayed.

In the following example, the logical AND operation is performed on the source address 10.0.0.0 and the mask 10.0.0.0, resulting in 10.0.0.0. Each destination in the routing table is also logically ANDed with the mask and compared to that result of 10.0.0.0. Any destinations that fall into that range are displayed in the output.

```
Router# show ip route 10.0.0.0 10.0.0.0 longer-prefixes

Codes: I - IGRP derived, R - RIP derived, O - OSPF derived,
       C - connected, S - static, E - EGP derived, B - BGP derived,
       * - candidate default route, IA - OSPF inter area route,
       i - IS-IS derived, ia - IS-IS, U - per-user static route,
       o - on-demand routing, M - mobile, P - periodic downloaded static route,
       D - EIGRP, EX - EIGRP external, E1 - OSPF external type 1 route,
       E2 - OSPF external type 2 route, N1 - OSPF NSSA external type 1 route,
       N2 - OSPF NSSA external type 2 route

Gateway of last resort is not set

S    10.134.0.0 is directly connected, Ethernet0
S    10.10.0.0 is directly connected, Ethernet0
S    10.129.0.0 is directly connected, Ethernet0
S    10.128.0.0 is directly connected, Ethernet0
S    10.49.246.0 is directly connected, Ethernet0
S    10.160.97.0 is directly connected, Ethernet0
S    10.153.88.0 is directly connected, Ethernet0
S    10.76.141.0 is directly connected, Ethernet0
S    10.75.138.0 is directly connected, Ethernet0
S    10.44.237.0 is directly connected, Ethernet0
S    10.31.222.0 is directly connected, Ethernet0
S    10.16.209.0 is directly connected, Ethernet0
S    10.145.0.0 is directly connected, Ethernet0
S    10.141.0.0 is directly connected, Ethernet0
S    10.138.0.0 is directly connected, Ethernet0
S    10.128.0.0 is directly connected, Ethernet0
```

```
     10.19.0.0 255.255.255.0 is subnetted, 1 subnets
C       10.19.64.0 is directly connected, Ethernet0
     10.69.0.0 is variably subnetted, 2 subnets, 2 masks
C       10.69.232.32 255.255.255.240 is directly connected, Ethernet0
S       10.69.0.0 255.255.0.0 is directly connected, Ethernet0
```

The following examples display all downloaded static routes. A P designates which route was installed using AAA route download.

```
Router# show ip route

Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, * - candidate default
       U - per-user static route, o - ODR, P - periodic downloaded static route
       T - traffic engineered route

Gateway of last resort is 172.21.17.1 to network 0.0.0.0

        172.31.0.0/32 is subnetted, 1 subnets
P       172.31.229.41 is directly connected, Dialer1 20.0.0.0/24 is subnetted, 3 subnets
P       10.1.1.0 [200/0] via 172.31.229.41, Dialer1
P       10.1.3.0 [200/0] via 172.31.229.41, Dialer1
P       10.1.2.0 [200/0] via 172.31.229.41, Dialer1

Router# show ip route static

     172.27.4.0/8 is variably subnetted, 2 subnets, 2 masks
P       172.1.1.1/32 is directly connected, BRI0
P       172.27.4.0/8 [1/0] via 103.1.1.1, BRI0
S    172.31.0.0/16 [1/0] via 172.21.114.65, Ethernet0
S    10.0.0.0/8 is directly connected, BRI0
P    10.0.0.0/8 is directly connected, BRI0
     172.21.0.0/16 is variably subnetted, 5 subnets, 2 masks
S       172.21.114.201/32 is directly connected, BRI0
S       172.21.114.205/32 is directly connected, BRI0
S       172.21.114.174/32 is directly connected, BRI0
S       172.21.114.12/32 is directly connected, BRI0
P    10.0.0.0/8 is directly connected, BRI0
P    10.1.0.0/8 is directly connected, BRI0
P    10.2.2.0/8 is directly connected, BRI0
S*   0.0.0.0/0 [1/0] via 172.21.114.65, Ethernet0
S    172.29.0.0/16 [1/0] via 172.21.114.65, Ethernet0
```

The following example shows how to use the **show ip route static download** command to display all active and inactive routes installed using AAA route download:

```
Router# show ip route static download

Connectivity: A - Active, I - Inactive

A     10.10.0.0 255.0.0.0 BRI0
A     10.11.0.0 255.0.0.0 BRI0
A     10.12.0.0 255.0.0.0 BRI0
A     10.13.0.0 255.0.0.0 BRI0
I     10.20.0.0 255.0.0.0 172.21.1.1
I     10.22.0.0 255.0.0.0 Serial0
I     10.30.0.0 255.0.0.0 Serial0
I     10.31.0.0 255.0.0.0 Serial1
I     10.32.0.0 255.0.0.0 Serial1
A     10.34.0.0 255.0.0.0 103.1.1.1
A     10.36.1.1 255.255.255.255 BRI0 200 name remote1
```

```
I     10.38.1.9 255.255.255.0 104.21.69.1
```

Table 1 show ip route Field Descriptions

Field	Description
O	Indicates the protocol that derived the route. It can be one of the following values: I—Interior Gateway Routing Protocol (IGRP) derived R—Routing Information Protocol (RIP) derived O—Open Shortest Path First (OSPF) derived C—connected S—static E—Exterior Gateway Protocol (EGP) derived B—Border Gateway Protocol (BGP) derived D—Enhanced Interior Gateway Routing Protocol (EIGRP) EX—EIGRP external i—IS-IS derived ia—IS-IS M—mobile P—periodic downloaded static route U—per-user static route o—on-demand routing
E2	Type of route. It can be one of the following values: *—Indicates the last path used when a packet was forwarded. It pertains only to the nonfast-switched packets. However, it does not indicate which path will be used next when forwarding a nonfast-switched packet, except when the paths are equal cost. IA—OSPF interarea route E1—OSPF external type 1 route E2—OSPF external type 2 route L1—IS-IS Level 1 route L2—IS-IS Level 2 route N1—OSPF not-so-stubby area (NSSA) external type 1 route N2—OSPF NSSA external type 2 route
10.110.0.0	Indicates the address of the remote network.
[160/5]	The first number in the brackets is the administrative distance of the information source; the second number is the metric for the route.
via 10.119.254.6	Specifies the address of the next router to the remote network.
0:01:00	Specifies the last time the route was updated (in hours:minutes:seconds).
Ethernet2	Specifies the interface through which the specified network can be reached.

Specific Route Information

When you specify that you want information about a specific network displayed, more detailed statistics are shown. The following is sample output from the **show ip route** command when entered with the address 10.0.0.1:

```
Router# show ip route 10.0.0.1

Routing entry for 10.0.0.1/32
    Known via "isis", distance 115, metric 20, type level-1
    Redistributing via isis
    Last update from 10.191.255.251 on Fddi1/0, 00:00:13 ago
    Routing Descriptor Blocks:
    * 10.22.22.2, from 10.191.255.247, via Serial2/3
       Route metric is 20, traffic share count is 1
       10.191.255.251, from 10.191.255.247, via Fddi1/0
       Route metric is 20, traffic share count is 1
```

When an IS-IS router advertises its link-state information, it includes one of its own IP addresses to be used as the originator IP address. When other routers calculate IP routes, they can store the originator IP address with each route in the routing table.

The example above shows the output from the **show ip route** command when looking at an IP route generated by IS-IS. Each path that is shown under the Routing Descriptor Blocks report displays two IP addresses. The first address (10.22.22.2) is the next hop address. The second is the originator IP address from the advertising IS-IS router. This address helps you determine where a particular IP route has originated in your network. In the example the route to 10.0.0.1/32 was originated by a router with IP address 10.191.255.247.

Table 2 describes the significant fields shown when using the **show ip route** command with an IP address (previous displays).

Table 2 show ip route with Address Field Descriptions

Field	Description
Routing entry for 10.0.0.1/32	Network number and mask.
Known via...	Indicates how the route was derived.
Tag	Integer that is used to implement the route.
type	Indicates the IS-IS route type (Level 1 or Level 2).
Redistributing via...	Indicates the redistribution protocol.
Last update from 10.191.255.251	Indicates the IP address of a router that is the next hop to the remote network and the router interface on which the last update arrived.
Routing Descriptor Blocks:	Displays the next hop IP address followed by the information source.
Route metric	This value is the best metric for this routing descriptor block.
traffic share count	Number of uses for this routing descriptor block.

The following is sample output using the **longer-prefixes** keyword. When the **longer-prefixes** keyword is included, the address and mask pair becomes the prefix, and any address that matches that prefix is displayed. Therefore, multiple addresses are displayed.

In the following example, the logical AND operation is performed on the source address 10.0.0.0 and the mask 10.0.0.0, resulting in 10.0.0.0. Each destination in the routing table is also logically ANDed with the mask and compared to that result of 10.0.0.0. Any destinations that fall into that range are displayed in the output.

```
Router# show ip route 10.0.0.0 10.0.0.0 longer-prefixes

Codes: I - IGRP derived, R - RIP derived, O - OSPF derived,
       C - connected, S - static, E - EGP derived, B - BGP derived,
       * - candidate default route, IA - OSPF inter area route,
       i - IS-IS derived, ia - IS-IS, U - per-user static route,
       o - on-demand routing, M - mobile, P - periodic downloaded static route,
       D - EIGRP, EX - EIGRP external, E1 - OSPF external type 1 route,
       E2 - OSPF external type 2 route, N1 - OSPF NSSA external type 1 route,
       N2 - OSPF NSSA external type 2 route

Gateway of last resort is not set

S    10.134.0.0 is directly connected, Ethernet0
S    10.10.0.0 is directly connected, Ethernet0
S    10.129.0.0 is directly connected, Ethernet0
S    10.128.0.0 is directly connected, Ethernet0
S    10.49.246.0 is directly connected, Ethernet0
S    10.160.97.0 is directly connected, Ethernet0
S    10.153.88.0 is directly connected, Ethernet0
S    10.76.141.0 is directly connected, Ethernet0
S    10.75.138.0 is directly connected, Ethernet0
S    10.44.237.0 is directly connected, Ethernet0
S    10.31.222.0 is directly connected, Ethernet0
S    10.16.209.0 is directly connected, Ethernet0
S    10.145.0.0 is directly connected, Ethernet0
S    10.141.0.0 is directly connected, Ethernet0
S    10.138.0.0 is directly connected, Ethernet0
S    10.128.0.0 is directly connected, Ethernet0
     10.19.0.0 255.255.255.0 is subnetted, 1 subnets
C       10.19.64.0 is directly connected, Ethernet0
     10.69.0.0 is variably subnetted, 2 subnets, 2 masks
C       10.69.232.32 255.255.255.240 is directly connected, Ethernet0
S       10.69.0.0 255.255.0.0 is directly connected, Ethernet0
```

The following output includes the tag 120 applied to the route 10.22.0.0/16. You must specify an IP prefix in order to see the tag value.

```
Router# show ip route 10.22.0.0

Routing entry for 10.22.0.0/16
  Known via "isis", distance 115, metric 12
  Tag 120, type level-1
  Redistributing via isis
  Last update from 172.19.170.12 on Ethernet2, 01:29:13 ago
  Routing Descriptor Blocks:
    * 172.19.170.12, from 10.3.3.3, via Ethernet2
        Route metric is 12, traffic share count is 1
        Route tag 120
```

Static Routes Using a DHCP Gateway Examples

The following example shows that IP route 10.8.8.0 is directly connected to the Internet and is the next-hop (option 3) default gateway. Routes 10.1.1.1 [1/0], 10.3.2.1 [24/0], and 172.2.2.2 [1/0] are static, and route 10.0.0.0/0 is a default route candidate.

```
Router# show ip route

Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route

Gateway of last resort is 10.0.19.14 to network 0.0.0.0

10.0.0.0/24 is subnetted, 1 subnets
C 10.8.8.0 is directly connected, Ethernet1
  10.0.0.0/32 is subnetted, 1 subnets
S 10.1.1.1 [1/0] via 10.8.8.1
  10.0.0.0/32 is subnetted, 1 subnets
S 10.3.2.1 [24/0] via 10.8.8.1
  172.0.0.0/32 is subnetted, 1 subnets
S 172.2.2.2 [1/0] via 10.8.8.1
  10.0.0.0/28 is subnetted, 1 subnets
C 10.0.19.0 is directly connected, Ethernet0
  10.0.0.0/24 is subnetted, 1 subnets
C 10.15.15.0 is directly connected, Loopback0

S* 10.0.0.0/0 [1/0] via 10.0.19.14
```

Related Commands

Command	Description
show dialer	Displays general diagnostic information for interfaces configured for DDR.
show interfaces tunnel	Displays a list of tunnel interface information.
show ip route summary	Displays the current state of the routing table in summary format.

show isis database verbose

To display additional information about the Intermediate System-to-Intermediate System (IS-IS) database, use the **show isis database verbose** command in user EXEC or privileged EXEC mode.

show isis database verbose

Syntax Description

This command has no arguments or keywords.

Command Modes

User EXEC
Privileged EXEC

Command History

Release	Modification
12.0(5)S	This command was introduced.
12.2(27)SBC	This command was integrated into Cisco IOS Release 12.2(27)SBC.

Examples

The following is sample output from the **show isis database verbose** command:

```
Router# show isis database verbose

IS-IS Level-1 Link State Database
LSPID                 LSP Seq Num  LSP Checksum  LSP Holdtime      ATT/P/OL
dtp-5.00-00         * 0x000000E6   0xC9BB        1042              0/0/0
  Area Address:49.0001
  NLPID:       0xCC
  Hostname:dtp-5
  Router ID:   5.5.5.5
  IP Address:  172.21.39.5
  Metric:10         IP 172.21.39.0/24
dtp-5.00-01         * 0x000000E7   0xAB36        1065              0/0/0
  Metric:10         IS-Extended dtp-5.01
    Affinity:0x00000000
    Interface IP Address:172.21.39.5
    Physical BW:10000000 bits/sec
    Reservable BW:1166000 bits/sec
    BW Unreserved[0]: 1166000 bits/sec, BW Unreserved[1]: 1166000 bits/sec
    BW Unreserved[2]: 1166000 bits/sec, BW Unreserved[3]: 1166000 bits/sec
    BW Unreserved[4]: 1166000 bits/sec, BW Unreserved[5]: 1166000 bits/sec
    BW Unreserved[6]: 1166000 bits/sec, BW Unreserved[7]: 1153000 bits/sec
  Metric:0          ES dtp-5
```

Table 3 describes the significant fields shown in the display.

Table 3 show isis database verbose Field Descriptions

Field	Description
LSPID	Link-state packet (LSP) identifier. The first six octets form the System ID of the router that originated the LSP. The next octet is the pseudonode ID. When this byte is zero, the LSP describes links from the system. When it is nonzero, the LSP is a pseudonode LSP. This is similar to a router LSA in Open Shortest Path First (OSPF); the LSP describes the state of the originating router. For each LAN, the designated router for that LAN creates and floods a pseudonode LSP that describes all systems attached to that LAN. The last octet is the LSP number. If all the data cannot fit into a single LSP, the LSP is divided into multiple LSP fragments. Each fragment has a different LSP number. An asterisk (*) indicates that the system issuing this command originated the LSP.
LSP Seq Num	LSP sequence number that allows other systems to determine if they received the latest information from the source.
LSP Checksum	Checksum of the entire LSP packet.
LSP Holdtime	Amount of time that the LSP remains valid (in seconds). An LSP hold time of zero indicates that this LSP was purged and is being removed from all routers' link-state databases (LSDBs). The value indicates how long the purged LSP will stay in the LSDB before it is completely removed.
ATT	Attach bit. This bit indicates that the router is also a Level 2 router, and it can reach other areas. Level 1 routers use the Attach bit to find the closest Level 2 router. They install a default route to the closest Level 2 router.
P	P bit. This bit detects if the IS can repair area partitions. Cisco and other vendors do not support area partition repair.
OL	Overload bit. This bit determines if the IS is congested. If the overload bit is set, other routers do not use this system as a transit router when they calculate routes. Only packets for destinations directly connected to the overloaded router are sent to this router.
Area Address	Reachable area addresses from the router. For Level 1 LSPs, these are the area addresses configured manually on the originating router. For Level 2 LSPs, these are all the area addresses for the area to which this router belongs.
NLPID	Network Layer Protocol identifier.
Hostname	Host name of the node.
Router ID	Traffic engineering router identifier for the node.
IP Address	IPv4 address for the interface.
Metric	IS-IS metric for the cost of the adjacency between the originating router and the advertised neighbor, or the metric of the cost to get from the advertising router to the advertised destination (which can be an IP address, an end system (ES), or a connectionless network service [CLNS] prefix).
Affinity	Link attribute flags that are being flooded.
Physical BW	Link bandwidth capacity (in bits per second).

Table 3 show isis database verbose Field Descriptions (continued)

Field	Description
Reservable BW	Amount of reservable bandwidth on this link.
BW Unreserved	Amount of bandwidth that is available for reservation.

The following example includes a route tag:

```
Router# show isis database verbose

IS-IS Level-1 Link State Database:
LSPID                 LSP Seq Num    LSP Checksum    LSP Holdtime    ATT/P/OL
dasher.00-00          0x000000F8     0xE57B          518             1/0/0
  Area Address: 49.0002
  NSPID:        0xCC
  Hostname: dasher
  IP Address: 10.3.0.1
  Metric: 10     IP 172.19.170.0/24
  Metric: 10     IP 10.0.3.0/24
  Metric: 10     IP 10.0.3.3/30
  Metric: 10     IS-Extended dasher.02172.19.170.0/24
  Metric: 20     IP-Interarea 10.1.1.1/32
    Route Admin Tag: 60
  Metric: 20     IP-Interarea 205.171.0.6/32
    Route Admin Tag: 50
```

Related Commands

Command	Description
show isis mpls traffic-eng adjacency-log	Displays a log of 20 entries of MPLS traffic engineering IS-IS adjacency changes.
show isis mpls traffic-eng advertisements	Displays the last flooded record from MPLS traffic engineering.
show isis mpls traffic-eng tunnel	Displays information about tunnels considered in the IS-IS next hop calculation.

summary-address (IS-IS)

To create aggregate addresses for Intermediate System-to-Intermediate System (IS-IS), use the **summary-address** command in router configuration mode. To restore the default, use the **no** form of this command.

summary-address *address mask* {**level-1** | **level-1-2** | **level-2**} [**tag** *tag-number*] [**metric** *metric-value*]

no summary-address *address mask* {**level-1** | **level-1-2** | **level-2**}[**tag** *tag-number*] [**metric** *metric-value*]

Syntax Description

address	Summary address designated for a range of addresses.
mask	IP subnet mask used for the summary route.
level-1	Only routes redistributed into Level 1 are summarized with the configured address and mask value.
level-1-2	Summary routes are applied when redistributing routes into Level 1 and Level 2 IS-IS, and when Level 2 IS-IS advertises Level 1 routes as reachable in its area.
level-2	Routes learned by Level 1 routing are summarized into the Level 2 backbone with the configured address and mask value. Redistributed routes into Level 2 IS-IS will be summarized also.
tag *tag-number*	(Optional) Integer used to tag the summary route.
metric *metric-value*	(Optional) Metric value applied to the summary route.

Defaults

All routes are advertised individually.

Command Modes

Router configuration

Command History

Release	Modification
10.0	This command was introduced.
12.3(2)T	The following keywords and arguments were added: • **tag** *tag-number* • **metric** *metric-value*
12.2(27)SBC	This command was integrated into Cisco IOS Release 12.2(27)SBC.

Usage Guidelines

Multiple groups of addresses can be summarized for a given level. Routes learned from other routing protocols can also be summarized. The metric used to advertise the summary is the smallest metric of all the more specific routes. This command helps reduce the size of the routing table.

This command also reduces the size of the link-state packets (LSPs) and thus the link-state database (LSDB). It also helps network stability because a summary advertisement is depending on many more specific routes. A single route flap does not cause the summary advertisement to flap in most cases.

The drawback of summary addresses is that other routes might have less information to calculate the most optimal routing table for all individual destinations.

Examples

The following example redistributes Routing Information Protocol (RIP) routes into IS-IS. In a RIP network, there are IP routes for 10.1.1, 10.1.2, 10.1.3, 10.1.4, and so on. This example advertises only 10.1.0.0 into the IS-IS Level 1 link-state PDU. The summary address is tagged with 100 and given a metric value of 110.

```
router isis
 net 01.0000.0000.0001.00
 redistribute rip level-1 metric 40
 summary-address 10.1.0.0 255.255.0.0 tag 100 metric 110
```