Implementing IS-IS

Integrated Intermediate System-to-Intermediate System (IS-IS), Internet Protocol Version 4 (IPv4), is a standards-based Interior Gateway Protocol (IGP). The Cisco software implements the IP routing capabilities described in International Organization for Standardization (ISO)/International Engineering Consortium (IEC) 10589 and RFC 1195, and adds the standard extensions for single topology and multitopology IS-IS for IP Version 6 (IPv6).

This module describes how to implement IS-IS (IPv4 and IPv6) on your Cisco IOS XR network.

Prerequisites for Implementing IS-IS

You must be in a user group associated with a task group that includes the proper task IDs. The command reference guides include the task IDs required for each command. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Implementing IS-IS

Multiple IS-IS instances can exist on the same physical interface. However, you must configure different instance-id for every instance that shares the same physical interface.

Alternatively, you can also create dot1q sub-interfaces and configure each dot1q sub-interface to different IS-IS instances.

Note   Users can configure the **no max-metric** command only with levels 1 or 2, that is, **no max-metric level {1|2}** in order to view the result in the output of the **show configuration** command. Else, the maximum metric configuration is not displayed in the output. This behavior is observed before committing the configuration to the router.

Configuration Examples for Implementing IS-IS

This section provides the following configuration examples:

Configuring Single-Topology IS-IS for IPv6: Example

The following example shows single-topology mode being enabled. An IS-IS instance is created, the NET is defined, IPv6 is configured along with IPv4 on an interface, and IPv4 link topology is used for IPv6.

This configuration allows POS interface 0/3/0/0 to form adjacencies for both IPv4 and IPv6 addresses.

```
router isis isp
 net 49.0000.0000.0001.00
 address-family ipv6 unicast
  single-topology
 interface POS0/3/0/0
  address-family ipv4 unicast
  !
  address-family ipv6 unicast
  !
  exit
!
interface POS0/3/0/0
 ipv4 address 10.0.1.3 255.255.255.0
 ipv6 address 2001::1/64
```

Configuring Multitopology IS-IS for IPv6: Example

The following example shows multitopology IS-IS being configured in IPv6.

```
router isis isp
 net 49.0000.0000.0001.00
 interface POS0/3/0/0
  address-family ipv6 unicast
  metric-style wide level 1
  exit
!
interface POS0/3/0/0
 ipv6 address 2001::1/64
```

Redistributing IS-IS Routes Between Multiple Instances: Example

The following example shows usage of the **attached-bit send always-set** and **redistribute** commands. Two instances, instance "1" restricted to Level 1 and instance "2" restricted to Level 2, are configured.

The Level 1 instance is propagating routes to the Level 2 instance using redistribution. Note that the administrative distance is explicitly configured higher on the Level 2 instance to ensure that Level 1 routes are preferred.

Attached bit is being set for the Level 1 instance since it is redistributing routes into the Level 2 instance. Therefore, instance "1" is a suitable candidate to get from the area to the backbone.

```
   router isis 1
     is-type level-2-only
    net 49.0001.0001.0001.0001.00
    address-family ipv4 unicast
     distance 116
     redistribute isis 2 level 2
   !
   interface GigabitEthernet 0/3/0/0
    address-family ipv4 unicast
    !
    !
   router isis 2
    is-type level-1
    net 49.0002.0001.0001.0002.00
    address-family ipv4 unicast

attached-
bit send always-
set
    !
   interface GigabitEthernet 0/1/0/0
    address-family ipv4 unicast
```

Tagging Routes: Example

The following example shows how to tag routes.

```
 route-policy isis-tag-55
 end-policy
 !
 route-policy isis-tag-555
   if destination in (5.5.5.0/24 eq 24) then
     set tag 555
     pass
   else
     drop
   endif
 end-policy
 !
 router static
  address-family ipv4 unicast
   0.0.0.0/0 2.6.0.1
   5.5.5.0/24 Null0
  !
 !
 router isis uut
  net 00.0000.0000.12a5.00
  address-family ipv4 unicast
   metric-style wide
   redistribute static level-1 route-policy isis-tag-555
   spf prefix-priority critical tag 13
   spf prefix-priority high tag 444
   spf prefix-priority medium tag 777
```

Configuring IS-IS Overload Bit Avoidance: Example

The following example shows how to activate IS-IS overload bit avoidance:

```
config
 mpls traffic-eng path-selection ignore overload
```

The following example shows how to deactivate IS-IS overload bit avoidance:

```
config
 no mpls traffic-eng path-selection ignore overload
```

Where to Go Next

To implement more IP routing protocols, see the following document modules in *Routing Configuration Guide for Cisco NCS 6000 Series Routers*:

- Implementing OSPF

- Implementing BGP

- Implementing EIGRP

- Implementing RIP

Additional References

The following sections provide references related to implementing IS-IS.

Related Documents

Related Topic	Document Title
IS-IS commands: complete command syntax, command modes, command history, defaults, usage guidelines, and examples	*Routing Command Reference for Cisco NCS 6000 Series Routers*
MPLS TE feature information	*Implementing MPLS Traffic Engineering on* module in *MPLS Configuration Guide for Cisco NCS 6000 Series Routers*
Bidirectional Forwarding Detection (BFD)	*Interface and Hardware Component Configuration Guide for Cisco NCS 6000 Series Routers* and *Interface and Hardware Component Command Reference for the Cisco NCS 6000 Series Routers*

Standards

Standards	Title
Draft-ietf-isis-ipv6-05.txt	*Routing IPv6 with IS-IS*, by Christian E. Hopps
Draft-ietf-isis-wg-multi-topology-06.txt	*M-ISIS: Multi Topology (MT) Routing in IS-IS,* by Tony Przygienda, Naiming Shen, and Nischal Sheth
Draft-ietf-isis-traffic-05.txt	*IS-IS Extensions for Traffic Engineering*, by Henk Smit and Toni Li
Draft-ietf-isis-restart-04.txt	*Restart Signaling for IS-IS*, by M. Shand and Les Ginsberg
Draft-ietf-isis-igp-p2p-over-lan-05.txt	*Point-to-point operation over LAN in link-state routing protocols*, by Naiming Shen
Draft-ietf-rtgwg-ipfrr-framework-06.txt	*IP Fast Reroute Framework*, by M. Shand and S. Bryant
Draft-ietf-rtgwg-lf-conv-frmwk-00.txt	*A Framework for Loop-free Convergence*, by M. Shand and S. Bryant

MIBs

MIBs	MIBs Link
—	To locate and download MIBs using Cisco IOS XR software, use the Cisco MIB Locator found at the following URL and choose a platform under the Cisco Access Products menu: https://mibs.cloudapps.cisco.com/ITDIT/MIBS/servlet/index

RFCs

RFCs	Title
RFC 1142	OSI IS-IS Intra-domain Routing Protocol
RFC 1195	Use of OSI IS-IS for Routing in TCP/IP and Dual Environments
RFC 2763	Dynamic Hostname Exchange Mechanism for IS-IS
RFC 2966	Domain-wide Prefix Distribution with Two-Level IS-IS
RFC 2973	IS-IS Mesh Groups
RFC 3277	IS-IS Transient Blackhole Avoidance

RFCs	Title
RFC 3373	Three-Way Handshake for IS-IS Point-to-Point Adjacencies
RFC 3567	IS-IS Cryptographic Authentication
RFC 4444	IS-IS Management Information Base

Technical Assistance

Description	Link
The Cisco Technical Support website contains thousands of 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/ techsupport