IS-IS Multiarea Support

Cisco software supports the configuration of multiple Intermediate System-to-Intermediate System (IS-IS) areas within a single device ISO Connectionless Network Service (CLNS). The IS-IS Multiarea Support feature lets you merge areas by configuring multiple Network Entity Titles (NETs) on a device.

This module describes the IS-IS Multiarea Support feature and explains how to configure it.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and 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 feature information table at the end of this module.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Restrictions for IS-IS Multiarea Support

- Routing is supported for only one Level 2 area per device.
- An interface cannot be part of more than one Level 1 or one Level 2 area per device.

- Only one process can be configured to perform Level 2 (interarea) routing. If Level 2 routing is configured on any process, all additional processes are automatically configured as Level 1.
- Redistribution between IS-IS areas cannot be configured.

Information About IS-IS Multiarea Support

Overview of IS-IS Multiarea Support

Small Intermediate System-to-Intermediate System (IS-IS) networks are built as a single area that includes all the devices in the network. As the network increases in size, all Level 2 devices from all areas are connected through a backbone. This network backbone is, in turn, connected to local areas. Within a local area, devices reach all system IDs. Between areas, devices reach the backbone, and the backbone devices reach other areas.

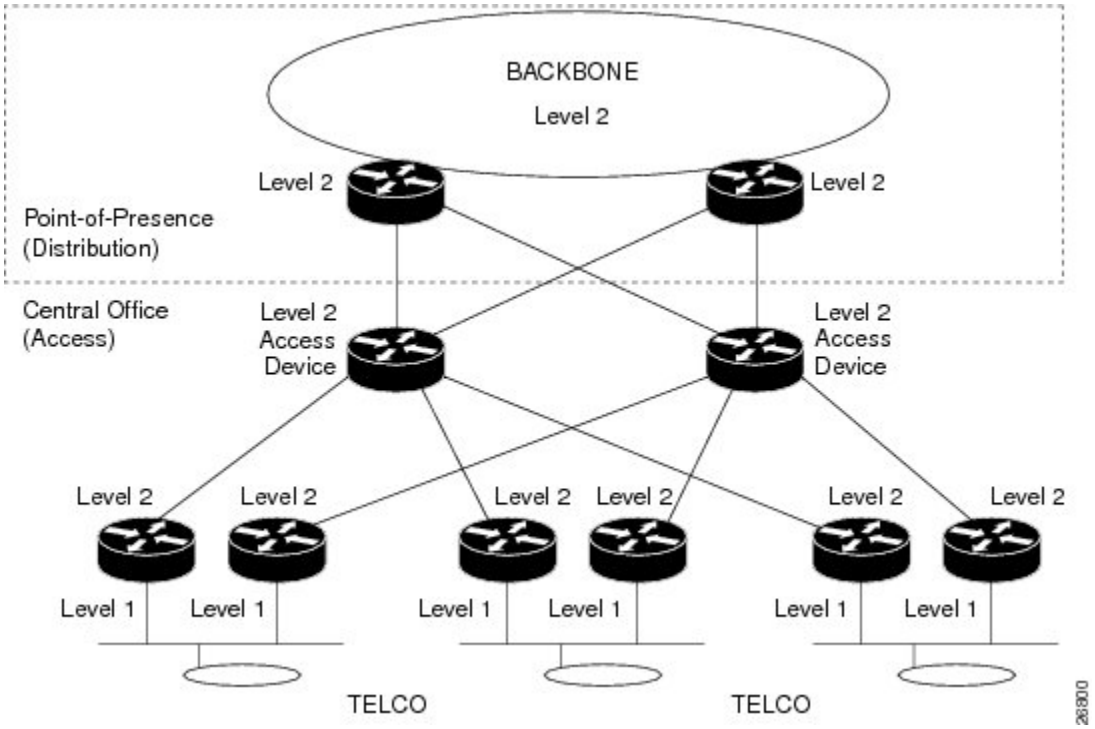
Devices establish Level 1 adjacencies to perform routing within a local area (intra-area routing). Devices establish Level 2 adjacencies to perform routing between Level 1 areas (interarea routing).

Some networks use legacy equipment that supports only Level 1 routing. These devices are typically organized into many small areas that cannot be aggregated due to performance limitations. Cisco devices are used to interconnect each area to the Level 2 backbone.

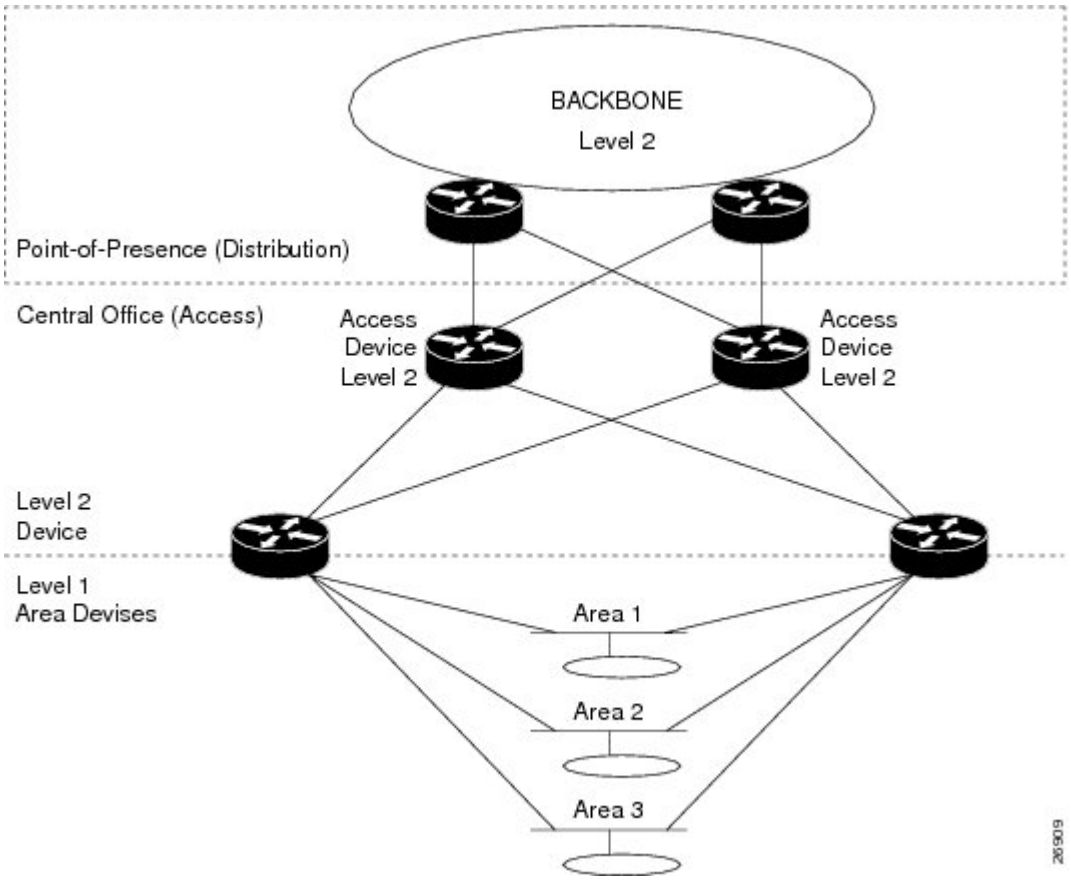
IP routes from the Level 1 device are advertised by default on the Level 2 device. Even when multiple Level 1 routing processes are configured on the same unit, they are advertised on the Level 2 device. No additional configuration is required to redistribute all Level 1 IP routes into the Level 2 process.

The figure below represents a Telco network used to monitor the status of the switching equipment in multiple remote central offices (where the telco equipment resides) from a central monitoring point. In this example, the CLNS network of the Telco is used to monitor the status of the switching equipment.

Figure 1: Telco IS-IS Network for Monitoring Remote Equipment Status



The figure below shows the same network reconfigured using multiarea IS-IS. The number of local access devices has been reduced. Each device continues to provide access to the backbone, but also participates in multiple Level 1 areas. In this example a 3:1 reduction in the number of devices required is shown.



Merging External Areas

Distinct areas defined in a multiarea device cannot share a common area address. This means that all devices in a single area must have unique system IDs. However, it is possible for two areas to be “merged” external to the router, such as when a common area number is introduced by other devices in the two areas. When this happens, the areas that now have a common area number are said to be “merged” into a single area.

The Intermediate System-to-Intermediate System (IS-IS) Multiarea Support feature lets you merge areas by configuring multiple network entity titles (NETs) on a device. If these NETs define a device to be in both area A and area B, for example, the device can potentially merge areas A and B. The result of the merge will be one Level 1 area with two area addresses: A and B.

Note All devices in this merged area must have Network Service Access Point (NSAP) addresses with unique system IDs.

Benefits of IS-IS Multiarea Support

- The IS-IS Multiarea Support feature makes it possible for one Cisco device to support multiple Level 1 areas.
- A single Cisco device can now connect up to 29 areas, as well as perform Level 2 (interarea) routing in the backbone.
- This feature also provides connectivity between Level 1 areas that are local to the device. Previously, Level 1 areas could only to be connected using the Level 2 backbone.

How to Configure IS-IS Multiarea Support

Assigning IS-IS Areas

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number*
4. **isis [** *area-tag* **]**
5. **net** *network-entity-title*
6. end

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** *type number*
	
	Example:
	`Device(config)`
	`# interface gigabitethernet 0/0`
		Enters interface configuration mode.

	Command or Action	Purpose

Step 4	**isis [** *area-tag* **]**
	
	Example:
	`Device(config-if)#`
	`isis`
	`test-area`
		Specifies the area tagged to the IS-IS interface of the Connectionless Network Service (CLNS).

Step 5	**net** *network-entity-title* **Example:** `Device(config-if)#` **net** `47.0004.004d.0001.0000.0c11.1111.00`	Configures Network Entity Titles (NETs) for the routing process. • Specify an NET for each routing process if you are configuring multiarea IS-IS.
Step 6	end **Example:** `Device(config-if)# end`	Exits interface configuration mode and returns to privileged EXEC mode.

Enabling CLNS Routing for an Area on an Interface

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number*
4. **clns router isis [** *area-tag* **]**
5. **ip address** *ip-address-mask*
6. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.

	Command or Action	Purpose
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.

Step 3	**interface** *type number*
	
	Example:
	
	`Device(config)`
	`# interface gigabitethernet 0/0`
		Enters interface configuration mode.

Step 4	**clns router isis [** *area-tag* **]**
	
	Example:
	
	`Device(config-if)`
	`#`
	`clns router isis`
	
	`area1`
		Specifies the area tagged to the IS-IS interface of the Connectionless Network Service (CLNS).

Step 5	**ip address** *ip-address-mask* **Example:** `Device(config-if)# ip address 10.0.0.1`	Defines the IP address for the interface. **Note** An IP address is required on all interfaces in an area enabled for IS-IS if any one interface is configured for IS-IS routing.
Step 6	**end** **Example:** `Device(config-if)# end`	Exits interface configuration mode and returns to privileged EXEC mode.

Enabling Partitioning Avoidance

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **partition avoidance**
4. **end**

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	**partition avoidance** **Example:** `Device(config)#` **partition avoidance**	Stops an IS-IS Level 1-2 border device from using a Level 1 area prefix on a Level 2 backbone.
Step 4	**end** **Example:** `Device(config)# end`	Exits global configuration mode and returns to privileged EXEC mode.

Changing the Routing Level for an Area

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **isis-type** level
4. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.

	Command or Action	Purpose
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**isis-type** level **Example:** `Device(config)#` **isis-type** *level1*	Stops an IS-IS Level 1-2 border device from using a Level 1 area prefix on a Level 2 backbone.
Step 4	**end** **Example:** `Device(config)# end`	Exits global configuration mode and returns to privileged EXEC mode.

Configuration Examples for IS-IS Multiarea Support

Example Assigning IS-IS Areas

```
Device> enable
Device# configure terminal
Device(config)# interface gigabitethernet 0/0
Device(config-if)# router isis test-area
Device(config-if)# net 47.0004.004d.0001.0000.0c11.1111.00
Device(config-if)# end
```

Example Enabling CLNS Routing for an Area on an Interface

```
Device> enable
Device# configure terminal
Device(config)# interface gigabitethernet 0/0
Device(config-if)# clns router isis test-area
Device(config-if)# ip address 10.0.0.1
Device(config-if)# end
```

Example Enabling Partitioning Avoidance

```
Device> enable
Device# configure terminal
Device(config)# partition avoidance
Device(config)# end
```

Example Changing the Routing Level for an Area

```
Device> enable
Device# configure terminal
Device(config)# isis-type level -1
Device(config)# end
```

Additional References for IS-IS Multiarea Support

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Command List, All Releases
IS-IS commands	Cisco IOS IP Routing: IS-IS Command Reference
IS-IS conceptual information	"Integrated IS-IS Routing Protocol Overview" module in the IP Routing: IS-IS Configuration Guide

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 IS-IS Multiarea Support

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

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Table 1: Feature Information for IS-IS Multiarea Support

Feature Name	Releases	Feature Information
IS-IS Multiarea Support	Cisco IOS XE Release 2.6 Cisco IOS XE 3.2SE	Cisco software supports the configuration of multiple Level 1 Intermediate System-to-Intermediate System (IS-IS) areas within a single device ISO Connectionless Network Service (CLNS). The IS-IS Multiarea Support feature lets you merge areas by configuring multiple Network Entity Titles (NETs) on a device. No commands were introduced or modified.

Glossary

Area —Group of connected routers and end systems in a routing domain (or autonomous system). All routers in the domain share topology and adjacency data. If Level 1 (intra-area) routing is enabled in the domain, all routers know how to reach all system IDs. If Level 2 routing is enabled in the domain, all routers know how to reach all other areas.

Conventional IS-IS —In this feature module, a router configured to perform intra-area (Level 1) IS-IS routing in a single area is considered to be conventionally configured. That router can also be configured to perform Level 2 (interarea) routing.

IS-IS —Intermediate System-to-Intermediate System Protocol as defined by ISO 10589 and RFC 1195.

Level 1 —Routers that establish Level 1 adjacencies in order to form a Level 1 area and perform intra-area routing.

Level 2 —Routers that establish Level 2 adjacencies in order to form a Level 2 area and perform interarea routing.

LSDB —link-state packet database. Database of all link-state packets from all routers in an area.

LSP —link-state packet. Packet containing information about the link state on a router instance.

OSI —Open Systems Interconnect (model). Protocol stack with ISO CLNS at Layer 3.