log-adjacency-changes

To configure the router to send a syslog message when an Open Shortest Path First (OSPF) neighbor goes up or down, use the **log-adjacency-changes** command in router configuration mode. To turn off this function, use the **no** form of this command.

log-adjacency-changes [**detail**]

no log-adjacency-changes [**detail**]

Syntax Description

detail	(Optional) Sends a syslog message for each state change, not just when a neighbor goes up or down.

Command Default

Enabled

Command Modes

Router configuration

Command History

Release	Modification
11.2	This command was introduced as **ospf log-adjacency-changes**.
12.1	The **ospf** keyword was omitted and the **detail** keyword was added.
12.2(15)T	Support for IPv6 was added.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

This command allows you to know about OSPF neighbors going up or down without turning on the **debug ip ospf packet** command or the **debug ipv6 ospf adjacency** command. The **log-adjacency-changes** command provides a higher level view of those changes of the peer relationship with less output than the **debug** command provides. The **log-adjacency-changes** command is on by default but only up/down (full/down) events are reported, unless the **detail** keyword is also used.

Examples

The following example configures the router to send a syslog message when an OSPF neighbor state changes:

```
log-adjacency-changes detail
```

Related Commands

Command	Description
debug ip ospf packet	Displays information about each OSPF packet received for IPv4.
debug ipv6 ospf	Displays debugging information for OSPF for IPv6.

lsp-full suppress

To control which routes are suppressed when the link-state protocol data unit (PDU) becomes full, use the **lsp-full suppress** command in router configuration mode. To stop suppression of redistributed routes, specify the **none** keyword or use the **no** form of this command.

lsp-full suppress {**external** [**interlevel**] | **interlevel** [**external**] | **none**}

no lsp-full suppress

Syntax Description

external	Suppresses any redistributed routes on this router.
interlevel	Suppresses any routes coming from the other level. For example, if the Level-2 LSP becomes full, routes from Level 1 are suppressed.
none	Suppresses no routes.

Command Default

Redistributed routes are suppressed.

Command Modes

Router configuration (config-router)

Command History

Release	Modification
12.0(25)S	This command was introduced.
12.2(18)S	This command was integrated into Cisco IOS Release 12.2(18)S.
12.3(4)T	This command was integrated into Cisco IOS Release 12.3(4)T.
12.2(27)SBC	This command was integrated into Cisco IOS Release 12.2(27)SBC.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.
Cisco IOS XE Release 2.1	This command was introduced on Cisco ASR 1000 Series Aggregation Services Routers.

Usage Guidelines

In networks where there is no limit placed on the number of redistributed routes into IS-IS (that is, the **redistribute maximum-prefix** command was not configured), it is possible that the link-state PDU (LSP) could become full and routes will be dropped. Use the **lsp-full suppress** command to define in advance which routes are suppressed in the event that the LSP becomes full.

The **external** and **interlevel** keywords can be specified together or separately.

Use the **clear isis lsp-full** command to clear the LSPFULL state.

Examples

The following example shows how to specify that if the LSP becomes full, both redistributed routes and routes from another level will be suppressed from the LSP:

```
router isis
 lsp-full suppress interlevel external
```

Related Commands

Command	Description
clear isis lsp-full	Clears the LSPFULL state.
redistribute maximum-prefix	Limits the number of prefixes redistributed into IS-IS or generates a warning when the number of prefixes redistributed into IS-IS reaches a maximum.

lsp-gen-interval (IPX)

To set the minimum interval at which link-state packets (LSPs) are generated, use the **lsp-gen-interval** command in router configuration mode. To restore the default interval, use the **no** form of this command.

lsp-gen-interval *seconds*

no lsp-gen-interval *seconds*

Syntax Description

seconds	Minimum interval, in seconds. It can be a number in the range 0 to 120. The default is 5 seconds.

Defaults

5 seconds

Command Modes

Router configuration

Command History

Release	Modification
10.3	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

The **lsp-gen-interval** command controls the rate at which LSPs are generated on a per-LSP basis. For instance, if a link is changing state at a high rate, the default value of the LSP generation interval limits the signaling of this change to once every 5 seconds. Because the generation of an LSP may cause all routers in the area to perform the SPF calculation, controlling this interval may have area-wide impact. Raising this interval can reduce the load on the network imposed by a rapidly changing link.

Examples

The following example sets the minimum interval at which LSPs are generated to 10 seconds:

```
lsp-gen-interval 10
```

Related Commands

Command	Description
ipx router	Specifies the routing protocol to use.
spf-interval	Controls how often Cisco IOS software performs the SPF calculation.

lsp-gen-interval (IS-IS)

To customize IS-IS throttling of LSP generation, use the **lsp-gen-interval** command in router configuration mode. To restore default values, use the **no** form of this command.

lsp-gen-interval [**level-1** | **level-2**] *lsp-max-wait* [*lsp-initial-wait lsp-second-wait*]

no lsp-gen-interval

Syntax Description

level-1	(Optional) Apply intervals to Level-1 areas only.
level-2	(Optional) Apply intervals to Level-2 areas only.
lsp-max-wait	Indicates the maximum interval (in seconds) between two consecutive occurrences of an LSP being generated. The range is 1 to 120 seconds. The default is 5 seconds.
lsp-initial-wait	(Optional) Indicates the initial LSP generation delay (in milliseconds). The range is 1 to 120,000 milliseconds. The default is 50 milliseconds.
lsp-second-wait	(Optional) Indicates the hold time between the first and second LSP generation (in milliseconds). The range is 1 to 120,000 milliseconds. The default is 5000 milliseconds (5 seconds).

Defaults

lsp-max-wait: 5 seconds
lsp-initial-wait: 50 milliseconds
lsp-second-wait: 5000 milliseconds

Command Modes

Router configuration

Command History

Release	Modification
12.1	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

The following description will help you determine whether to change the default values of this command:

- The *lsp-initial-wait* argument indicates the initial wait time (in milliseconds) before generating the first LSP.
- The third argument indicates the amount of time to wait (in milliseconds) between the first and second LSP generation.

- Each subsequent wait interval is twice as long as the previous one until the wait interval reaches the *lsp-max-wait* interval specified, so this value causes the throttling or slowing down of the LSP generation after the initial and second intervals. Once this interval is reached, the wait interval continues at this interval until the network calms down.
- After the network calms down and there are no triggers for 2 times the *lsp-max-wait* interval, fast behavior is restored (the initial wait time).

Notice that the **lsp-gen-interval** command controls the delay between LSPs being *generated*, as opposed to the following related commands:

- The **isis lsp-interval** command sets the delay (in milliseconds) between successive LSPs being *transmitted* (including LSPs generated by another system and forwarded by the local system).
- The **isis retransmit-interval** command sets the amount of time (in seconds) between retransmissions *of the same LSP* on a point-to-point link.
- The **isis retransmit-throttle-interval** command sets the minimum delay (in milliseconds) between retransmitted LSPs on a point-to-point interface.

These commands can be used in combination to control the rate of LSP packets being generated, transmitted, and retransmitted.

Examples

The following example configures intervals for SPF calculations, PRC, and LSP generation:

```
router isis
 spf-interval 5 10 20
 prc-interval 5 10 20
 lsp-gen-interval 2 50 100
```

Related Commands

Command	Description
isis lsp-interval	Sets the time delay between successive IS-IS LSP transmissions.
isis retransmit-interval	Sets the amount of time between retransmission of each IS-IS LSP on a point-to-point link.
isis retransmit-throttle-interval	Sets the minimum delay between retransmissions on each LSP on a point-to-point interface.

lsp-refresh-interval (IS-IS)

To set the link-state packet (LSP) refresh interval, use the **lsp-refresh-interval** command in router configuration mode. To restore the default refresh interval, use the **no** form of this command.

lsp-refresh-interval *seconds*

no lsp-refresh-interval

Syntax Description

seconds	Interval (in seconds) at which LSPs are refreshed.The range is 1 to 65535 seconds. The default value is 900 seconds (15 minutes).

Defaults

900 seconds (15 minutes)

Command Modes

Router configuration

Command History

Release	Modification
10.3	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

The refresh interval determines the rate at which Cisco IOS software periodically transmits in LSPs the route topology information that it originates. This is done to keep the database information from becoming too old.

LSPs must be periodically refreshed before their lifetimes expire. The value set for the **lsp-refresh-interval** command should be less than the value set for the **max-lsp-lifetime** command; otherwise, LSPs will time out before they are refreshed. If you misconfigure the LSP lifetime to be too low compared to the LSP refresh interval, the software will reduce the LSP refresh interval to prevent the LSPs from timing out.

Reducing the refresh interval reduces the amount of time that undetected link state database corruption can persist at the cost of increased link utilization. (This is an extremely unlikely event, however, because there are other safeguards against corruption.) Increasing the interval reduces the link utilization caused by the flooding of refreshed packets (although this utilization is very small).

Examples

The following example configures the IS-IS LSP refresh interval to be 1080 seconds (18 minutes):

```
router isis
 lsp-refresh-interval 1080
```

Related Commands

Command	Description
max-lsp-lifetime (IS-IS)	Sets the maximum time that link-state packets (LSPs) can remain in a router's database without being refreshed.

max-area-addresses

To configure additional manual addresses for an IS-IS area, use the **max-area-addresses** command in router configuration mode. To disable the manual addresses, use the **no** form of this command.

max-area-addresses *number*

no max-area-addresses *number*

Syntax Description

number	Number of manual addresses to add. The range is from 3 to 234. There is no default value.

Command Default

No manual addresses are configured for an IS-IS area.

Command Modes

Router configuration

Command History

Release	Modification
10.0	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

The **max-area-addresses** command allows you to maximize the size of an IS-IS area by configuring additional manual addresses. You specify the number of manual addresses that you want to add by entering the **max-area-addresses** command, and you assign a NET address to create each manual address by entering the **net** command.

Examples

The following example configures three manual addresses as follows:

```
router isis
 max-area-addresses 3
 net 50.3131.3131.3131.00
 net 51.3131.3131.3131.00
 net 52.3131.3131.3131.00
```

In the following example, an error message appears because the user has exceeded the maximum number of manual addresses that were configured with the **max-area-addresses** command:

```
router isis
 max-area-addresses 2
 net 50.3131.3131.3131.00
 net 51.3131.3131.3131.00
 net 52.3131.3131.3131.00
%The maximum allowed addresses already configured
```

Related Commands

Command	Description
net	Assigns a NET address to an IS-IS router.

metric

To globally change the metric value for all Intermediate System-to-Intermediate System (IS-IS) interfaces, use the **metric** command in interface configuration mode or address family configuration mode. To disable the metric value and reinstate the default metric value of 10, use the **no** form of this command.

metric *default-value* [**level-1** | **level-2**]

no metric *default-value* [**level-1** | **level-2**]

Syntax Description

default-value	Metric value to be assigned to the link and used to calculate the path cost via the links to destinations. You can configure this metric for Level 1 or Level 2 routing only. For style wide metrics the range is from 1 to 16777214. For style narrow metrics the range is from 1 to 63.
level-1	(Optional) Set IS-IS Level-1 IPv4 or IPv6 metric.
level-2	(Optional) Set IS-IS Level-2 IPv4 or IPv6 metric.

Defaults

The default value for active IS-IS interfaces is 10; the default value for inactive IS-IS interfaces is 0. If the **level-1** or **level-2** keyword is not entered, the metric will be applied to both Level 1 and Level 2 IS-IS interfaces.

Command Modes

Interface configuration
Address family configuration

Command History

Release	Modification
12.3(4)T	This command was introduced.
12.0(27)S	This command was integrated into Cisco IOS Release 12.0(27)S.
12.2(25)S	This command was integrated into Cisco IOS Release 12.2(25)S.
12.2(18)SXE	This command was integrated into Cisco IOS Release 12.2(18)SXE.
12.2(27)SBC	This command was integrated into Cisco IOS Release 12.2(27)SBC.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

When you need to change the default metric value for all IS-IS interfaces, it is recommended to use the **metric** command in order to configure all interfaces globally. Globally configuring the metric values prevents user errors, such as unintentionally removing a set metric from an interface without configuring a new value and unintentionally allowing the interface to revert to the default metric of 10, thereby becoming a highly preferred interface in the network.

For networks running IPv4, enter the **metric** command in interface configuration mode. For networks running IPv6, enter the **metric** command in address family configuration mode.

Once you enter the **metric** command to change the default IS-IS interface metric value, an enabled interface will use the new value instead of the default value of 10. Passive interfaces will continue to use the metric value of 0.

Note The metric value that is directly configured for a specific interface with either the **isis metric** command or the **isis ipv6 metric** command will always take precedence over the metric value that you configure with the **metric** command.

Examples

The following example configures the IS-IS interfaces with a global default value of 111 for an IS-IS IPv4 network:

```
interface Ethernet3/1
 ip address 10.10.10.2 255.255.0.0
 ip router isis area1
 no ip route-cache
 duplex half
!
interface Ethernet3/2
 ip address 10.10.10.130 255.255.255.0
 ip router isis area1
 no ip route-cache
 duplex half
!
router isis area1
 net 01.0000.0309.1234.00
 metric-style wide
 metric 111
```

Entering the **show clns interface** command returns the following information:

```
Router# show clns interface

Ethernet3/1 is up, line protocol is up
  Checksums enabled, MTU 1497, Encapsulation SAP
  ERPDUs enabled, min. interval 10 msec.
  CLNS fast switching enabled
  CLNS SSE switching disabled
  DEC compatibility mode OFF for this interface
  Next ESH/ISH in 39 seconds
  Routing Protocol: IS-IS
    Circuit Type: level-1-2
    Interface number 0x0, local circuit ID 0x1
    Level-1 Metric: 111, Priority: 64, Circuit ID: mekong.01
    Level-1 IPv6 Metric: 10
    Number of active level-1 adjacencies: 0
    Level-2 Metric: 111, Priority: 64, Circuit ID: mekong.01
    Level-2 IPv6 Metric: 10
    Number of active level-2 adjacencies: 0
    Next IS-IS LAN Level-1 Hello in 922 milliseconds
    Next IS-IS LAN Level-2 Hello in 1 seconds
Ethernet3/2 is up, line protocol is up
  Checksums enabled, MTU 1497, Encapsulation SAP
  ERPDUs enabled, min. interval 10 msec.
  CLNS fast switching enabled
  CLNS SSE switching disabled
  DEC compatibility mode OFF for this interface
  Next ESH/ISH in 20 seconds
  Routing Protocol: IS-IS
    Circuit Type: level-1-2
```

```
    Interface number 0x1, local circuit ID 0x2
    Level-1 Metric: 111, Priority: 64, Circuit ID: mekong.02
    Level-1 IPv6 Metric: 10
    Number of active level-1 adjacencies: 1
    Level-2 Metric: 111, Priority: 64, Circuit ID: mekong.02
    Level-2 IPv6 Metric: 10
    Number of active level-2 adjacencies: 1
    Next IS-IS LAN Level-1 Hello in 2 seconds
    Next IS-IS LAN Level-2 Hello in 1 seconds
```

The following example configures IPv6 for IS-IS and a global default value of 222 IPv6 metric for the IS-IS interfaces. The metric of 10 that was entered using the **isis metric** command will take precedence.

```
interface Ethernet3/1
 ip address 10.10.10.2 255.255.0.0
 ip router isis area1
 no ip route-cache
 duplex half
 isis metric 10
!
interface Ethernet3/2
 ip address 10.10.10.10 255.255.255.0
 ip router isis area1
 no ip route-cache
 duplex half
router isis area1
 net 01.0000.0309.1234.00
 metric-style wide
 metric 111
 !
 address-family ipv6
 metric 222
 exit-address-family
```

Enter the **show clns interface** command to verify that the global default metric for IS-IS IPv6 interfaces for IPv6 network is 222:

```
Router# show clns interface

Ethernet3/1 is up, line protocol is up
  Checksums enabled, MTU 1497, Encapsulation SAP
  ERPDUs enabled, min. interval 10 msec.
  CLNS fast switching enabled
  CLNS SSE switching disabled
  DEC compatibility mode OFF for this interface
  Next ESH/ISH in 51 seconds
  Routing Protocol: IS-IS
    Circuit Type: level-1-2
    Interface number 0x0, local circuit ID 0x1
    Level-1 Metric: 10, Priority: 64, Circuit ID: mekong.01
    Level-1 IPv6 Metric: 222
    Number of active level-1 adjacencies: 0
    Level-2 Metric: 10, Priority: 64, Circuit ID: mekong.01
    Level-2 IPv6 Metric: 222
    Number of active level-2 adjacencies: 0
    Next IS-IS LAN Level-1 Hello in 2 seconds
    Next IS-IS LAN Level-2 Hello in 2 seconds
Ethernet3/2 is up, line protocol is up
  Checksums enabled, MTU 1497, Encapsulation SAP
  ERPDUs enabled, min. interval 10 msec.
  CLNS fast switching enabled
  CLNS SSE switching disabled
  DEC compatibility mode OFF for this interface
  Next ESH/ISH in 17 seconds
```

```
Routing Protocol: IS-IS
  Circuit Type: level-1-2
  Interface number 0x1, local circuit ID 0x2
  Level-1 Metric: 111, Priority: 64, Circuit ID: mekong.02
  Level-1 IPv6 Metric: 222
  Number of active level-1 adjacencies: 1
  Level-2 Metric: 111, Priority: 64, Circuit ID: mekong.02
  Level-2 IPv6 Metric: 222
  Number of active level-2 adjacencies: 1
  Next IS-IS LAN Level-1 Hello in 1 seconds
  Next IS-IS LAN Level-2 Hello in 89 milliseconds
```

Related Commands

Command	Description
isis ipv6 metric	Configures the value of an IS-IS IPv6 metric.
isis metric	Configures the metric for an interface.

metric-style wide

To configure a router running Intermediate System-to-Intermediate System (IS-IS) so that it generates and accepts only new-style type, length, value objects (TLVs), use the **metric-style wide** command in router configuration mode. To disable this function, use the **no** form of this command.

metric-style wide [**transition**] [**level-1** | **level-2** | **level-1-2**]

no metric-style wide [**transition**] [**level-1** | **level-2** | **level-1-2**]

Syntax Description

transition	(Optional) Instructs the router to accept both old- and new-style TLVs.
level-1	(Optional) Enables this command on routing level 1.
level-2	(Optional) Enables this command on routing level 2.
level-1-2	(Optional) Enables this command on routing levels 1 and 2.

Command Default

The Multiprotocol Label Switching (MPLS) traffic engineering image generates only old-style TLVs. To do MPLS traffic engineering, new-style TLVs that have wider metric fields must be generated.

Command Modes

Router configuration (config-router)

Command History

Release	Modification
12.0(5)S	This command was introduced.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release train depends on your feature set, platform, and platform hardware.
Cisco IOS XE Release 2.1	This command was implemented on Cisco ASR 1000 Series Aggregation Services Routers.

Usage Guidelines

If you enter the **metric-style wide** command, a router generates and accepts only new-style TLVs. Therefore, the router uses less memory and other resources than it would if it generated both old-style and new-style TLVs.

This style is appropriate for enabling MPLS traffic engineering across an entire network.

Note This discussion of metric styles and transition strategies is oriented toward traffic engineering deployment. Other commands and models could be appropriate if the new-style TLVs are desired for other reasons. For example, a network might require wider metrics, but might not use traffic engineering.

Examples

The following example shows how to configure a router to generate and accept only new-style TLVs on level 1:

```
Router(config-router)# metric-style wide level-1
```

Related Commands

Command	Description
metric-style narrow	Configures a router to generate and accept old-style TLVs.
metric-style transition	Configures a router to generate and accept both old-style and new-style TLVs.

net

To configure an Intermediate System-to-Intermediate System (IS-IS) network entity title (NET) for the routing process, use the **net** command in global configuration mode. To remove a NET, use the **no** form of this command.

net *net1* **alt** *net2*

no net *net*

Syntax Description

net1	NET network services access point (NSAP) name or address for the IS-IS routing process on the Mulltilayer Switch Feature Card (MSFC) in the primary slot; see the "Usage Guidelines" section for additional information about valid values.
alt *net2*	Specifies the NET name or address for the IS-IS routing process on the MSFC in the alternate slot; see the "Usage Guidelines" section for additional information about valid values.
net	NET NSAP name or address to be removed.

Defaults

The defaults are as follows:

- No NET is configured.
- The IS-IS process is disabled.

Command Modes

Global configuration

Command History

Release	Modification
10.0	This command was introduced.
12.2(14)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to Release 12.2(17d)SXB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

An IS (Intermediate system) is identified by an address known as a network access point (NASAP). The NSAP is divided up into three parts as specified by ISO/AI 10589:

Area address—This field is of variable length, composed of high order octets, and it excludes the System ID and N-selector (NSEL) fields. This area address is associated wit a single area within the routing domain.

System ID—This field is 6 octets long and should be set to a unique value with Level 1 and Level 2. The system IS defines an end system (ES) or an IS in an area. You configure the area address and the system ID with the NET command. You can display the system ID with the **show isis topology** command.

NSEL—This field is called the N-selector, also referred to as the NSAP, and it specifies the upper-layer protocol. The NSEL is the last byte of the NSAP and identifies a network service user. A network service user is a transport entity or the IS network entity itself. When the N-selector is set to zero, the entire NSAP is called a network entity title (NET).

A NET is an NSAP where the last byte is always the n-selector and is always zero. A NET can be from 8 to 20 bytes in length.

Under most circumstances, you should configure one NET only. It is possible to configure two or three NETs, but you should not configure more than one NET except for the following unusual circumstances:

- A network configuration has multiple areas that are merged.
- One area in the IS-IS process is being split into multiple areas.

Configuring multiple NETs in these two circumstances can be temporarily useful because multiple area addresses enable you to renumber an area individually as needed.

When entering the value for the *net* argument, use these guidelines:

- In a 3-slot chassis, slot 1 is the primary slot and slot 2 is the alternate slot.
- In a 6-slot chassis, slot 5 is the primary slot and slot 6 is the alternate slot.
- In a 9-slot chassis, slot 5 is the primary slot and slot 6 is the alternate slot.
- In a 13-slot chassis, slot 7 is the primary slot and slot 8 is the alternate slot.

If you are using IS-IS to perform IP routing only (no connectionless network service routing is enabled), you must configure a NET to define the router ID and area ID.

Examples

The following example shows how to configure a router with a NET which consists of the system ID 0000.0c11.1110 and area address 47.0004.004d.0001:

```
router isis firstcompany
 net 47.0004.004d.0001.0001.0c11.1111.00
```

The following example shows three IS-IS routing processes with three areas that are configured. Each area has a unique identifier, but the system ID is the same for all areas.

```
clns routing
.
.
.

interface Tunnel529
 ip address 10.0.0.5 255.255.255.0
 ip router isis BB
 clns router isis BB

interface Ethernet1
 ip address 10.1.1.5 255.255.255.0
 ip router isis A3253-01
 clns router isis A3253-01
!
interface Ethernet2
 ip address 10.2.2.5 255.255.255.0
 ip router isis A3253-02
 clns router isis A3253-02
.
.
.
```

```
router isis BB                          ! Defaults to "is-type level-1-2"
 net 49.2222.0000.0000.0005.00
!
router isis A3253-01
 net 49.0553.0001.0000.0000.0005.00
 is-type level-1
!
router isis A3253-02
 net 49.0553.0002.0000.0000.0005.00
 is-type level-1
```

Related Commands

Command	Description
is-type	Configures the routing level for an instance of the IS-IS routing process.
router isis	Enables the IS-IS routing protocol and specifies an IS-IS process.
show isis topology	Displays a list of all connected routers in all areas.

partition avoidance

To cause an Intermediate System-to-Intermediate System (IS-IS) Level 1-2 border router to stop advertising the Level 1 area prefix into the Level 2 backbone when full connectivity is lost between the border router, all adjacent Level 1 routers, and end hosts, use the **partition avoidance** command in router configuration mode. To disable this output format, use the **no** form of the command.

partition avoidance *area-tag*

no partition avoidance *area-tag*

Syntax Description

area-tag	Meaningful name for a routing process. If it is not specified, a null tag is assumed and the process is referenced with a null tag. This name must be unique among all IP or Connectionless Network Service Protocol (CLNS) router processes for a given router. Required for multiarea IS-IS configuration. Optional for conventional IS-IS configuration.

Defaults

This command is disabled by default.

Command Modes

Router configuration

Command History

Release	Modification
12.0(5)T	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

When the **partition avoidance** command is enabled, a multiarea router withdraws a Level 1 area prefix from the Level 2 backbone when it no longer has any active adjacencies to that Level 1 area. This withdrawal prevents the Level 1 area from appearing to be partitioned within the Level 2 backbone.

In International Organization for Standardization (ISO) CLNS networks using a redundant topology, it is possible for an area to become "partitioned" when full connectivity is lost between a Level 1-2 border router, all adjacent Level 1 routers, and end hosts. In such a case, multiple Level 1-2 border routers advertise the Level 1 area prefix into the backbone area, even though any one router can reach only a subset of the end hosts in the Level 1 area.

When enabled, the **partition avoidance** command prevents this partitioning by causing the border router to stop advertising the Level 1 area prefix into the Level 2 backbone. This command displays the output from different areas as a string or additional white space.

Other cases of connectivity loss within the Level 1 area itself are not detected or corrected by the border router, and this command will have no effect.

Examples

The following example causes the routing process named Finance to stop advertising the prefix for the area named area1 when the router no longer has any active adjacencies to area1:

```
router isis Finance
 partition avoidance area1
```

Related Commands

Command	Description
is-type	Configures the routing level for an instance of the IS-IS routing process.
router isis	Enables the IS-IS routing protocol and specifies an IS-IS process.

prc-interval

To customize Intermediate System-to-Intermediate System (IS-IS) throttling of partial route calculations (PRC), use the **prc-interval** command in router configuration mode. To restore default values, use the **no** form of this command.

prc-interval *prc-max-wait* [*prc-initial-wait prc-second-wait*]

no prc-interval

Syntax Description

prc-max-wait	Indicates the maximum interval (in seconds) between two consecutive PRC calculations. Value range is 1 to 120 seconds. The default is 5 seconds.
prc-initial-wait	(Optional) Indicates the initial PRC calculation delay (in milliseconds) after a topology change. The range is 1 to 120,000 milliseconds. The default is 2000 milliseconds.
prc-second-wait	(Optional) Indicates the hold time between the first and second PRC calculation (in milliseconds). The range is 1 to 120,000 milliseconds. The default is 5000 milliseconds (5 seconds).

Defaults

prc-max-wait: 5 seconds
prc-initial-wait: 2000 milliseconds
prc-second-wait: 5000 milliseconds

Command Modes

Router configuration

Command History

Release	Modification
12.1	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

PRC is the software's process of calculating routes without performing an shortest path first (SPF) calculation. This is possible when the topology of the routing system itself has not changed, but a change is detected in the information announced by a particular IS or when it is necessary to attempt to reinstall such routes in the Routing Information Base (RIB).

The following description will help you determine whether to change the default values of this command:

- The *prc-initial-wait* argument indicates the initial wait time (in milliseconds) before generating the first link-state packet (LSP).
- The *prc-second-wait* argument indicates the amount of time to wait (in milliseconds) between the first and second LSP generation.

- Each subsequent wait interval is twice as long as the previous one until the wait interval reaches the *prc-max-wait* interval specified, so this value causes the throttling or slowing down of the PRC calculation after the initial and second intervals. Once this interval is reached, the wait interval continues at this interval until the network calms down.
- After the network calms down and there are no triggers for 2 times the *prc-max-wait* interval, fast behavior is restored (the initial wait time).

Examples

The following example configures intervals for SPF calculations, PRC, and LSP generation:

```
router isis
 spf-interval 5 10 20
 prc-interval 5 10 20
 lsp-gen-interval 2 50 100
```

protocol shutdown

To disable the Intermediate System-to-Intermediate System (IS-IS) protocol so that it cannot form any adjacency on any interface and will clear the IS-IS link-state packet (LSP) database, use the **protocol shutdown** command in router configuration mode. To reenable the IS-IS protocol, use the **no** form of this command.

protocol shutdown

no protocol shutdown

Syntax Description

This command has no arguments or keywords.

Defaults

No default behavior or values

Command Modes

Router configuration

Command History

Release	Modification
12.3(4)T	This command was introduced.
12.0(27)S	This command was integrated into Cisco IOS Release 12.0(27)S.
12.2(25)S	This command was integrated into Cisco IOS Release 12.2(25)S.
12.2(18)SXE	This command was integrated into Cisco IOS Release 12.2(18)SXE.
12.2(27)SBC	This command was integrated into Cisco IOS Release 12.2(27)SBC.

Usage Guidelines

The **protocol shutdown** command allows you to disable the IS-IS protocol for a specific routing instance without removing any existing IS-IS configurations parameters. When you enter the **protocol shutdown** command, the IS-IS protocol will continue to run on the router, and you can use the current IS-IS configuration, but IS-IS will not form any adjacencies on any interface, and it will also clear the IS-IS LSP database.

If you want to disable the IS-IS protocol for a specific interface, use the **isis protocol shutdown** command.

Examples

The following example disables the IS-IS protocol for a specific routing instance:

```
Router(config)# router isis area1
Router(config-router)# protocol shutdown
```

Related Commands

Command	Description
isis protocol shutdown	Disables the IS-IS protocol so that it cannot form adjacencies on a specified interface and places the IP address of the interface into the LSP that is generated by the router.

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.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

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.

router isis

To enable the Intermediate System-to-Intermediate System (IS-IS) routing protocol and to specify an IS-IS process, use the **router isis** command in global configuration mode. To disable IS-IS routing, use the **no** form of this command.

router isis [*area-tag*]

no router isis [*area-tag*]

Syntax Description

area-tag	(Optional) Required for multiarea IS-IS configuration. Optional for conventional IS-IS configuration. Meaningful name for a routing process. If it is not specified, a null tag is assumed and the process is referenced with a null tag. This name must be unique among all IP or Connectionless Network Service (CLNS) router processes for a given router.

Command Default

This command is disabled by default.

Command Modes

Global configuration (config)

Command History

Release	Modification
10.0	This command was introduced.
12.0(5)T	This command was modified. Multiarea functionality was added to change the way the *area-tag* argument is used.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.
Cisco IOS XE Release 2.1	This command was integrated into Cisco IOS XE Release 2.1 and implemented on Cisco ASR 1000 Series Aggregation Services Routers.

Usage Guidelines

This command is used to enable routing for an area. An appropriate network entity title (NET) must be configured to specify the area address of the area and system ID of the router. Routing must be enabled on one or more interfaces before adjacencies may be established and dynamic routing is possible.

If you have IS-IS running and at least one International Standards Organization Interior Gateway Routing Protocol (ISO-IGRP) process, the IS-IS process and the ISO-IGRP process cannot both be configured without an area tag. The null tag can be used by only one process. If you run ISO-IGRP and IS-IS, a null tag can be used for IS-IS, but not for ISO-IGRP at the same time. However, each area in an IS-IS multiarea configuration should have a nonnull area tag to facilitate identification of the area.

You can configure only one IS-IS routing process to perform Level 2 (interarea) routing. You can configure this process to perform Level 1 (intra-area) routing at the same time. You can configure up to 29 additional processes as Level 1-only processes. If Level 2 routing is configured on any process, all additional processes are automatically configured as Level 1.

An interface cannot be part of more than one area, except in the case where the associated routing process is performing both Level 1 and Level 2 routing. On media such as WAN media where subinterfaces are supported, different subinterfaces could be configured for different areas.

If Level 2 routing is not desired for a given area, use the **is-type** command to remove Level 2. Level 2 routing can then be enabled on some other router instance.

Explicit redistribution between IS-IS instances is prohibited (prevented by the parser). In other words, you cannot issue a **redistribute isis** *area-tag* command in the context of another IS-IS router instance (**router isis** *area-tag*). Redistribution from any other routing protocol into a particular area is possible, and is configured per router instance, as in Cisco IOS Release 12.0, using the **redistribute** and **route map** commands. By default, redistribution is into Level 2.

If multiple Level 1 areas are defined, the Target Address Resolution Protocol (TARP) behaves in the following way:

- The locally assigned target identifier gets the network service access point (NSAP) of the Level 2 area, if present.
- If only Level 1 areas are configured, the router uses the NSAP of the first active Level 1 area as shown in the configuration at the time of TARP configuration (“tarp run”). (Level 1 areas are sorted alphanumerically by tag name, with capital letters coming before lowercase letters. For example, AREA-1 precedes AREA-2, which precedes area-1.) Note that the target identifier NSAP could change following a reload if a new Level 1 area is added to the configuration after TARP is running.
- The router continues to process all Type 1 and 2 protocol data units (PDUs) that are for this router. Type 1 PDUs are processed locally if the specified target identifier is in the local target identifier cache. If not, they are “propagated” (routed) to all interfaces in the *same* Level 1 area. (The same area is defined as the area configured on the input interface.)
- Type 2 PDUs are processed locally if the specified target identifier is in the local target identifier cache. If not, they are propagated via all interfaces (all Level 1 or Level 2 areas) with TARP enabled. If the source of the PDU is from a different area, the information is also added to the local target identifier cache. Type 2 PDUs are propagated via all static adjacencies.
- Type 4 PDUs (for changes originated locally) are propagated to all Level 1 and Level 2 areas (because internally they are treated as “Level 1-2”).
- Type 3 and 5 PDUs continue to be routed.
- Type 1 PDUs are propagated only via Level 1 static adjacencies if the static NSAP is in one of the Level 1 areas in this router.

After you enter the **router isis** command, you can enter the maximum number of paths. There can be from 1 to 32 paths.

Examples

The following example shows how to configure IS-IS for IP routing, with system ID 0000.0000.0002 and area ID 01.0001, and enable IS-IS to form adjacencies on Ethernet interface 0 and serial interface 0. The IP prefix assigned to Ethernet interface 0 will be advertised to other IS-IS routers.

```
router isis tag1
 net 01.0001.0000.0000.0002
 is-type level-1
!
interface ethernet 0
```

```
 ip address 10.1.1.1 255.255.255.0
 ip router isis
!

interface serial 0
 ip unnumbered ethernet0
 ip router isis
```

The following example shows how to start IS-IS routing with the optional *area-tag* argument, where "example" is the value for the *area-tag* argument:

```
router isis example
```

The following example shows how to specify IS-IS as an IP routing protocol for a process named Finance, and specify that the Finance process will be routed on Ethernet interface 0 and serial interface 0:

```
router isis Finance
 net 49.0001.aaaa.aaaa.aaaa.00
interface Ethernet 0
 ip router isis Finance
interface serial 0
 ip router isis Finance
```

The following example shows usage of the **maximum-paths** option:

```
router isis
maximum-paths?
20
```

Related Commands

Command	Description
clns router isis	Enables IS-IS routing for ISO CLNS on an interface and attaches an area designator to the routing process.
ip router isis	Configures an IS-IS routing process for IP on an interface and attaches an area designator to the routing process.
is-type	Configures the routing level for an IS-IS routing process.
net	Configures an IS-IS NET for the routing process.
redistribute (IP)	Redistributes routes from one routing domain into another routing domain.
route-map (IP)	Defines the conditions for redistributing routes from one routing protocol into another.

set-attached-bit

To specify constraints for when a Level 1 - Level 2 (L1L2) router should set its attached-bit, use the **set-attached-bit** command in router configuration mode. To disable this function, use the **no** form of this command.

set-attached-bit route-map *map-tag*

no set-attached-bit route-map *map-tag*

Syntax Description

route-map *map-tag*	Identifier of a configured route map. If the specified route map is matched, the router continues to set its attached-bit.

Defaults

This command is disabled by default.

Command Modes

Router configuration

Command History

Release	Modification
12.2	This command was introduced.
12.2(4)B	This command was integrated into Cisco IOS Release 12.2(4)B.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

In the current IS-IS implementation, as specified in ISO 10589, L1L2 routers set their Level 1 (L1) link-state packet (LSP) attached-bit when they see other areas in their own domain, or see other domains. However, in some network topologies, adjacent L1L2 routers in different areas may lose connectivity to the Level 2 (L2) backbone. Level 1 (L1) routers may then send traffic destined outside of the area or domain to L1L2 routers that may not have such connectivity.

To allow more control over the attached-bit setting for L1L2 routers, enter the **set-attached-bit** command in router configuration mode. The route map can specify one or more CLNS routes. If at least one of the match address route-map clauses matches a route in the L2 CLNS routing table, and if all other requirements for setting the attached-bit are met, the L1L2 router will continue to set the attached-bit in its L1 LSP. If the requirements are not met or no match address route-map clauses match a route in the L2 CLNS routing table, the attached-bit will not be set.

Note Wildcarded matches are not supported. For each route-map statement, an exact route lookup of the specified route will be performed. The first matched route will have other match statements applied.

Examples

In the following example, the attached-bit will stay set when the router matches 49.00aa in the L2 CLNS routing table.

```
router isis
 clns filter-set L2_backbone_connectivity permit 49.00aa
 route-map check-for-L2_backbone_connectivity
 match clns address L2_backbone_connectivity
router isis
 set-attached-bit route-map check-for-L2_backbone_connectivity
end
show clns route 49.00aa

Known via "isis", distance 110, metric 30, Dynamic Entry
Routing Descriptor Blocks:
 via tr2, Serial0
   isis, route metric is 30, route version is 58
```

Related Commands

Command	Description
route-map	Defines the conditions for redistributing routes from one routing protocol into another.
show clns route	Displays one or all of the destinations to which a router knows how to route CLNS packets.

set-overload-bit

To configure the router to signal other routers not to use it as an intermediate hop in their shortest path first (SPF) calculations, use the **set-overload-bit** command in router configuration mode. To remove the designation, use the **no** form of this command.

set-overload-bit [**on-startup** {*seconds* | **wait-for-bgp**}] [**suppress** [[**interlevel**] [**external**]]]

no set-overload-bit

Syntax Description

on-startup	(Optional) Sets the overload bit upon the system starting up. The overload bit remains set for the number of *seconds* configured or until BGP has converged, depending on the subsequent argument or keyword specified.
seconds	(Optional) When the **on-startup** keyword is configured, causes the overload bit to be set upon system startup and remain set for the specified number of seconds. The range is from 5 to 86400 seconds.
wait-for-bgp	(Optional) When the **on-startup** keyword is configured, causes the overload bit to be set upon system startup and remain set until BGP has converged.
suppress	(Optional) Causes the type of prefix identified by the subsequent keyword or keywords to be suppressed.
interlevel	(Optional) When the **suppress** keyword is configured, prevents the IP prefixes learned from another IS-IS level from being advertised.
external	(Optional) When the **suppress** keyword is configured, prevents the IP prefixes learned from other protocols from being advertised.

Defaults

The overload bit is not set.

Command Modes

Router configuration

Command History

Release	Modification
11.2	This command was introduced.
11.3(2)	The **on-startup** keyword and the *seconds* argument were added.
12.0(7)S	The **wait-for-bgp** keyword was added.
12.1(9)	The **wait-for-bgp** keyword was added.
12.2(2)	The **wait-for-bgp** keyword was added.
12.0(21)ST	The **suppress**, **interlevel**, and **external** keywords were added.
12.2(8)	The **suppress**, **interlevel**, and **external** keywords were added.

Release	Modification
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

This command forces the router to set the overload bit (also known as the hippity bit) in its nonpseudonode link-state packets (LSPs). Normally, the setting of the overload bit is allowed only when a router runs into problems. For example, when a router is experiencing a memory shortage, it might be that the link-state database is not complete, resulting in an incomplete or inaccurate routing table. By setting the overload bit in its LSPs, other routers can ignore the unreliable router in their SPF calculations until the router has recovered from its problems.

The result will be that no paths through this router are seen by other routers in the IS-IS area. However, IP and Connectionless Network Service (CLNS) prefixes directly connected to this router will still be reachable.

This command can be useful when you want to connect a router to an IS-IS network but do not want real traffic flowing through it under any circumstances. Examples situations are as follows:

- A test router in the lab, connected to a production network.
- A router configured as an LSP flooding server, for example, on a nonbroadcast multiaccess (NBMA) network, in combination with the mesh group feature.
- A router that is aggregating virtual circuits (VCs) used only for network management. In this case, the network management stations must be on a network directly connected to the router with the **set-overload-bit** command configured.

Unless you specify the **on-startup** keyword, this command sets the overload bit immediately.

In addition to setting the overload bit, you might want to suppress certain types of IP prefix advertisements from LSPs. For example, allowing IP prefix propagation between Level 1 and Level 2 effectively makes a node a transit node for IP traffic, which might be undesirable. The **suppress** keyword used with the **interlevel** or **external** keyword (or both) accomplishes that suppression while the overload bit is set.

Examples

The following example sets the overload bit upon startup and until BGP has converged, and suppresses redistribution between IS-IS levels and suppresses redistribution from external routing protocols while the overload bit is set:

```
interface Ethernet0
 ip address 10.1.1.1 255.255.255.0
 ip router isis
router isis
 net 49.0001.0000.0000.0001.00
 set-overload-bit on-startup wait-for-bgp suppress interlevel external
router bgp 100
```

show clns interface

To list the CLNS-specific information about each interface, use the **show clns interface** command in privileged EXEC mode.

show clns interface [*type number*]

Syntax Description

type	(Optional) Interface type.
number	(Optional) Interface number.

Command Modes

Privileged EXEC

Command History

Mainline Release	Modification
10.0	This command was introduced.
0S Release	
12.0(31)S	Support for the BFD feature was added.
S Release	
12.2(18)SXE	Support for the Bidirectional Forwarding Detection (BFD) feature was added.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
T Release	
12.4(4)T	Support for the BFD feature was added.

Examples

The following is sample output from the **show clns interface** command that includes information for Token Ring and serial interfaces:

```
Router# show clns interface

TokenRing 0 is administratively down, line protocol is down
  CLNS protocol processing disabled
TokenRing 1 is up, line protocol is up
  Checksums enabled, MTU 4461, Encapsulation SNAP
  ERPDUs enabled, min. interval 10 msec.
  RDPDUs enabled, min. interval 100 msec., Addr Mask enabled
  Congestion Experienced bit set at 4 packets
  CLNS fast switching disabled
  DEC compatibility mode OFF for this interface
  Next ESH/ISH in 18 seconds
  Routing Protocol: ISO IGRP
      Routing Domain/Area: <39.0003> <0020>
Serial 2 is up, line protocol is up
  Checksums enabled, MTU 1497, Encapsulation HDLC
ERPDUs enabled, min. interval 10 msec.
     RDPDUs enabled, min. interval 100 msec., Addr Mask enabled
     Congestion Experienced bit set at 4 packets
     CLNS fast switching enabled
     DEC compatibility mode OFF for this interface
     CLNS cluster alias enabled on this interface
```

```
    Next ESH/ISH in 48 seconds
  Routing Protocol: IS-IS
       Circuit Type: level-1-2
       Level-1 Metric: 10, Priority: 64, Circuit ID: 0000.0C00.2D55.0A
       Number of active level-1 adjacencies: 0
       Level-2 Metric: 10, Priority: 64, Circuit ID: 0000.0000.0000.00
       Number of active level-2 adjacencies: 0
       Next IS-IS LAN Level-1 hello in 3 seconds
       Next IS-IS LAN Level-2 hello in 3 seconds
```

Cisco IOS Release 12.2(18)SXE, 12.0(31)S, and 12.4(4)T

The following is sample output from the **show clns interface** command that verifies that the BFD feature has been enabled on Ethernet interface 3/0. The relevant command output is shown in bold in the output.

```
Router# show clns interface ethernet 3/0

Ethernet3/0 is up, line protocol is up
  Checksums enabled, MTU 1497, Encapsulation SAP
  ERPDUs enabled, min. interval 10 msec.
  CLNS fast switching enabled
  CLNS SSE switching disabled
  DEC compatibility mode OFF for this interface
  Next ESH/ISH in 42 seconds
  Routing Protocol: IS-IS
    Circuit Type: level-1-2
    Interface number 0x1, local circuit ID 0x2
    Level-1 Metric: 10, Priority: 64, Circuit ID: RouterA.02
    DR ID: 0000.0000.0000.00
    Level-1 IPv6 Metric: 10
    Number of active level-1 adjacencies: 0
    Level-2 Metric: 10, Priority: 64, Circuit ID: RouterA.02
    DR ID: 0000.0000.0000.00
    Level-2 IPv6 Metric: 10
    Number of active level-2 adjacencies: 0
    Next IS-IS LAN Level-1 Hello in 3 seconds
    Next IS-IS LAN Level-2 Hello in 5 seconds
    BFD enabled
```

Table 8 describes the significant fields shown in the display.

Table 8 show clns interface Field Descriptions

Field	Description
TokenRing 0 is administratively down, line protocol is down	(First interface). Shown to be administratively down with CLNS disabled.
TokenRing 1 is up, line protocol is up	(Second interface). Shown to be up, and the line protocol is up.
Serial 2 is up, line protocol is up	(Third interface). Shown to be up, and the line protocol is up.
Checksums enabled	Can be enabled or disabled.
MTU	The number following maximum transmission unit (MTU) is the maximum transmission size for a packet on this interface.
Encapsulation	Describes the encapsulation used by CLNP packets on this interface.

Table 8 show clns interface Field Descriptions (continued)

Field	Description
ERPDUs	Displays information about the generation of error protocol data units (ERPDUs). They can be either enabled or disabled. If they are enabled, they are sent out no more frequently than the specified interval.
RDPDUs	Provides information about the generation of redirect protocol data units (RDPDUs). They can be either enabled or disabled. If they are enabled, they are sent out no more frequently than the specified interval. If the address mask is enabled, redirects are sent out with an address mask.
Congestion Experienced	Tells when CLNS will turn on the congestion experienced bit. The default is to turn this bit on when there are more than four packets in a queue.
CLNS fast switching	Displays whether fast switching is supported for CLNS on this interface.
DEC compatibility mode	Indicates whether Digital Equipment Corporation (DEC) compatibility has been enabled.
CLNS cluster alias enabled on this interface	Indicates that CLNS cluster aliasing has been enabled on this interface.
Next ESH/ISH	Displays when the next end system (ES) hello or intermediate system (IS) hello will be sent on this interface.
Routing Protocol	Lists the areas that this interface is in. In most cases, an interface will be in only one area.
Circuit Type	Indicates whether the interface has been configured for local routing (level 1), area routing (level 2), or local and area routing (level 1-2).
Interface number, local circuit ID Level-1 Metric DR ID Level-1 IPv6 Metric Number of active level-1 adjacencies Level-2 Metric DR ID Level-2 IPv6 Metric Number of active level-2 adjacencies Next IS-IS LAN Level-1 Next IS-IS LAN Level-2	Last series of fields displays information pertaining to the International Organization for Standardization (ISO) CLNS routing protocols enabled on the interface. For ISO Interior Gateway Routing Protocol (IGRP), the routing domain and area addresses are specified. For IS-IS, the Level 1 and Level 2 metrics, priorities, circuit IDs, and number of active Level 1 and Level 2 adjacencies are specified.
BFD enabled	BFD has been enabled on the interface.

show clns is-neighbors

To display Intermediate System-to-Intermediate System (IS-IS) related information for IS-IS router adjacencies, use the **show clns is-neighbors** command in EXEC mode. Neighbor entries are sorted according to the area in which they are located.

show clns *area-tag* **is-neighbors** [*type number*] [**detail**]

Syntax Description

area-tag	Required for multiarea IS-IS configuration. Optional for conventional IS-IS configuration. Meaningful name for a routing process. This name must be unique among all IP or CLNS router processes for a given router. If an area tag is not specified, a null tag is assumed and the process is referenced with a null tag. If an area tag is specified, output is limited to the specified area.
type	(Optional) Interface type.
number	(Optional) Interface number.
detail	(Optional) When specified, the areas associated with the intermediate systems are displayed. Otherwise, a summary display is provided.

Command Modes

EXEC

Command History

Release	Modification
10.0	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Examples

The following is sample output from the **show clns is-neighbors** command:

```
Router# show clns is-neighbors

System Id       Interface   State  Type  Priority  Circuit Id         Format
0000.0C00.0C35  Ethernet1   Up     L1    64        0000.0C00.62E6.03  Phase V
0800.2B16.24EA  Ethernet0   Up     L1L2  64/64     0800.2B16.24EA.01  Phase V
0000.0C00.3E51  Serial1     Up     L2    0         04                 Phase V
0000.0C00.62E6  Ethernet1   Up     L1    64        0000.0C00.62E6.03  Phase V
```

Table 9 describes significant fields shown in the display.

Table 9 show clns is-neighbors Field Descriptions

Field	Descriptions
System Id	Identification value of the system.
Interface	Interface on which the router was discovered.
State	Adjacency state. Up and Init are the states. See the **show clns neighbors** description.

Table 9 show clns is-neighbors Field Descriptions (continued)

Field	Descriptions
Type	L1, L2, and L1L2 type adjacencies. See the **show clns neighbors** description.
Priority	IS-IS priority that the respective neighbor is advertising. The highest priority neighbor is elected the designated IS-IS router for the interface.
Circuit Id	Neighbor's idea of what the designated IS-IS router is for the interface.
Format	Indicates if the neighbor is either a Phase V (OSI) adjacency or Phase IV (DECnet) adjacency.

The following is sample output from the **show clns is-neighbors detail** command:

```
Router# show clns is-neighbors detail

System Id       Interface   State  Type  Priority  Circuit Id         Format
0000.0C00.0C35  Ethernet1   Up     L1    64        0000.0C00.62E6.03  Phase V
  Area Address(es): 47.0004.004D.0001 39.0001
  Uptime: 0:03:35
0800.2B16.24EA  Ethernet0   Up     L1L2  64/64     0800.2B16.24EA.01  Phase V
  Area Address(es): 47.0004.004D.0001
  Uptime: 0:03:35
0000.0C00.3E51  Serial1     Up     L2    0         04                 Phase V
  Area Address(es): 39.0004
  Uptime: 0:03:35
000.0C00.62E6  Ethernet1    Up     L1    64        0000.0C00.62E6.03  Phase V
  Area Address(es): 47.0004.004D.0001
  Uptime: 0:03:35
```

Notice that the information displayed in **show clns is-neighbors detail** output includes everything shown in **show clns is-neighbors** output, but it also includes the area addresses associated with the IS neighbors (intermediate-system adjacencies) and how long (uptime) the adjacency has existed.

Related Commands

Command	Description
clear clns is-neighbors	Removes IS neighbor information from the adjacency database.
clns is-neighbor	Defines all intermediate systems that will be used when you manually specify the NSAP-to-SNPA mapping.

show clns traffic

To list the CLNS packets that this router has seen, use the **show clns traffic** command in user EXEC or privileged EXEC mode.

show clns *area-tag* **traffic**

Syntax Description

area-tag	Required for multiarea IS-IS configuration. Optional for conventional IS-IS configuration. Meaningful name for a routing process. This name must be unique among all IP or CLNS router processes for a given router. If an area tag is not specified, a null tag is assumed and the process is referenced with a null tag. If an area tag is specified, output is limited to the specified area.

Command Modes

User EXEC
Privileged EXEC

Command History

Release	Modification
10.0	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Examples

The following is sample output from the **show clns traffic** command:

```
Router# show clns traffic

CLNS & ESIS Output: 139885, Input: 90406
CLNS Local: 0, Forward: 0
CLNS Discards:
    Hdr Syntax: 150, Checksum: 0, Lifetime: 0, Output cngstn: 0
  No Route: 0, Dst Unreachable 0, Encaps. Failed: 0
  NLP Unknown: 0, Not an IS: 0
CLNS Options: Packets 19, total 19, bad 0, GQOS 0, cngstn exprncd 0
CLNS Segments: Segmented: 0, Failed: 0
CLNS Broadcasts: sent: 0, rcvd: 0
Echos: Rcvd 0 requests, 69679 replies
  Sent 69701 requests, 0 replies
ESIS(sent/rcvd): ESHs: 0/34, ISHs: 483/1839, RDs: 0/0, QCF: 0/0
ISO IGRP: Querys (sent/rcvd): 0/0 Updates (sent/rcvd): 1279/1402
ISO IGRP: Router Hellos: (sent/rcvd): 1673/1848
ISO IGRP Syntax Errors: 0
IS-IS: Level-1 Hellos (sent/rcvd): 0/0
IS-IS: Level-2 Hellos (sent/rcvd): 0/0
IS-IS: PTP Hellos (sent/rcvd): 0/0
IS-IS: Level-1 LSPs (sent/rcvd): 0/0
IS-IS: Level-2 LSPs (sent/rcvd): 0/0
IS-IS: Level-1 CSNPs (sent/rcvd): 0/0
IS-IS: Level-2 CSNPs (sent/rcvd): 0/0
IS-IS: Level-1 PSNPs (sent/rcvd): 0/0
IS-IS: Level-2 PSNPs (sent/rcvd): 0/0
IS-IS: Level-1 DR Elections: 0
```

```
IS-IS: Level-2 DR Elections: 0
IS-IS: Level-1 SPF Calculations: 0
IS-IS: Level-2 SPF Calculations: 0
```

Table 10 describes significant fields shown in the display.

Table 10 show clns traffic Field Descriptions

Field	Description
CLNS & ESIS Output	Total number of packets that this router has sent.
Input	Total number of packets that this router has received.
CLNS Local	Lists the number of packets that were generated by this router.
Forward	Lists the number of packets that this router has forwarded.
CLNS Discards	Lists the packets that CLNS has discarded, along with the reason for the discard.
CLNS Options	Lists the options that have been seen in CLNS packets.
CLNS Segments	Lists the number of packets that have been segmented and the number of failures that occurred because a packet could not be segmented.
CLNS Broadcasts	Lists the number of CLNS broadcasts that have been sent and received.
Echos	Lists the number of echo request packets and echo reply packets that have been received. The line following this field lists the number of echo request packets and echo reply packets that have been sent.
ESIS (sent/rcvd)	Lists the number of ESH, ISH, and Redirects sent and received.
ISO IGRP	Lists the number of ISO Interior Gateway Routing Protocol (IGRP) queries and updates sent and received.
Router Hellos	Lists the number of ISO IGRP router hello packets that have been sent and received.
IS-IS: Level-1 hellos (sent/rcvd)	Lists the number of Level 1 IS-IS hello packets sent and received.
IS-IS: Level-2 hellos (sent/rcvd)	Lists the number of Level 2 IS-IS hello packets sent and received.
IS-IS: PTP hellos (sent/rcvd)	Lists the number of point-to-point IS-IS hello packets sent and received over serial links.
IS-IS: Level-1 LSPs (sent/rcvd)	Lists the number of Level 1 link-state PDUs sent and received.
IS-IS: Level-2 LSPs (sent/rcvd)	Lists the number of Level 2 link-state PDUs sent and received.
IS-IS: Level-1 CSNPs (sent/rcvd)	Lists the number of Level 1 CSNPs sent and received.
IS-IS: Level-2 CSNPs (sent/rcvd)	Lists the number of Level 2 CSNPs sent and received.

Table 10 show clns traffic Field Descriptions (continued)

Field	Description
IS-IS: Level-1 PSNPs (sent/rcvd)	Lists the number of Level 1 PSNPs sent and received.
IS-IS: Level-2 PSNPs (sent/rcvd)	Lists the number of Level 2 PSNPs sent and received.
IS-IS: Level-1 DR Elections	Lists the number of times Level 1 designated router election occurred.
IS-IS: Level-2 DR Elections	Lists the number of times Level 2 designated router election occurred.
IS-IS: Level-1 SPF Calculations	Lists the number of times Level 1 shortest-path-first (SPF) tree was computed.
IS-IS: Level-2 SPF Calculations	Lists the number of times Level 2 SPF tree was computed.

show isis database

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

show isis [*process-tag*] **database** [**level-1 | l1**] [**level-2 | l2**][**detail**] [**lspid**]

Syntax Description

process-tag	(Optional) A unique name among all International Organization for Standardization (ISO) router processes including IP and Connectionless Network Service (CLNS) router processes for a given router. If a process tag is specified, output is limited to the specified routing process. When **null** is specified for the process tag, output is displayed only for the router process that has no tag specified. If a process tag is not specified, output is displayed for all processes.
level-1	(Optional) Displays the IS-IS link-state database for Level 1. l1 is the abbreviation for the **level-1** keyword
level-2	(Optional) Displays the IS-IS link-state database for Level 2. l2 is the abbreviation for the **level-2** keyword.
detail	(Optional) Displays the contents of each link-state packet (LSP). Otherwise, a summary display is provided.
lspid	(Optional) Displays the link-state protocol data unit (PDU) identifier. Displays the contents of a single LSP by its ID number.

Command Modes

User EXEC (>)
Privileged EXEC (#)

Command History

Release	Modification
10.0	This command was introduced.
12.2(15)T	Support was added for IPv6.
12.2(18)S	This command was integrated into Cisco IOS Release 12.2(18)S.
12.0(26)S	This command was integrated into Cisco IOS Release 12.0(26)S.
12.0(29)S	The *process-tag* argument was added.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2(25)SG	This command was integrated into Cisco IOS Release 12.2(25)SG.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.
Cisco IOS XE Release 2.4	This command was introduced on Cisco ASR 1000 Series Routers.

Usage Guidelines

The order of the optional argument and keywords is not important when this command is entered. For example, the following are both valid command specifications and provide the same output: **show isis database detail l2** and **show isis database l2 detail**.

Examples

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

```
Router# show isis database

IS-IS Level-1 Link State Database
LSPID                 LSP Seq Num  LSP Checksum  LSP Holdtime  ATT/P/OL
0000.0C00.0C35.00-00  0x0000000C   0x5696        792           0/0/0
0000.0C00.40AF.00-00* 0x00000009   0x8452        1077          1/0/0
0000.0C00.62E6.00-00  0x0000000A   0x38E7        383           0/0/0
0000.0C00.62E6.03-00  0x00000006   0x82BC        384           0/0/0
0800.2B16.24EA.00-00  0x00001D9F   0x8864        1188          1/0/0
0800.2B16.24EA.01-00  0x00001E36   0x0935        1198          1/0/0

IS-IS Level-2 Link State Database
LSPID                 LSP Seq Num  LSP Checksum  LSP Holdtime  ATT/P/OL
0000.0C00.0C35.03-00  0x00000005   0x04C8        792           0/0/0
0000.0C00.3E51.00-00  0x00000007   0xAF96        758           0/0/0
0000.0C00.40AF.00-00* 0x0000000A   0x3AA9        1077          0/0/0
```

The following is sample output from the **show isis database** command using the *process-tag* argument to display information about a VPN routing and forwarding instance (VRF)-aware IS-IS instance tagFirst:

```
Router# show isis tagFirst database level-2

Tag tagFirst:
IS-IS Level-2 Link State Database:
LSPID                 LSP Seq Num  LSP Checksum  LSP Holdtime  ATT/P/OL
igp-01.00-00          0x0000000A   0x5E73        914           0/0/0
igp-01.03-00          0x00000001   0x8E41        894           0/0/0
igp-01.04-00          0x00000001   0x8747        894           0/0/0
igp-03.00-00        * 0x00000005   0x55AD        727           0/0/0
igp-03.02-00        * 0x00000001   0x3B97        727           0/0/0
igp-02.00-0           0x00000004   0xC1FB        993           0/0/0
igp-02.01-00          0x00000001   0x448D        814           0/0/0
igp-04.00-00          0x00000004   0x76D0        892           0/0/0
```

Table 11 describes the significant fields shown in the display.

Table 11 show isis database Field Descriptions

Field	Description
Tag tagFirst	Tag name that identifies an IS-IS instance.
LSPID	The 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 nonzero, the LSP describes links from the system. When it is zero, the LSP is a so-called nonpseudonode LSP. This mechanism is similar to a router link-state advertisement (LSA) in the Open Shortest Path First (OSPF) protocol. The LSP will describe the state of the originating router. For each LAN, the designated router for that LAN will create and flood a pseudonode LSP, describing all systems attached to that LAN. The last octet is the LSP number. If there is more data than can fit in a single LSP, the LSP will be divided into multiple LSP fragments. Each fragment will have a different LSP number. An asterisk (*) indicates that the LSP was originated by the system on which this command is issued.

Table 11 show isis database Field Descriptions (continued)

Field	Description
LSP Seq Num	Sequence number for the LSP that allows other systems to determine if they have received the latest information from the source.
LSP Checksum	Checksum of the entire LSP packet.
LSP Holdtime	Amount of time the LSP remains valid (in seconds). An LSP hold time of zero indicates that this LSP was purged and is being removed from the link-state database (LSDB) of all routers. The value indicates how long the purged LSP will stay in the LSDB before being completely removed.
ATT	The Attach bit. This bit indicates that the router is also a Level 2 router, and it can reach other areas. Level 1-only routers and Level 1-2 routers that have lost connection to other Level 2 routers will use the Attach bit to find the closest Level 2 router. They will point a default route to the closest Level 2 router.
P	The P bit. Detects if the intermediate systems is area partition repair-capable. Cisco and other vendors do not support area partition repair.
OL	The Overload bit. Determines if the IS is congested. If the Overload bit is set, other routers will not use this system as a transit router when calculating routers. Only packets for destinations directly connected to the overloaded router will be sent to this router.

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

```
Router# show isis database detail

IS-IS Level-1 Link State Database
LSPID                 LSP Seq Num  LSP Checksum  LSP Holdtime  ATT/P/OL
0000.0C00.0C35.00-00  0x0000000C   0x5696        325           0/0/0
  Area Address: 47.0004.004D.0001
  Area Address: 39.0001
  Metric: 10   IS 0000.0C00.62E6.03
  Metric: 0    ES 0000.0C00.0C35
0000.0C00.40AF.00-00* 0x00000009   0x8452        608           1/0/0
  Area Address: 47.0004.004D.0001
  Topology: IPv4 (0x0) IPv6 (0x2)
  NLPID: 0xCC 0x8E
  IP Address: 172.16.21.49
  Metric: 10   IS 0800.2B16.24EA.01
  Metric: 10   IS 0000.0C00.62E6.03
  Metric: 0    ES 0000.0C00.40AF
  IPv6 Address: 2001:0DB8::/32
  Metric: 10   IPv6 (MT-IPv6) 2001:0DB8::/64
  Metric: 5    IS-Extended cisco.03
  Metric: 10   IS-Extended cisco1.03
  Metric: 10    IS (MT-IPv6) cisco.03
```

As the output shows, in addition to the information displayed with the **show isis database** command, the **show isis database detail** command displays the contents of each LSP.

Table 12 describes the significant fields shown in the display.

Table 12 show isis database detail Field Descriptions

Field	Description
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.
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 CLNS prefix).
Topology	States the topology supported (for example, IPv4, IPv6).
IPv6 Address	The IPv6 address.
MT-IPv6	Advertised using multitopology Type, Length, and Value objects (TLVs).

The following is additional sample output from the **show isis database detail** command. This LSP is a Level 2 LSP. The area address 39.0001 is the address of the area in which the router resides.

```
Router# show isis database 12 detail

IS-IS Level-2 Link State Database
LSPID                 LSP Seq Num  LSP Checksum  LSP Holdtime  ATT/P/OL
0000.0C00.1111.00-00* 0x00000006   0x4DB3        1194          0/0/0
  Area Address: 39.0001
  NLPID:        0x81 0xCC
  IP Address:  172.16.64.17
  Metric: 10   IS 0000.0C00.1111.09
  Metric: 10   IS 0000.0C00.1111.08
  Metric: 10   IP 172.16.65.0 255.255.255.0
```

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.
12.1(3)T	This command was integrated into Cisco IOS Release 12.1(3)T.
12.0(10)ST	This command was integrated into Cisco IOS Release 12.0(10)ST.
12.2(27)SBC	This command was integrated into Cisco IOS Release 12.2(27)SBC.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.
Cisco IOS XE Release 2.1	This command was implemented on Cisco ASR 1000 Series Aggregation Services Routers.

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:   10.5.5.5
  IP Address:  172.16.39.5
  Metric:10         IP 172.16.39.0/24
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 13 describes the significant fields shown in the display.

Table 13 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	Hostname of the node.
Router ID	Traffic engineering router identifier for the node.
IP Address	IPv4 address for the interface.

Table 13 show isis database verbose Field Descriptions (continued)

Field	Description
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).
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 172.16.170.0/24
  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 192.168.0.6/32
    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.

show isis fast-reroute

To display information about Intermediate System-to-Intermediate System (IS-IS) Fast Reroute (FRR) configurations, use the **show isis fast-reroute** command in user EXEC or privileged EXEC mode.

show isis fast-reroute {**interfaces** [*type number*] | **summary**}

Syntax Description

interfaces	Displays information about all interfaces that are configured with FRR.
type	(Optional) Interface type. For more information, use the question mark (?) online help function.
number	(Optional) Interface or subinterface number. For more information about the numbering syntax for your networking device, use the question mark (?) online help function.
summary	Displays FRR configuration information summary.

Command Default

This command has no default settings.

Command Modes

User EXEC (>)
Privileged EXEC (#)

Command History

Release	Modification
15.1(2)S	This command was introduced.

Usage Guidelines

The **show isis fast-reroute interfaces** command displays whether or not an interface is supported by a platform.

Examples

The following is sample output from the **show isis fast-reroute interfaces** command:

```
Router# show isis fast-reroute interfaces

Tag Null - Fast-Reroute Platform Support Information:

   Serial6/3: Protectable: Yes. Usable for repair: Yes
   Serial6/2: Protectable: Yes. Usable for repair: Yes
   Loopback16: Protectable: No. Usable for repair: No
```

Table 14 describes the significant fields shown in the display.

Table 14 show isis fast-reroute interfaces Field Descriptions

Field	Description
Protectable	Specifies whether or not an interface is a protected interface.
Usable for repair	Specifies whether or not an interface can be used as a repair path.

The following is sample output from the **show isis fast-reroute summary** command:

```
Router# show isis fast-reroute summary

Prefix Counts:          Total      Protected    Coverage
   High priority:        17          17           100%
   Normal priority:      0           0            0%
```

Table 15 describes the significant fields shown in the display.

Table 15 show isis fast-reroute summary Field Descriptions

Field	Description
Total	Total number of prefixes.
Protected	Total number of protected prefixes.
High priority	Prefixes that have a high priority.
Normal priority	Prefixes that have a normal priority.

Related Commands

Command	Description
debug isis fast-reroute	Enables debugging of IS-IS FRR.
fast-reroute load-sharing	Disables FRR load sharing of prefixes.
fast-reroute per-prefix	Enables FRR per prefix.
fast-reroute tie-break	Configures the FRR tiebreaking priority.

show isis hostname

To display the router-name-to-system-ID mapping table entries for an Intermediate System-to-Intermediate System (IS-IS) router, use the **show isis hostname** command in privileged EXEC mode.

show isis hostname

Syntax Description

This command has no arguments or keywords.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.0	This command was introduced.
12.0S	This command was integrated into Cisco IOS Release 12.0(S).

Usage Guidelines

In the IS-IS routing domain, the system ID is used to represent each router. The system ID is part of the network entity title (NET) that is configured for each IS-IS router. For example, a router with a configured NET of 49.0001.0023.0003.000a.00 has a system ID of 0023.0003.000a. Router-name-to-system-ID mapping is difficult for network administrators to remember during maintenance and troubleshooting on the routers. Entering the **show isis hostname** command displays the entries in the router-name-to-system-ID mapping table.

If the dynamic hostname feature has not been disabled by entering the **no hostname dynamic** command, the mapping will consist of a dynamic host mapping table. However, if the **clns host** command has been entered to create a mapping between the router name and the system ID, this locally defined mapping will take precedence over the dynamically learned one from the dynamic hostname feature.

Examples

The following example changes the hostname to RouterA and assigns the NET 49.0001.0000.0000.000b.00 to RouterA.

```
Router> enable
Router# configure terminal
Router(config)# hostname RouterA
RouterA(config)# router isis CompanyA
RouterA(config-router)# net 49.0001.0000.0000.000b.00
RouterA(config-router)# hostname dynamic
RouterA(config-router)# end
```

Entering the **show isis hostname** command displays the dynamic host mapping table. The dynamic host mapping table displays the router-name-to-system-ID mapping table entries for Router-b, Router-c and for the local router named Router-a. The command output shows that the local router is running the IS-IS process named CompanyA. The table also shows that the neighbor router Router-b is a Level-1 router, and its hostname is advertised by the Level-1 (L1) link-state protocol (LSP). Router-b is a Level-2 router and its hostname is advertised by the L2 LSP. The * symbol that appears under Level for the local router Router-a signifies that this is the router-name-to-system-ID mapping information for the local router.

```
Router-a# show isis hostname

Level  System ID      Dynamic Hostname    (CompanyA)
   1   3333.3333.333b Router-b
   2   3131.3131.313b Router-c
   *   3232.3232.323b Router-a
```

Related Commands

Command	Description
clns host	Defines a name-to-NSAP mapping that can then be used with commands that require NSAPs.
hostname	Specifies or modifies the hostname for the network server.
hostname dynamic	Enables dynamic hostname capability.
net	Configures an IS-IS NET for a CLNS or IS-IS routing process.

show isis lsp-log

To display the Level 1 and Level 2 Intermediate System-to-Intermediate System (IS-IS) link-state packet (LSP) log of the interfaces that triggered the new LSP, use the **show isis lsp-log** command in EXEC mode.

show isis lsp-log

Syntax Description

This command has no arguments or keywords.

Command Modes

EXEC

Command History

Release	Modification
12.0	This command was introduced.
12.2(15)T	This command is no longer supported in Cisco IOS Mainline or Technology-based (T) releases. It may continue to appear in Cisco IOS 12.2S-family releases.

Examples

The following is sample output from the **show isis lsp-log** command:

```
Router# show isis lsp-log

   Level 1 LSP log
  When       Count      Interface   Triggers
07:05:18        3                  CONFIG NEWADJ DIS
07:05:13        2       Ethernet0  NEWADJ DIS
07:04:43        1                  ATTACHFLAG
07:01:38        2       Ethernet0  IPUP
07:01:33        2       Loopback0  CONFIG
07:01:24        1       Ethernet0  DELADJ
07:01:17        2       Ethernet0  DIS ES
07:01:02        1       Ethernet0  NEWADJ
07:00:57        2       Ethernet0  NEWADJ DIS


   Level 2 LSP log
  When       Count      Interface   Triggers
07:05:24        2                  CONFIG NEWADJ
07:05:23        1       Ethernet0  NEWADJ
07:05:18        1       Ethernet0  DIS
07:05:00        1         Serial0  NEWADJ
07:01:44        2       Ethernet0  IPUP
07:01:39        3       Loopback0  CONFIG DELADJ
07:01:30        1       Ethernet0  DELADJ
07:01:25        1         Serial0  NEWADJ
07:00:56        1                  IPIA
07:00:47        2                  AREASET IPIA
```

Table 16 describes the fields shown in the display.

Table 16 show isis lsp-log Field Descriptions

Field	Description
When	Time elapsed since the LSP was generated.
Count	Number of events that took place at this time.
Interface	Interface that caused the LSP regeneration.
Triggers	Event that triggered the LSP to be flooded. Possible triggers for an LSP are as follows: • AREASET—Active area set changed. • ATTACHFLAG—Attach bit changed state. • CLEAR—Some form of manual **clear** command was issued. • CONFIG—Any configuration change. • DELADJ—Adjacency went down. • DIS—DIS changed or pseudonode changed. • ES—End System adjacency changed. • HIPPITY—LSPDB overload bit changed state. • IF_DOWN—Needs a new LSP. • IP_DEF_ORIG—Default information originate changed. • IPDOWN—Directly connected IP prefix down. • IP_EXTERNAL—Redistributed IP route appeared or gone. • IPIA—Interarea IP route appeared or gone. • IPUP—Directly connected IP prefix up. • NEWADJ—New adjacency came up. • REDIST—Redistributed level-2 CLNS route changed. • RRR_INFO—RRR bandwidth resource information.

show isis neighbors

To display information about Intermediate System-to-Intermediate System (IS-IS) neighbors, use the **show isis neighbors** command in privileged EXEC mode.

show isis neighbors [**detail**]

Syntax Description

detail	(Optional) Displays more detailed information for IS-IS neighbors.

Command Default

Brief information for IS-IS neighbors is displayed.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(18)S	This command was introduced.
12.3	This command was integrated into Cisco IOS Release 12.3.
12.0(29)S	This command was integrated into Cisco IOS Release 12.0(29)S.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(33)SRB	The command output was modified to support the Multi-Topology Routing (MTR) feature.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

The **show isis neighbors** command is used to display brief information about connected IS-IS routers. Enter the **detail** keyword to display more detailed information.

Examples

Release 12.0(29)S

The **show isis neighbors** command is entered to display information about the IS-IS neighbor Router1.

```
Router5# show isis neighbors

System Id      Type Interface IP Address      State Holdtime Circuit Id
0000.0000.0002 L1   Et0/0     192.168.128.2   UP    21       R5.02
0000.0000.0002 L2   Et0/0     192.168.128.2   UP    28       R5.02
```

Thee **show isis neighbors detail** command is entered to display more detailed information about the IS-IS neighbor Router1.

```
Router5# show isis neighbors detail

System Id           Type Interface IP Address      State Holdtime Circuit Id
0000.0000.0002      L1   Et0/0     192.168.128.2   UP    21       R5.02
```

```
  Area Address(es): 49.0001
  SNPA: aabb.cc00.1f00
  State Changed: 00:00:52
  LAN Priority: 64
  Format: Phase V
0000.0000.0002      L2   Et0/0     192.168.128.2   UP    22       R5.02
  Area Address(es): 49.0001
  SNPA: aabb.cc00.1f00
  State Changed: 00:00:52
  LAN Priority: 64
  Format: Phase V
```

Release 12.2(33)SRB

The **show isis neighbors detail** command is entered to verify the status of the IS-IS neighbor Router1 for a network that has MTR configured. For each of the topologies - unicast, DATA and VOICE, the interface information is displayed.

```
Router5# show isis neighbors detail

System Id      Type Interface IP Address      State Holdtime Circuit Id
0000.0000.0005 L2   Et0/0     192.168.128.2   UP    28       R5.01
  Area Address(es): 33
  SNPA: aabb.cc00.1f00
  State Changed: 00:07:05
  LAN Priority: 64
  Format: Phase V
  Remote TID:  100, 200
  Local TID:   100, 200
```

Table 17 describes the significant fields shown in the display.

Table 17 show isis neighbors Field Descriptions

Field	Description
System Id	Six-byte value that identifies a system in an area.
Type	Level type. Indicates whether the IS-IS neighbor is a Level 1, Level-1-2, or Level 2 router.
Interface	Interface from which the system was learned.
IP Address	IP address of the neighbor router.
State	Indicates whether the state of the IS-IS neighbor is up or down.
Holdtime	Link-state packet (LSP) holdtime. Amount of time that the LSP remains valid (in seconds).
Circuit Id	Port location for the IS-IS neighbor router that indicates how it is connected to the local router.
Area Address(es)	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.
SNPA	Subnetwork point of attachment. This is the data-link address.
State Changed	State change.
LAN Priority	Priority of the LAN.

Table 17 show isis neighbors Field Descriptions (continued)

Field	Description
Remote TID	Neighbor router topology ID(s).
Local TID	Local router topology ID(s).

show isis nsf

To display current state information regarding Intermediate System-to-Intermediate System (IS-IS) Cisco nonstop forwarding (NSF), use the **show isis nsf** command in user EXEC mode.

show isis nsf

Syntax Description

This command has no arguments or keywords.

Command Modes

User EXEC

Command History

Release	Modification
12.0(22)S	This command was introduced.
12.2(18)S	This command was integrated into Cisco IOS Release 12.2(18)S.
12.2(20)S	Support for the Cisco 7304 router was added.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.

Usage Guidelines

The **show isis nsf** command can be used with both Cisco proprietary IS-IS NSF and Internet Engineering Task Force (IETF) IS-IS NSF. The information displayed when this command is entered depends on which protocol has been configured. To configure nsf for a specific routing protocol, use the **router bgp**, **router ospf**, or **router isis** commands in global configuration mode.

Examples

The following example shows state information for an active RP that is configured to use Cisco proprietary IS-IS NSF:

```
Router# show isis nsf

NSF enabled, mode 'cisco'
RP is ACTIVE, standby ready, bulk sync complete
NSF interval timer expired (NSF restart enabled)
Checkpointing enabled, no errors
Local state:ACTIVE,  Peer state:STANDBY HOT,  Mode:SSO
```

The following example shows state information for a standby RP that is configured to use Cisco proprietary IS-IS NSF:

```
Router# show isis nsf

NSF enabled, mode 'cisco'
RP is STANDBY, chkpt msg receive count:ADJ 2, LSP 314
NSF interval timer notification received (NSF restart enabled)
Checkpointing enabled, no errors
Local state:STANDBY HOT,  Peer state:ACTIVE,  Mode:SSO
```

The following example shows state information when the networking device is configured to use IETF IS-IS NSF:

```
Router# show isis nsf

NSF is ENABLED, mode IETF
NSF pdb state:Inactive
NSF L1 active interfaces:0
NSF L1 active LSPs:0
NSF interfaces awaiting L1 CSNP:0
Awaiting L1 LSPs:
NSF L2 active interfaces:0
NSF L2 active LSPs:0
NSF interfaces awaiting L2 CSNP:0
Awaiting L2 LSPs:
Interface:Serial3/0/2
    NSF L1 Restart state:Running
    NSF p2p Restart retransmissions:0
    Maximum L1 NSF Restart retransmissions:3
    L1 NSF ACK requested:FALSE
    L1 NSF CSNP requested:FALSE
    NSF L2 Restart state:Running
    NSF p2p Restart retransmissions:0
    Maximum L2 NSF Restart retransmissions:3
    L2 NSF ACK requested:FALSE
Interface:GigabitEthernet2/0/0
    NSF L1 Restart state:Running
    NSF L1 Restart retransmissions:0
    Maximum L1 NSF Restart retransmissions:3
    L1 NSF ACK requested:FALSE
    L1 NSF CSNP requested:FALSE
    NSF L2 Restart state:Running
    NSF L2 Restart retransmissions:0
    Maximum L2 NSF Restart retransmissions:3
    L2 NSF ACK requested:FALSE
    L2 NSF CSNP requested:FALSE
```

Related Commands

Command	Description
debug isis nsf	Displays information about the IS-IS state during an NSF restart.
nsf (IS-IS)	Configures NSF operations for IS-IS.
nsf t3	Specifies the methodology used to determine how long IETF NSF will wait for the LSP database to synchronize before generating overloaded link state information for itself and flooding that information out to its neighbors.
nsf interface wait	Specifies how long a NSF restart will wait for all interfaces with IS-IS adjacencies to come up before completing the restart.
nsf interval	Specifies the minimum time between NSF restart attempts.
show clns neighbors	Displays both ES and IS neighbors.

show isis rib

To display paths for a specific route or for all routes under a major network that are stored in the IP local Routing Information Base (RIB), use the **show isis rib** command in privileged EXEC mode.

show isis rib [*ip-address* | *ip-address-mask*]

Syntax Description

ip-address	(Optional) Displays paths for a specific route.
ip-address-mask	(Optional) Displays paths for all routes under a major network.

Command Default

If no *ip-address* or *ip-address-mask* argument is specified, all routes in the Integrated Intermediate System-to-Intermediate System (IS-IS) local RIB will be displayed.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.0(26)S	This command was introduced.
12.3(4)T	This command was integrated into Cisco IOS Release 12.3(4)T.
12.2(25)S	This command was integrated into Cisco IOS Release 12.2(25)S
12.2(18)SXE	This command was integrated into Cisco IOS Release 12.2(18)SXE.
12.2(27)SBC	This command was integrated into Cisco IOS Release 12.2(27)SBC.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

To verify that an IP prefix update that exists in the IP global RIB also has been updated in the IS-IS local RIB, enter the **show isis rib** command.

Examples

The following is sample output from the **show isis rib** command to show all routes under the major network with the IP address mask 10.2.2.0 255.255.255.0 that are stored within the IS-IS local RIB:

```
Router# show isis rib 10.2.2.0 255.255.255.0

IPv4 local RIB for IS-IS process
10.2.2.0/24
 [115/L2/20} via 10.2.2.2(Ethernet2), from 10.22.22.22, tag 0, LSP[10/10]
```

Table 18 describes the significant fields shown in the display.

Table 18 show isis rib Field Descriptions

Field	Description
10.2.2.0/24	IP prefix that is stored within the IS-IS local RIB.
[115/L2/20]	Administrative instance/type/metric for the routing path to reach the next hop of the router.
via 10.2.2.2(Ethernet2)	IP address of the next hop—in this instance, Ethernet2.
tag 0	Priority of the IP prefix. All prefixes have a tag 0 priority unless otherwise configured.

Related Commands

Command	Description
debug isis rib	Displays debug information for IP Version 4 routes within the global or IS-IS local RIB.
ip route priority high	Assigns a high priority to an IS-IS IP prefix.

show isis rib redistribution

To display the prefixes in the local redistribution cache, use the **show isis rib redistribution** command in user EXEC or privileged EXEC mode.

show isis rib redistribution [**level-1** | **level-2**] [*network-prefix*]

Syntax Description

level-1	(Optional) Displays level 1 local redistribution cache information.
level-2	(Optional) Displays level 2 local redistribution cache information.
network-prefix	(Optional) The network ID in the A.B.C.D format for a specific network.

Command Modes

User EXEC
Privileged EXEC

Command History

Release	Modification
12.0(27)S	This command was introduced.
12.3(7)T	This command was integrated into Cisco IOS Release 12.3(7)T.
12.2(25)S	This command was integrated into Cisco IOS Release 12.2(25)S.
12.2(18)SXE	This command was integrated into Cisco IOS Release 12.2(18)SXE.
12.2(27)SBC	This command was integrated into Cisco IOS Release 12.2(27)SBC.

Usage Guidelines

You can use the **show isis rib redistribution** command to verify that desired routes have been redistributed into Intermediate System-to-Intermediate System (IS-IS). The command output will show the network prefixes in the local redistribution cache.

Examples

In the following example, the output from the **show isis rib redistribution** command verifies that Internet Protocol version 4 (IPv4) routes have been redistributed into IS-IS. The output is self-explanatory.

```
Router# show isis rib redistribution

IPv4 redistribution RIB for IS-IS process
====== Level 1 ======
10.3.3.0/24
  [Connected/0] external
10.0.18.48/28
  [Connected/0] external
====== Level 2 ======
```

The following lines indicate that the prefix 10.3.3.0 with a mask 24 was redistributed from the connected routing protocol into IS-IS as a level 1 route, cost 0, with a metric type external:

```
10.3.3.0/24
  [Connected/0] external
```

The following lines show that the connected routing protocol owns the prefix 10.0.18.48 and that the metric for the route is 28:

```
10.0.18.48/28
  [Connected/0] external
```

Related Commands

Command	Description
clear isis rib redistribution	Clears some or all prefixes in the local redistribution cache.
debug isis rib redistribution	Debugs the local redistribution cache event.

show isis spf-log

To display how often and why the router has run a full shortest path first (SPF) calculation, use the **show isis spf-log** user command in user EXEC or privileged EXEC mode.

show isis [*area-tag*] [**ipv6** | *] **spf-log**

Syntax Description

area-tag	(Optional) Required for multiarea Intermediate System-to-Intermediate System (IS-IS) configuration. Optional for conventional IS-IS configuration. Meaningful name for a routing process. This name must be unique among all IP or Connectionless Network Service (CLNS) router processes for a given router. If an area tag is not specified, a null tag is assumed and the process is referenced with a null tag. If an area tag is specified, output is limited to the specified area.
ipv6	(Optional) Displays IS-IS multitopology for IPv6 SPF log.
*	(Optional) Displays the SPF logs of all address families.

Command Modes

User EXEC
Privileged EXEC

Command History

Release	Modification
10.0	This command was introduced.
12.2(15)T	Support was added for IPv6.
12.2(18)S	This command was integrated into Cisco IOS Release 12.2(18)S.
12.0(26)S	This command was integrated into Cisco IOS Release 12.0(26)S.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.

Examples

The following is sample output from the **show isis spf-log** command with the optional **ipv6** keyword:

```
Router# show isis ipv6 spf-log

                 IPv6 Level 1 SPF log
  When   Duration  Nodes  Count     Last trigger LSP   Triggers
00:15:46    3124     40      1          milles.00-00  TLVCODE
00:15:24    3216     41      5          milles.00-00  TLVCODE NEWLSP
00:15:19    3096     41      1          deurze.00-00  TLVCODE
00:14:54    3004     41      2          milles.00-00  ATTACHFLAG LSPHEADER
00:14:49    3384     41      1          milles.00-01  TLVCODE
00:14:23    2932     41      3          milles.00-00  TLVCODE
00:05:18    3140     41      1                        PERIODIC
00:03:54    3144     41      1          milles.01-00  TLVCODE
00:03:49    2908     41      1          milles.01-00  TLVCODE
00:03:28    3148     41      3           bakel.00-00  TLVCODE TLVCONTENT
```

```
00:03:15    3054     41      1          milles.00-00  TLVCODE
00:02:53    2958     41      1          mortel.00-00  TLVCODE
00:02:48    3632     41      2          milles.00-00  NEWADJ TLVCODE
00:02:23    2988     41      1          milles.00-01  TLVCODE
00:02:18    3016     41      1          gemert.00-00  TLVCODE
00:02:14    2932     41      1           bakel.00-00  TLVCONTENT
00:02:09    2988     41      2           bakel.00-00  TLVCONTENT
00:01:54    3228     41      1          milles.00-00  TLVCODE
00:01:38    3120     41      3            rips.03-00  TLVCONTENT
```

Table 19 describes the significant fields shown in the display.

Table 19 show isis spf-log Field Descriptions

Field	Description
When	How long ago (in hours: minutes: seconds) a full SPF calculation occurred. The last 20 occurrences are logged.
Duration	Number of milliseconds required to complete this SPF run. Elapsed time is wall clock time, not CPU time.
Nodes	Number of routers and pseudonodes (LANs) that make up the topology calculated in this SPF run.
Count	Number of events that triggered this SPF run. When there is a topology change, often multiple link-state packets (LSPs) are received in a short time. A router waits 5 seconds before running a full SPF run, so it can include all new information. This count denotes the number of events (such as receiving new LSPs) that occurred while the router was waiting its 5 seconds before running full SPF.
Last trigger LSP	Whenever a full SPF calculation is triggered by the arrival of a new LSP, the router stores the LSP ID. The LSP ID can provide a clue as to the source of routing instability in an area. If multiple LSPs are causing an SPF run, only the LSP ID of the last received LSP is remembered.
Triggers	A list of all reasons that triggered a full SPF calculation. For a list of possible triggers, see Table 18.

Table 20 lists possible triggers of a full SPF calculation.

Table 20 Possible Triggers of Full SPF Calculation

Trigger	Description
ATTACHFLAG	This router is now attached to the Level 2 backbone or it has just lost contact to the Level 2 backbone.
ADMINDIST	Another administrative distance was configured for the IS-IS process on this router.
AREASET	Set of learned area addresses in this area changed.
BACKUPOVFL	An IP prefix disappeared. The router knows there is another way to reach that prefix but has not stored that backup route. The only way to find the alternative route is through a full SPF run.
DBCHANGED	A **clear isis *** command was issued on this router.

Table 20 Possible Triggers of Full SPF Calculation (continued)

Trigger	Description
IPBACKUP	An IP route disappeared, which was not learned via IS-IS, but via another protocol with better administrative distance. IS-IS will run a full SPF to install an IS-IS route for the disappeared IP prefix.
IPQUERY	A **clear ip route** command was issued on this router.
LSPEXPIRED	Some LSP in the link-state database (LSDB) has expired.
LSPHEADER	ATT/P/OL bits or is-type in an LSP header changed.
NEWADJ	This router has created a new adjacency to another router.
NEWAREA	A new area (via network entity title [NET]) was configured on this router.
NEWLEVEL	A new level (via is-type) was configured on this router.
NEWLSP	A new router or pseudonode appeared in the topology.
NEWMETRIC	A new metric was configured on an interface of this router.
NEWSYSID	A new system ID (via NET) was configured on this router.
PERIODIC	Typically, every 15 minutes a router runs a periodic full SPF calculation.
RTCLEARED	A **clear clns route** command was issued on this router.
TLVCODE	TLV code mismatch, indicating that different TLVs are included in the newest version of an LSP.
TLVCONTENT	TLV contents changed. This normally indicates that an adjacency somewhere in the area has come up or gone down. The “Last trigger LSP” column indicates where the instability may have occurred.

show isis topology

To display a list of all connected routers in all areas, use the **show isis topology** command in user EXEC or privileged EXEC mode.

show isis [*process-tag*] [**ipv6** | *] **topology**

Syntax Description

process-tag	(Optional) A unique name among all International Organization for Standardization (ISO) router processes including IP and Connectionless Network Service (CLNS) router processes for a given router. If a process tag is specified, output is limited to the specified routing process. When **null** is specified for the process tag, output is displayed only for the router process that has no tag specified. If a process tag is not specified, output is displayed for all processes.
ipv6	(Optional) Displays Intermediate System-to-Intermediate System (IS-IS) IPv6 topology.
*	(Optional) Displays the topology of all address families.

Command Modes

User EXEC (>)
Privileged EXEC (#)

Command History

Release	Modification
12.0(5)T	This command was introduced.
12.2(15)T	Support was added for IPv6.
12.2(18)S	This command was integrated into Cisco IOS Release 12.2(18)S.
12.0(26)S	This command was integrated into Cisco IOS Release 12.0(26)S.
12.0(29)S	The *process-tag* argument was added.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2(25)SG	This command was integrated into Cisco IOS Release 12.2(25)SG.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.
15.0(1)M	This command was integrated into Cisco IOS Release 15.0(1)M.

Usage Guidelines

Use the **show isis topology** EXEC command to verify the presence and connectivity between all routers in all areas.

Examples

The following example shows output from the **show isis topology** command using the optional **ipv6** keyword. The command shown is used in a dual CLNS-IP network:

```
Router# show isis ipv6 topology

Tag L2BB:
IS-IS IPv6 paths to level-1 routers
```

```
System Id       Metric  Next-Hop        Interface       SNPA
0000.0000.0005 --
0000.0000.0009  10      0000.0000.0009  Tu529           *Tunnel*
0000.0000.0017  20      0000.0000.0009  Tu529           *Tunnel*
0000.0000.0053  30      0000.0000.0009  Tu529           *Tunnel*
0000.0000.0068  20      0000.0000.0009  Tu529           *Tunnel*

IS-IS paths to level-2 routers
System Id       Metric  Next-Hop        Interface       SNPA
0000.0000.0005  --
0000.0000.0009  10      0000.0000.0009  Tu529           *Tunnel*
0000.0000.0017  20      0000.0000.0009  Tu529           *Tunnel*
0000.0000.0053  30      0000.0000.0009  Tu529           *Tunnel*
0000.0000.0068  20      0000.0000.0009  Tu529           *Tunnel*
Tag A3253-01:
IS-IS paths to level-1 routers
System Id       Metric  Next-Hop        Interface       SNPA
0000.0000.0003  10      0000.0000.0003  Et1             0000.0c03.6944
0000.0000.0005  --
0000.0000.0053  10      0000.0000.0053  Et1             0060.3e58.ccdb

Tag A3253-02:
IS-IS paths to level-1 routers
System Id       Metric  Next-Hop        Interface       SNPA
0000.0000.0002  10      0000.0000.0002  Et2             0000.0c03.6bc5
0000.0000.0005  --
0000.0000.0053  10      0000.0000.0053  Et2             0060.3e58.ccde
```

Table 21 describes the significant fields shown in the display.

Table 21 show isis topology Field Descriptions

Field	Description
Tag	Identifies the routing process.
System Id	Six-byte value that identifies a system in an area.
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 CLNS prefix).
Next-Hop	The address of the next hop router.
Interface	Interface from which the system was learned.
SNPA	Subnetwork point of attachment. This is the data-link address.

snmp-server enable traps isis

To enable Simple Network Management Protocol (SNMP) notifications for Intermediate System-to-Intermediate System (IS-IS) errors and transition state changes, use the **snmp-server enable traps isis** command in global configuration mode. To disable all or some of the IS-IS SNMP notifications, use the **no** form of this command.

snmp-server enable traps isis [**errors** [*error-type*]] [**state-change** [*state-change-type*]]

no snmp-server enable traps isis [**errors** [*error-type*]] [**state-change** [*state-change-type*]]

Syntax Description

errors	(Optional) Enables Simple Network Management Protocol (SNMP) notifications for errors and mismatches that occur as a result of invalid field values in PDUs that have been received on a circuit for an IS.
error-type	(Optional) One or more of the optional IS-IS error type keywords can follow the **errors** keyword: • **authentication**—Enables SNMP notifications only for authentication failures in a PDU received by an IS. • **authentication-type**—Enables SNMP notifications only for invalid authentication type fields in a PDU received by an IS. • **id-length-mismatch**—Enables SNMP notifications only for mismatches in system ID field lengths. • **iih**—Enables SNMP notifications only for IS-IS Hello PDU errors. One or more of the following three optional IS-IS Hello PDU error keywords can follow the **iih** keyword: – **adjacency-rejected**—Enables SNMP notifications for link-state packet (LSP)-specific errors and mismatches. – **area-mismatch**—Enables SNMP notifications for mismatches in area addresses between ISs. – **version-skew**—Enables SNMP notifications for IS-IS protocol version mismatches. • **lsp**—Enables SNMP notifications only for LSP-specific errors and mismatches. One or more of the following eight optional IS-IS Hello PDU error keywords can follow the **lsp** keyword: – **buffsize-mismatch**—Enables SNMP notifications for buffer size mismatches for LSPs. – **max-seq-overflow**—Enables SNMP notifications for attempts to exceed the maximum sequence number. – **packet-corrupt**—Enables SNMP notifications for LSP in-memory corruptions with invalid checksums. – **packet-parse**—Enables SNMP notifications for packet parse failures on received circuit. – **protocol-support**—Enables SNMP notifications for supported protocol mismatches non-pseudonode LSPs. – **purge-zero-age**—Enables SNMP notifications for invalid attempts to purge the LSP of an IS. – **size-exceeded**—Enables SNMP notifications for oversized LSPs that cause propagation failures. – **skip-sequence-number**—Enables SNMP notifications for system ID duplications (the sequence number is greater than 1). • **manual-address-drop**—Enables SNMP notifications only for manually configured area addresses that have been dropped. • **maxarea-mismatch**—Enables SNMP notifications only for mismatches in maximum area address values.

state-change	(Optional) Enables SNMP notifications for all IS-IS transition state change traps.
state-change-type	(Optional) One or both of the optional IS-IS transition state change keywords can follow the **state-change** keyword: • **adjacency**—Enables SNMP notifications only for adjacency changes between IS-IS neighbors. • **database-overload**—Enables SNMP notifications only for authentication failures on IS-IS neighbors.

Command Default

This command is disabled by default. If you enter this command with no keywords, the default is to enable all SNMP notifications.

Command Modes

Global configuration

Command History

Release	Modification
12.2(25)SG	This command was introduced.
12.2(31)SB2	This command was integrated into Cisco IOS Release 12.2(31)SB2.
12.2(33)SRB	This command was integrated into Cisco IOS Release 12.2(33)SRB.
12.2(31)SB3	This command was implemented on the Cisco 10000 series.

Usage Guidelines

To globally enable all IS-IS MIB traps, enter the **snmp-server enable traps isis** command in global configuration mode. If you want to disable one or more traps, you can enter the **no snmp-server enable traps isis errors** command or the **no snmp-server enable traps isis state-change** command followed by the keywords that represent the traps that you want to disable. Entering the **no snmp-server enable traps isis errors** command without any keywords will disable all IS-IS error traps. Entering the **no snmp-server enable traps isis state-change** command without any keywords will disable all IS-IS state-change traps.

Examples

The following example shows how to enable the router to send IS-IS SNMP notifications only for IS-IS errors involving authentication to the host at the address myhost.cisco.com using the community string defined as public:

```
Router(config)# snmp-server enable traps isis errors authentication
Router(config)# snmp-server host myhost.cisco.com version 2c public
```

The following example shows how to enable the router to send IS-IS SNMP notifications for state changes involving adjacencies between Intermediate Systems (ISs) to the host at the address myhost.cisco.com using the community string defined as public:

```
Router(config)# snmp-server enable traps isis state-change adjacency
Router(config)# snmp-server host myhost.cisco.com version 2c public
```

Related Commands

Command	Description
snmp-server host	Specifies the recipient of an SNMP notification operation.

spf-interval

To customize Intermediate System-to-Intermediate System (IS-IS) throttling of shortest path first (SPF) calculations, use the **spf-interval** command in router configuration mode. To restore default values, use the **no** form of this command.

spf-interval [**level-1** | **level-2**] *spf-max-wait* [*spf-initial-wait spf-second-wait*]

no spf-interval

Syntax Description

level-1	(Optional) Apply intervals to Level-1 areas only.
level-2	(Optional) Apply intervals to Level-2 areas only.
spf-max-wait	Indicates the maximum interval (in seconds) between two consecutive SPF calculations. The range is 1 to 120 seconds. The default is 10 seconds.
spf-initial-wait	(Optional) Indicates the initial SPF calculation delay (in milliseconds) after a topology change. The range is 1 to 120000 milliseconds. The default is 5500 milliseconds (5.5 seconds).
spf-second-wait	(Optional) Indicates the hold time between the first and second SPF calculation (in milliseconds). The range is 1 to 120000 milliseconds. The default is 5500 milliseconds (5.5 seconds).

Defaults

spf-max-wait: 10 seconds
spf-initial-wait: 5500 milliseconds
spf-second-wait: 5500 milliseconds

Command Modes

Router configuration

Command History

Release	Modification
10.3	This command was introduced.
12.1	The **level-1** and **level-2** keywords were added; the *spf-max-wait*, *spf-initial-wait*, and *spf-second-wait* arguments were added. The default interval between SPF calculations was changed from 5 seconds to 10 seconds.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

SPF calculations are performed only when the topology changes. They are not performed when external routes change.

The **spf-interval** command controls how often Cisco IOS software performs the SPF calculation. The SPF calculation is processor-intensive. Therefore, it may be useful to limit how often this is done, especially when the area is large and the topology changes often. Increasing the SPF interval reduces the processor load of the router, but potentially slows down the rate of convergence.

The following description will help you determine whether to change the default values of this command:

- The *spf-initial-wait* argument indicates the initial wait time (in milliseconds) after a topology change before the first SPF calculation.
- The *spf-second-wait* argument indicates the interval (in milliseconds) between the first and second SPF calculation.
- Each subsequent wait interval is twice as long as the previous one until the wait interval reaches the *spf-max-wait* interval specified; the SPF calculations are throttled or slowed down after the initial and second intervals. Once the *spf-max-wait* interval is reached, the wait interval continues at this interval until the network calms down.
- After the network calms down and there are no triggers for 2 times the *spf-max-wait* interval, fast behavior is restored (the initial wait time).

SPF throttling is not a dampening mechanism; that is, SPF throttling does not prevent SPF calculations or mark any route, interface, or router as down. SPF throttling simply increases the intervals between SPF calculations.

Examples

The following example configures intervals for SPF calculations, partial route calculation (PRC), and link-state packet (LSP) generation:

```
router isis
 spf-interval 5 10 20
 prc-interval 5 10 20
 lsp-gen-interval 2 50 100
```

srlg

To assign an interface to a Shared Risk Link Group (SRLG) and to configure interface-specific SRLG, use the **srlg** command in interface configuration mode. To disable the configuration, use the **no** form of this command.

srlg gid *srlg-id*

no srlg gid *srlg-id*

Syntax Description

gid	Specifies the SRLG group ID.
srlg-id	SRLG ID. Valid values are from 1 to 8192.

Command Default

No interfaces are assigned to an SRLG.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
15.1(2)S	This command was introduced.

Usage Guidelines

The SRLG configuration assigns an interface to one or more risk groups. When an interface assigned to one group fails, the other interfaces that are part of the group also fail.

Examples

The following example shows how to assign an SRLG group ID to a Gigabit Ethernet interface:

```
Router(config)# interface gigabitethernet 0/0
Router(config-if)# srlg gid 900
Router(config-if)# end
```

Related Commands

Command	Description
interface	Configures an interface and enters interface configuration mode.

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	(Optional) Only routes redistributed into Level 1 are summarized with the configured address and mask value.
level-1-2	(Optional) 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	(Optional) 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) Specifies the integer used to tag the summary route.
metric *metric-value*	(Optional) Specifies the metric value applied to the summary route.

Command Default

All routes are advertised individually.

Command Modes

Router configuration (config-router)

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.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.
Cisco IOS XE Release 2.1	This command was implemented on Cisco ASR 1000 Series Aggregation Services Routers.

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 protocol data unit (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
```

vrf (router configuration)

To associate an Intermediate System-to-Intermediate System (IS-IS) instance with a VPN routing and forwarding instance (VRF), use the **vrf** command in router configuration mode. To remove the VRF, use the **no** form of this command.

vrf *vrf-name*

no vrf *vrf-name*

Syntax Description

vrf-name	Name of the VRF to which you want to associate an IS-IS instance.

Command Default

An ISIS instance is not associated with a VRF.

Command Modes

Router configuration (config-router)

Command History

Release	Modification
12.0(29)S	This command was introduced.
12.2(33)SRB	This command was integrated into Cisco IOS Release 12.2(33)SRB.
15.0(1)M	This command was integrated into Cisco IOS Release 15.0(1)M.

Usage Guidelines

You must already have created the VRF before you can associate it with an IS-IS instance. The following restrictions should be noted:

- IS-IS instances running Connectionless Network Services (CLNS) must have the same system ID.
- An IS-IS instance that is running CLNS or IPv6 cannot be associated with a VRF.
- You can configure only one IS-IS instance to run both CLNS and IP.
- IS-IS instances within the same VRF must have unique system IDs, although IS-IS instances located in separate VRFs can have the same system ID.
- You can associate an IS-IS instance with only one VRF.
- You can configure the **passive-interface default** command only on one IS-IS instance per VRF.
- Redistribution is allowed only within the same VRF.
- You can enable only one IS-IS instance per interface.
- An interface can belong to an IS-IS instance only if they are associated with the same VRF.

For more information about configuring VRF-aware IS-IS instances, see the IS-IS Support for Multiple Instances (IP only) Each Mapped to a VRF feature.

Examples

The following example shows the creation of an IS-IS instance that gets associated with a VRF called First:

```
Router(config)# router isis tagFirst
Router(config-router)# vrf First
```

Related Commands

Command	Description
ip router isis	Configures an IS-IS process for IP on an interface and attaches a tag designator to the routing process.
router isis	Enables the IS-IS routing protocol and specifies an IS-IS process.
show clns neighbors	Displays ES, IS, and M-ISIS neighbors.
show clns protocol	Lists the protocol-specific information for each ISO IGRP or IS-IS routing process in the router.
show isis database	Displays the IS-IS link-state database.