Segment Routing—IS-IS v4 node SID

The Segment Routing—ISIS v4 node SID feature provides support for segment routing on Cisco Intermediate System-to-Intermediate System (IS-IS) networks.

Information About Segment Routing IS-IS v4 Node SID

Segment Routing IS-IS v4 Node SID

Segment Routing (SR) is a technique by which the path followed by a packet is encoded in the packet itself. The path followed by a packet in segment routing is encoded in the packet itself similar to loose or strict source routing. Segment Routing relies on a small number of extensions to Cisco Intermediate System-to-Intermediate System (IS-IS) and Open Shortest Path First (OSPF) protocols.

How to Configure Segment Routing —IS-IS v4 Node SID

Configuring Segment Routing

Before You Begin

Before configuring IS-IS to support segment routing you must first configure the segment routing feature in global configuration mode.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. segment-routing mpls
4. connected-prefix-sid-map
5. address-family ipv4
6. 1.1.1.1/32 index 100 range 1
7. exit-address-family

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device# enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	segment-routing mpls **Example:** `Device(config-sr)# segment-routing mpls`	Enables the segment feature using the mpls data plane.
Step 4	connected-prefix-sid-map **Example:** `Device(config-srmpls)# connected-prefix-sid-map`	Enters a sub-mode where you can configure address-family specific mappings for local prefixes and SIDs.
Step 5	address-family ipv4 **Example:** `Device(config-srmpls-conn)# address-family ipv4`	Specifies IPv4 address prefixes.
Step 6	1.1.1.1/32 index 100 range 1 **Example:** `Device(config-srmpls-conn-af)# 1.1.1.1/32 100 range 1`	Associates SID 100 with the address 1.1.1.1/32.

	Command or Action	Purpose
Step 7	exit-address-family **Example:** `Device(config-srmpls-conn-af)# exit-address-family`	Exits the address family.

Configuring Segment Routing on IS-IS Network

Before You Begin

Before you configure segment routing on IS-IS network, IS-IS must be enabled on your network.

SUMMARY STEPS

1. router isis
2. net network-entity-title
3. metric-style wide
4. **segment-routing** mpls
5. exit
6. show isis segment-routing

DETAILED STEPS

	Command or Action	Purpose
Step 1	router isis **Example:** `Device(config-if)# router isis`	Enables the IS-IS routing protocol and enters router configuration mode.
Step 2	net network-entity-title **Example:** `Device(config-router)# net 49.0000.0000.0003.00`	Configures network entity titles (NETs) for the routing instance.
Step 3	metric-style wide **Example:** `Device(config-router)# metric-style wide`	Configures the device to generate and accept only wide link metrics.

	Command or Action	Purpose
Step 4	**segment-routing** mpls **Example:** `Device(config-router)# segment-routing mpls`	Configures segment routing operation state.
Step 5	exit **Example:** `Device(config-router)# exit`	Exits segment routing mode and returns to the configuration terminal mode.
Step 6	show isis segment-routing **Example:** `Device# show is-is segment-routing`	(Optional) Displays the current state of the IS-IS segment routing.

The following example displays output from the show isis segment-routing state command for the segment routing under IS-IS:

```
Device# show isis segment-routing

ISIS protocol is registered with MFI
ISIS MFI Client ID:0x63
Tag 1 - Segment-Routing:
   SR State:SR_ENABLED
   Number of SRGB:1
   SRGB Start:16000, Range:8000, srgb_handle:0x4500AED0, srgb_state: created
   Address-family IPv4 unicast SR is configured
     Operational state:Enabled
```

Configuring Prefix-SID for IS-IS

This task explains how to configure prefix segment identifier (SID) index under each interface.

Before You Begin

Segment routing must be enabled on the corresponding address family.

SUMMARY STEPS

1. enable
2. configure terminal
3. segment-routing mpls
4. connected-prefix-sid-map
5. address-family ipv4
6. 1.1.1.1/32 index 100 range 1
7. exit

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable **Example:** `Device# enable`	Enables privileged EXEC mode.
Step 2	configure terminal **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	segment-routing mpls **Example:** `Device(config)# segment-routing mpls`	Configures segment routing mpls mode.
Step 4	connected-prefix-sid-map **Example:** `Device(config-srmpls)# connected-prefix-sid-map`	Enters a sub-mode where you can configure address-family specific mappings for local prefixes and SIDs.
Step 5	address-family ipv4 **Example:** `Device(config-srmpls-conn)# address-family ipv4`	Specifies the IPv4 address family and enters router address family configuration mode.
Step 6	1.1.1.1/32 index 100 range 1 **Example:** `Device(config-srmpls-conn-af)# 1.1.1.1/32 100 range 1`	Associates SID 100 with the address 1.1.1.1/32.
Step 7	exit **Example:** `Device(config-router)# exit`	Exits segment routing mode and returns to the configuration terminal mode.

Configuring Prefix Attribute N-flag-clear

By default, a flag called N-flag is set by IS-IS when advertising a SID which is associated with a loopback address. If you wish to clear this flag add explicit configuration.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. interface loopback3
4. isis prefix n-flag-clear

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device# enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	interface loopback3 **Example:** `Device(config)# interface loopback3`	Specifies the interface loopback.
Step 4	isis prefix n-flag-clear **Example:** `Device(config-if)# isis prefix n-flag-clear`	Clears the prefix N-flag.

Configuring Explicit Null Attribute

To disable penultimate-hop-popping (PHP) and add explicit-Null label, explicit-null option needs to be specified. Once the option is given, IS-IS sets the E flag in the prefix-SID sub TLV.

By default, a flag called E-flag (Explicit-Null flag) is set to 0 by ISIS when advertising a Prefix SID which is associated with a loopback address. If you wish to set this flag add explicit configuration

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. segment-routing mpls
4. set-attributes
5. address-family ipv4
6. explicit-null
7. exit-address-family

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device# enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	segment-routing mpls **Example:** `Device(config)# segment-routing mpls`	Configures segment routing mpls mode.
Step 4	set-attributes **Example:** `Device(config-srmpls)# set-attributes`	Sets the attribute.
Step 5	address-family ipv4 **Example:** `Device(config-srmpls-attr)# address-family ipv4`	Specifies the IPv4 address family and enters router address family configuration mode.
Step 6	explicit-null **Example:** `Device(config-srmpls-attr-af)# explicit-null`	Specifies the explicit-null.

	Command or Action	Purpose
Step 7	exit-address-family **Example:** `Device(config-srmpls-attr-af)# exit-address-family`	Exits the address family.

Configuration Examples for Segment Routing —IS-IS v4 Node SID

Example: Configuring Segment Routing on IS-IS Network

The following example shows how to configure prefix segment identifier (SID) index under each interface:

```
Device(config)#segment-routing mpls
 Device(config-srmpls)#connected-prefix-sid-map
  Device(config-srmpls-conn)#address-family ipv4
   Device(config-srmpls-conn-af)#10.1.2.2/32 index 2 range 1
  Device(config-srmpls-conn-af)#exit-address-family
 Device(config-srmpls-conn-af)#end
```

Example: Configuring Explicit Null Attribute

The following is an example for configuring explicit null attribute:

```
Device(config)# segment-routing mpls
Device(config-srmpls)# set-attributes
 Device(config-srmpls-attr)# address-family ipv4
  Device(config-srmpls-attr-af)# explicit-null
 Device (config-srmpls-attr-af)# exit-address-family
```

Additional References for Segment Routing-IS-IS v4 Node SID

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Command List, All Releases http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/mcl/allreleasemcl/all-book.html

Related Topic	Document Title
IP Routing ISIS commands	Cisco IOS IP Routing ISIS commands http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/mcl/allreleasemcl/all-book.html

Technical Assistance

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

Feature Information for Segment Routing—IS-IS v4 Node SID

Table 1: Feature Information for Segment Routing—IS-IS v4 Node SID

Feature Name	Releases	Feature Information
Segment Routing—IS-IS v4 Node SID	Cisco IOS XE Release 3.16S	The Segment Routing—ISIS v4 node SID feature provides support for segment routing on IS-IS networks. The following commands were introduced or modified: **connected-prefix-sid-map**, **show isis segment-routing**, **isis prefix n-flag-clear**, **explicit-null**