# Cisco IOS IP Routing: ISIS Command Reference

# CONTENTS

# Integrated IS-IS Commands: A through I

# advertise-passive-only

To configure Intermediate System-to-Intermediate System (IS-IS) to advertise only prefixes that belong to passive interfaces, use the **advertise-passive-only** command in router configuration mode. To remove the restriction, use the **no** form of this command.

**advertise-passive-only**

**no advertise-passive-only**

**Syntax Description**  This command has no arguments or keywords.

**Command Default**  IS-IS does not advertise only IPv6 prefixes that belong to passive interfaces.

**Command Modes**  Router configuration

**Command History**

| Release | Modification |
|---------|-------------|
| 12.0(22)S | This command was introduced. |
| 12.3(2)T | This command was integrated into Cisco IOS Release 12.3(2)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 3.6S | This command was integrated into Cisco IOS XE Release 3.6S. |

**Usage Guidelines**  This command is an IS-IS mechanism to exclude IP prefixes of connected networks from link-state packet (LSP) advertisements, thereby reducing IS-IS convergence time.

Configuring this command per IS-IS instance is a scalable method to reduce IS-IS convergence time because fewer prefixes will be advertised in the router nonpseudonode LSP.

This command relies on the fact that when enabling IS-IS on a loopback interface, you usually configure the loopback as passive (to prevent sending unnecessary hello packets out through it because there is no chance of finding a neighbor behind it). Thus, if you want to advertise only the loopback and if it has already been configured as passive, configuring the **advertise-passive-only** command per IS-IS instance prevents overpopulation of the routing tables.

An alternative to this command is the **no** isis advertise-prefix command. The **no** isis advertise-prefixcommandis a small-scale method because it is configured per interface.

**Examples**

The following example uses the **advertise-passive-only** command, which affects the IS-IS instance, and thereby prevents advertising the IP network of Ethernet interface 0. Only the IP address of loopback interface 0 is advertised.

```
!
interface loopback 0
 ip address 192.168.10.1 255.255.255.255
 no ip directed-broadcast
!
!
interface Ethernet0
 ip address 192.168.20.1 255.255.255.0
 no ip directed-broadcast
 ip router isis
!.
!.
!.
!
router isis
 passive-interface Loopback0
 net 47.0004.004d.0001.0001.0c11.1111.00
 advertise-passive-only
 log-adjacency-changes
!
```

**Related Commands**

| Command | Description |
|---------|-------------|
| **isis advertise-prefix** | Allows the advertising of IP prefixes of connected networks in LSP advertisements per IS-IS interface. |
| **passive-interface** | Suppresses the sending of routing updates through the specified interface. |

# advertise passive-only (IPv6)

To configure Intermediate System-to-Intermediate System (IS-IS) to advertise only IPv6 prefixes that belong to passive interfaces, use the **advertise passive-only** command in address family configuration mode. To remove the restriction, use the **no** form of this command.

**advertise passive-only**

**no advertise passive-only**

**Syntax Description**　This command has no arguments or keywords.

**Command Default**　IS-IS does not advertise only IPv6 prefixes that belong to passive interfaces.

**Command Modes**　Address family configuration (config-router-af)

**Command History**

| Release | Modification |
| --- | --- |
| Cisco IOS XE Release 3.6S | This command was introduced. |
| 15.2(4)M | This command was integrated into Cisco IOS Release 15.2(4)M. |

**Usage Guidelines**　This command is an IS-IS mechanism to exclude IPv6 prefixes of connected networks from link-state packet (LSP) advertisements, thereby reducing IS-IS convergence time.

Configuring this command per IS-IS instance is a scalable method to reduce IS-IS convergence time because fewer IPv6 prefixes will be advertised in the router nonpseudonode LSP.

This command relies on the fact that when enabling IS-IS on a loopback interface, you usually configure the loopback as passive (to prevent sending unnecessary hello packets out through it because there is no chance of finding a neighbor behind it). Thus, if you want to advertise only the loopback and if it has already been configured as passive, configuring the **advertise passive-only** command per IS-IS instance prevents overpopulation of the routing tables.

An alternative to this command is the **no isis advertise-prefix** command, which is a small-scale method because it is configured per interface.

**Examples**　The following example uses the **advertise passive-only** command, which affects the IS-IS instance, and thereby prevents advertising the IPv6 network of Gigabit Ethernet interface 0/0/0. Only the IPv6 address of loopback interface 0 is advertised.

```
router isis
 net 49.0000.0000.0100.00
 metric-style wide
 address-family ipv6
   advertise passive-only
```

```
 interface GigabitEthernet 0/0/0
  ipv6 address 2001::1/64
  ipv6 router isis
  interface loopback 0
  ipv6 address 2002::1/128
  router isis
passive-interface loopback 0
end
```

**show isis database detail level-1**

```
IS-IS Level-1 Link State Database:
LSPID            LSP Seq Num  LSP Checksum  LSP Holdtime      ATT/P/OL
Device.00-00   * 0x00000004   0x8EB2        1192              0/0/0
  Area Address: 49
  NLPID:        0xCC 0x8E
  Hostname: Device
  IPv6 Address: 2002::1
  Metric: 0          IPv6 2002::1/128
```

**Related Commands**

| Command | Description |
|---|---|
| **address-family ipv6** (IS-IS) | Enters address family configuration mode for configuring IS-IS routing sessions that use standard IPv6 address prefixes. |
| **isis advertise-prefix** | Allows the advertising of IP prefixes of connected networks in LSP advertisements per IS-IS interface. |
| **passive-interface** | Suppresses the sending of routing updates through the specified interface. |

# area-password

To configure the Intermediate System-to-Intermediate System (IS-IS) area authentication password, use the **area-password** command in r outer configuration mode. To disable the password, use the **no** form of this command.

**area-password** *password* [**authenticate snp** {**validate**| **send-only**}]

**no area-password** [ *password* ]

**Syntax Description**

| *password* | Password you assign. |
|---|---|
| **authenticate snp** | (Optional) Causes the system to insert the password into sequence number PDUs ( SNPs). |
| **validate** | Causes the system to insert the password into the SNPs and check the password in SNPs that it receives. |
| **send-only** | Causes the system only to insert the password into the SNPs, but not check the password in SNPs that it receives. Use this keyword during a software upgrade to ease the transition. |

**Command Default**    No area password is defined, and area password authentication is disabled.

**Command Modes**    Router configuration

**Command History**

| Release | Modification |
|---|---|
| 10.0 | This command was introduced. |
| 12.0(21)ST | The **authenticate snp**, **validate**, and **send-only** keywords were added. |
| 12.2(11)S | This command was integrated into Cisco IOS Release 12.2(11)S. |
| 12.0(22)S | This command was integrated into Cisco IOS Release 12.0(22)S. |
| 12.2(13)T | This command was integrated into Cisco IOS Release 12.2(13)T. |
| 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**    Using the **area-password** command on all routers in an area will prevent unauthorized routers from injecting false routing information into the link-state database.

This password is exchanged as plain text and thus this feature provides only limited security.

This password is inserted in Level 1 (station router level) PDU link-state packets (LSPs), complete sequence number PDUs (CSNPs), and partial sequence number PDUs (PSNP).

If you do not specify the **authenticate snp** keyword along with either the **validate** or **send-only** keyword, then the IS-IS routing protocol does not insert the password into SNPs.

**Examples**    The following example assigns an area authentication password and specifies that the password be inserted in SNPs and checked in SNPs that the system receives:

```
router isis
 area-password track authenticate snp validate
```

**Related Commands**

| Command | Description |
|---------|-------------|
| **domain-password** | Configures the IS-IS routing domain authentication password. |
| **isis password** | Configures the authentication password for an interface. |

# authentication key-chain

To enable authentication for Intermediate System-to-Intermediate System (IS-IS), use the **authentication key-chain** command in router configuration mode. To disable such authentication, use the **no** form of this command.

**authentication key-chain** *name-of-chain* [**level-1**| **level-2**]

**no authentication key-chain** *name-of-chain* [**level-1**| **level-2**]

**Syntax Description**

| | |
|---|---|
| *name-of-chain* | Enables authentication and specifies the group of keys that are valid. |
| **level-1** | (Optional) Enables authentication for Level 1 packets only. |
| **level-2** | (Optional) Enables authentication for Level 2 packets only. |

**Command Default**

No key chain authentication is provided for IS-IS packets at the router level.

**Command Modes**

Router configuration

**Command History**

| Release | Modification |
|---|---|
| 12.0(21)ST | 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**

If no key chain is configured with the **key chain** command, no key chain authentication is performed.

Key chain authentication could apply to clear text authentication or MD5 authentication. The mode is determined by the authentication mode command .

Only one authentication key chain is applied to IS-IS at one time. That is, if you configure a second **authentication key-chain** command, the first is overridden.

If neither the **level-1**nor **level-2**keyword is configured, the chain applies to both levels.

You can specify authentication for an individual IS-IS interface by using the isis authentication key-chain command.

**Examples**    The following example configures IS-IS to accept and send any key belonging to the key chain named site1:

```
router isis real_secure_network
 net 49.0000.0101.0101.0101.00
 is-type level-1
 authentication mode md5 level-1
 authentication key-chain site1 level-1
```

**Related Commands**

| Command | Description |
|---|---|
| **authentication mode** | Specifies the type of authentication used in IS-IS packets for the IS-IS instance. |
| **isis authentication key-chain** | Enables authentication for an IS-IS interface. |
| **key chain** | Enables authentication for routing protocols. |

# authentication mode

To specify the type of authentication used in Intermediate System-to-Intermediate System (IS-IS) packets for the IS-IS instance, use the **authentication mode** command in router configuration mode. To restore clear text authentication, use the **no** form of this command.

**authentication mode** {**md5**| **text**} [**level-1**| **level-2**]

**no authentication mode**

**Syntax Description**

| md5 | Message Digest 5 (MD5) authentication. |
|---|---|
| text | Clear text authentication. |
| level-1 | (Optional) Enables the specified authentication for Level 1 packets only. |
| level-2 | (Optional) Enables the specified authentication for Level 2 packets only. |

**Command Default**

No authentication is provided for IS-IS packets at the router level by use of this command, although clear text (plain text) authentication could be configured by other means, such as the **area-password** command or the **domain-password** command.

**Command Modes**

Router configuration

**Command History**

| Release | Modification |
|---|---|
| 12.0(21)ST | This command was introduced. |
| 12.2(11)S | This command was integrated into Cisco IOS Release 12.2(11)S. |
| 12.0(22)S | This command was integrated into Cisco IOS Release 12.0(22)S. |
| 12.2(13)T | This command was integrated into Cisco IOS Release 12.2(13)T. |
| 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**   If neither the **level-1**nor **level-2**keyword is configured, the mode applies to both levels.

You can specify the type of authentication and the level to which it applies for a single IS-IS interface, rather than per IS-IS instance, by using the **isis authentication mode** command.

If you had clear text authentication configured by using the **area-password** or **domain-password** command, the **authentication mode** command overrides both of those commands.

If you configure the **authentication mode** command and subsequently try to configure the **area-password** or **domain-password** command, you will not be allowed to do so. If you truly want to configure clear text authentication using the **area-password** or **domain-password** command, you must use the **no authentication mode** command first.

**Examples**   The following example configures for the IS-IS instance that Message Digest 5 (MD5) authentication is performed on Level 1 packets:

```
router isis real_secure_network
 net 49.0000.0101.0101.0101.00
 is-type level-1
 authentication mode md5 level-1
 authentication key-chain site1 level-1
```

**Related Commands**

| Command | Description |
|---|---|
| **area-password** | Configures the IS-IS area authentication password. |
| **authentication key-chain** | Enables authentication for IS-IS packets and specifies the set of keys that can be used on an interface. |
| **domain-password** | Configures the IS-IS routing domain authentication password. |
| **isis authentication mode** | Specifies the type of authentication used for an Intermediate System-to-Intermediate System (IS-IS) interface. |
| **key chain** | Enables authentication for routing protocols. |

# authentication send-only

To specify for the Intermediate System-to-Intermediate System (IS-IS) instance that authentication is performed only on IS-IS packets being sent (not received), use the **authentication send-only** command in router configuration mode. To configure for the IS-IS instance that if authentication is configured at the router level, such authentication be performed on packets being sent and received, use the **no** form of this command.

**authentication send-only** [**level-1**| **level-2**]

**no authentication send-only**

**Syntax Description**

| level-1 | (Optional) Authentication is performed only on Level 1 packets that are being sent (not received). |
|---------|----------------------------------------------------------------------------------------------------|
| level-2 | (Optional) Authentication is performed only on Level 2 packets that are being sent (not received). |

**Command Default**

If authentication is configured at the router level, it applies to IS-IS packets being sent and received.

**Command Modes**

Router configuration

**Command History**

| Release | Modification |
|---------|--------------|
| 12.0(21)ST | This command was introduced. |
| 12.2(11)S | This command was integrated into Cisco IOS Release 12.2(11)S. |
| 12.0(22)S | This command was integrated into Cisco IOS Release 12.0(22)S. |
| 12.2(13)T | This command was integrated into Cisco IOS Release 12.2(13)T. |
| 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**

Use this command before configuring the authentication mode and authentication key chain so that the implementation of authentication goes smoothly. That is, the routers will have more time for the keys to be configured on each router if authentication is inserted only on the packets being sent, not checked on packets being received. After all of the routers that must communicate are configured with this command, enable the

authentication mode and key chain on each router. Then specify the **no**authentication send-only command to disable the send-only feature.

If neither the **level-1**nor **level-2**keyword is configured, the send-only feature applies to both levels.

This command could apply to clear text authentication or Message Digest 5 (MD5) authentication. The mode is determined by the authentication mode command.

**Examples**

The following example configures IS-IS Level 1 packets to use clear text authentication on packets being sent (not received):

```
router isis real_secure_network
 net 49.0000.0101.0101.0101.00
 is-type level-1
 authentication send-only level-1
 authentication mode text level-1
 authentication key-chain site1 level-1
```

**Related Commands**

| Command | Description |
|---|---|
| **authentication key-chain** | Enables authentication for Intermediate System-to-Intermediate System (IS-IS) packets and specifies the set of keys that can be used on an interface. |
| **authentication mode** | Specifies the type of authentication used in Intermediate System-to-Intermediate System (IS-IS) packets for the IS-IS instance. |
| **key chain** | Enables authentication for routing protocols. |

# clear isis lsp-full

To clear the LSPFULL state, use the **clear isis lsp-full**command in privileged EXEC mode.

**clear isis lsp-full**

**Syntax Description**

This command has no arguments or keywords.

**Command Modes**

Privileged EXEC

**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. |

**Usage Guidelines**

If the link-state PDU (LSP) becomes full because too many routes are redistributed, use the **clear isis lsp-full** command to clear the state after the problem has been resolved.

**Examples**

This example clears the LSPFULL state:

```
Router# clear isis lsp-full
```

**Related Commands**

| Command | Description |
|---------|-------------|
| **lsp-full suppress** | Controls which routes are suppressed when the link-state PDU becomes full. |

# clear isis rib redistribution

To clear some or all prefixes in the Intermediate System-to-Intermediate System (IS-IS) redistribution cache, use the **clear isis rib redistribution** command in privileged EXEC mode.

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

## Syntax Description

| level-1 | (Optional) Clears Level 1 IS-IS redistributed prefixes from the redistribution cache. |
|---|---|
| level-2 | (Optional) Clears Level 2 IS-IS redistributed prefixes from the redistribution cache. |
| *network-prefix* | (Optional) The network ID in the A.B.C.D format for the specific network prefix you want to clear from the redistribution Routing Information Base (RIB). If you do not provide a network mask for the prefix, the major net of the prefix will be used for the network mask. |
| *network-mask* | (Optional) The network ID in the A.B.C.D format for the network mask for the specific network prefix you want to clear from the RIB. If you do not provide a network mask for the prefix, the major net of the prefix will be used for the network mask. |

## Command Modes

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. |
| 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |

**Usage Guidelines**  We recommend that you use this command in a troubleshooting situation only when a Cisco Technical Assistance Center representative requests you to do so following a software error.

**Examples**  The following example clears the network prefix 10.1.0.0 from the IP local redistribution cache:

```
Router# clear isis rib redistribution 10.1.0.0 255.255.0.0
```

**Related Commands**

| Command | Description |
|---------|-------------|
| **debug isis rib redistribution** | Debugs the local redistribution cache event. |
| **show isis rib redistribution** | Displays the prefixes in the IS-IS redistribution cache. |

# default-information originate (IS-IS)

To generate a default route into an Intermediate System-to-Intermediate System (IS-IS) routing domain, use the **default-information originate** command in router configuration mode. To disable this feature, use the **no** form of this command.

**default-information originate** [**route-map** *map-name*]

**no default-information originate** [**route-map** *map-name*]

**Syntax Description**

| route-map | *map-name* | (Optional) Routing process will generate the default route if the route map is satisfied. |
|---|---|---|

**Command Default**

This command is disabled by default.

**Command Modes**

Router configuration

**Command History**

| Release | Modification |
|---|---|
| 10.0 | This command was introduced. |
| 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**

If a router configured with this command has a route to 0.0.0.0 in the routing table, IS-IS will originate an advertisement for 0.0.0.0 in its link-state packets (LSPs).

Without a route map, the default is advertised only in Level 2 LSPs. For Level 1 routing, there is another mechanism to find the default route, which is to look for the closest Level 1 or Level 2 router. The closest Level 1 or Level 2 router can be found by looking at the attached-bit (ATT) in Level 1 LSPs.

A route map can be used for two purposes:

- Make the router generate default in its Level 1 LSPs.

- Advertise 0/0 conditionally.

With a **match ip address** *standard-access-list* command, you can specify one or more IP routes that must exist before the router will advertise 0/0.

**Examples**    The following example forces the software to generate a default external route into an IS-IS domain:

```
router isis
! BGP routes will be distributed into IS-IS
redistribute bgp 120
! access list 2 is applied to outgoing routing updates
distribute-list 2 out
default-information originate
! access list 2 defined as giving access to network 10.105.0.0
access-list 2 permit 10.105.0.0 0.0.255.255
```

**Related Commands**

| Command | Description |
|---|---|
| **redistribute (IP)** | Redistributes routes from one routing domain into another routing domain. |
| **show isis database** | Displays the Intermediate System-to-Intermediate System (IS-IS) link-state database. |

# domain-password

To configure the Intermediate System-to-Intermediate System (IS-IS) routing domain authentication password, u se the **domain-password**command in router configuration mode. To disable a password, use the **no** form of this command.

**domain-password** *password* [**authenticate snp** {**validate**| **send-only**}]

**no domain-password** [ *password* ]

**Syntax Description**

| *password* | Password you assign. |
|---|---|
| **authenticate snp** | (Optional) Causes the system to insert the password into SNP protocol data units (PDUs). |
| **validate** | (Optional) Causes the system to insert the password into the SNPs and check the password in SNPs that it receives. |
| **send-only** | (Optional) Causes the system only to insert the password into the SNPs, but not check the password in SNPs that it receives. Use this keyword during a software upgrade to ease the transition. |

**Command Default**

No domain password is specified and no authentication is enabled for exchange of Level 2 routing information.

**Command Modes**

Router configuration

**Command History**

| Release | Modification |
|---|---|
| 10.0 | This command was introduced. |
| 12.0(21)ST | The **authenticate snp**, **validate**, and **send-only** keywords were added. |
| 12.2(11)S | This command was integrated into Cisco IOS Release 12.2(11)S. |
| 12.0(22)S | This command was integrated into Cisco IOS Release 12.0(22)S. |
| 12.2(13)T | This command was integrated into Cisco IOS Release 12.2(13)T. |
| 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |

| Release | Modification |
|---------|--------------|
| 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 password is exchanged as plain text and thus this feature provides only limited security.

This password is inserted in Level 2 (area router level) PDU link-state packets (LSPs), complete sequence number PDUs (CSNPs), and partial sequence number PDUs (PSNPs).

If you do not specify the **authenticate snp** keyword along with either the **validate** or **send-only** keyword, then the IS-IS routing protocol does not insert the password into SNPs.

**Examples**  The following example assigns an authentication password to the routing domain and specifies that the password be inserted in SNPs and checked in SNPs that the system receives:

```
router isis
 domain-password users2j45 authenticate snp validate
```

**Related Commands**

| Command | Description |
|---------|-------------|
| **area-password** | Configures the IS-IS area authentication password. |
| **isis password** | Configures the authentication password for an interface. |

# fast-flood

To fill Intermediate System-to-Intermediate System (IS-IS) link-state packets (LSPs), use the **fast-flood** command in router configuration mode. To disable the fast flooding, use the **no** form of this command.

**fast-flood** [ *lsp-number* ]

**no fast-flood** [ *lsp-number* ]

## Syntax Description

| *lsp-number* | (Optional) The number of LSPs from 1 to 15 to be flooded before shortest path first (SPF) is started. The default is 5 LSPs. |
| --- | --- |

## Command Default

Fast flooding is disabled.

## Command Modes

Router configuration (config-router)

## 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. This command replaces the **ip fast-convergence** command. |
| Cisco IOS XE Release 2.6 | This command was introduced on Cisco ASR 1000 Series Aggregation Services Routers. |
| 15.1(2)S | This command was integrated into Cisco IOS Release 15.1(2)S. |

## Usage Guidelines

The fast-flood command sends a specified number of LSPs from the router. If no LSP number value is specified, the default it 5. The LSPs invoke SPF before running SPF. When you speed up the LSP flooding process, you improve overall network convergence time.

If you are running SPF and if you have configured values shorter than 40 milliseconds for the initial delay that is set by the *seconds* argument of the **incremental-spf** command, the SPF computation might start before the LSP that triggered SPF is flooded to neighbors. The router should always flood, at least, the LSP that triggered SPF before the router runs the SPF computation.

We recommend that you enable the fast flooding of LSPs before the router runs the SPF computation, in order to achieve a faster convergence time.

**Note** Beginning with Cisco IOS Release 12.3(7)T, the **ip fast-convergence** command is replaced with the **fast-flood** command.

**Examples** In the following example, the **fast-flood** command is entered to configure the router to fill the first seven LSPs that invoke SPF, before the SPF computation is started. When the **show running-configuration** command is entered, the output confirms that fast flooding has been enabled on the router.

```
Router# clear isis rib redistribution 10.1.0.0 255.255.0.0
Router> enable
Router# configure terminal
Router(config)# router isis first
Router(config-router)# fast-flood 7
Router(config-router)# end
Router# show running-config
fast-flood 7
```

**Related Commands**

| Command | Description |
|---------|-------------|
| **incremental-spf** | Enables incremental SPF. |

# fast-reroute load-sharing disable

To disable Fast Reroute (FRR) load sharing of prefixes, use the **fast-reroute load-sharing disable** command in router configuration mode. To restore the default setting, use the **no** form of this command.

**fast-reroute load-sharing** {**level-1**| **level-2**} **disable**

**no fast-reroute load-sharing** {**level-1**| **level-2**} **disable**

**Syntax Description**

| level-1 | Specifies Level 1 packets. |
|---------|----------------------------|
| level-2 | Specifies Level 2 packets. |

**Command Default**

Load sharing of prefixes is enabled by default.

**Command Modes**

Router configuration (config-router)

**Command History**

| Release | Modification |
|---------|--------------|
| 15.1(2)S | This command was introduced. |
| Cisco IOS XE Release 3.4S | This command was integrated into Cisco IOS XE Release 3.4S. |

**Usage Guidelines**

You must configure the **router isis** command before you can configure the **fast-reroute load-sharing disable** command.

Load sharing equally distributes the prefixes that use the same protected primary path over the available loop-free alternates (LFAs). An LFA is a next hop that helps a packet reach its destination without looping back.

**Examples**

The following example shows how to disable load sharing of Level 2 prefixes:

```
Router(config)# router isis
Router(router-config)# fast-reroute load-sharing level-2 disable
Router(router-config)# end
```

**Related Commands**

| Command | Description |
|---------|-------------|
| router isis | Enables the IS-IS routing protocol and specifies an IS-IS process. |

# fast-reroute per-prefix

To enable Fast Reroute (FRR) per prefix, use the **fast-reroute per-prefix** command in router configuration mode. To disable the configuration, use the **no** form of this command.

**fast-reroute per-prefix** {**level-1**| **level-2**} {**all**| **route-map** *route-map-name*}

**no fast-reroute per-prefix** {**level-1**| **level-2**} {**all**| **route-map** *route-map-name*}

**Syntax Description**

| level-1 | Enables per-prefix FRR of Level 1 packets. |
|---|---|
| level-2 | Enables per-prefix FRR of Level 2 packets. |
| all | Enables FRR of all primary paths. |
| route-map | Specifies the route map for selecting primary paths for protection. |
| *route-map-name* | Route map name. |

**Command Default**

Fast Reroute per prefix is disabled.

**Command Modes**

Router configuration (config-router)

**Command History**

| Release | Modification |
|---|---|
| 15.1(2)S | This command was introduced. |
| Cisco IOS XE Release 3.4S | This command was integrated into Cisco IOS XE Release 3.4S. |
| 15.2(2)SNI | This command was implemented on the Cisco ASR 901 Series Aggregation Services Routers. |

**Usage Guidelines**

You must configure the **router isis** command before you can configure the **fast-reroute per-prefix** command.

You must configure the **all** keyword to protect all prefixes or configure the **route-map** *route-map-name* keyword and argument pair to protect a selected set of prefixes. When you specify the **all** keyword, all paths are protected, except paths that use interfaces, which are not supported, or interfaces, which are not enabled for protection. Using the **route-map** *route-map-name* keyword and argument pair to specify protected routes provides you with the flexibility to select protected routes, including using administrative tags.

Repair paths forward traffic during a routing transition. Repair paths are precomputed in anticipation of failures so that they can be activated when a failure is detected.

**Examples**    The following example shows how to enable FRR for all Level 2 prefixes:

```
Router(config)# router isis
Router(router-config)# fast-reroute per-prefix level-2 all
Router(router-config)# end
```

**Related Commands**

| Command | Description |
|---------|-------------|
| **router isis** | Enables the IS-IS routing protocol and specifies an IS-IS process. |

# fast-reroute remote-lfa

To configure a fast reroute (FRR) path that redirects traffic to a remote loop-free alternate (LFA) tunnel, use the **fast-reroute remote-lfa** command in router configuration mode. To disable the configuration, use the **no** form of this command.

**fast-reroute remote-lfa** {**level-1**| **level-2**} **mpls-ldp** [**maximum-metric** *metric-value*]

**no fast-reroute remote-lfa** {**level-1**| **level-2**}

**Syntax Description**

| level-1 | Enables LFA FRR of level 1 packets. |
|---------|-------------------------------------|
| level-2 | Enables LFA FRR of level 2 packets. |
| mpls-ldp | Specifies that the tunnel type is MPLS or LDP. |
| maximum-metric *metric-value* | (Optional) Specifies the maximum metric value required to reach the release node. |

**Command Default**

LFA FRR is disabled.

**Command Modes**

Router configuration (config-router)

**Command History**

| Release | Modification |
|---------|--------------|
| 15.2(2)S | This command was introduced. |
| 15.2(2)SNI | This command was implemented on the Cisco ASR 901 Series Aggregation Services Routers. |

**Usage Guidelines**

You must configure the **router isis** command before you can configure the **fast-reroute remote-lfa** command.

**Examples**

The following example shows how to enable LFA FRR for all level 2 packets:

```
Router(config)# router isis
Router(router-config)# fast-reroute remote-lfa level-2 mpls-ldp
```

**Related Commands**

| Command | Description |
|---------|-------------|
| **router isis** | Enables the IS-IS routing protocol and specifies an IS-IS process. |

# fast-reroute tie-break

To configure the Fast Reroute (FRR) tiebreaking priority, use the **fast-reroute tie-break** command in router configuration mode. To disable the configuration, use the **no** form of this command.

**fast-reroute tie-break** {**level-1**| **level-2**} {**downstream**| **linecard-disjoint**| **lowest-backup-path-metric**| **node-protecting**| **primary-path**| **secondary-path**| **srlg-disjoint**} *priority-number*

**no fast-reroute tie-break** {**level-1**| **level-2**} {**downstream**| **linecard-disjoint**| **lowest-backup-path-metric**| **node-protecting**| **primary-path**| **secondary-path**| **srlg-disjoint**}

**Syntax Description**

| | |
|---|---|
| **level-1** | Configures tiebreaking for Level 1 packets. |
| **level-2** | Configures tiebreaking for Level 2 packets. |
| **downstream** | Configures loop-free alternates (LFAs) whose metric to the protected destination is lower than the metric of the protecting node to the destination. |
| **linecard-disjoint** | Configures LFAs that use interfaces that do not exist on the line card of the interface used by the primary path. The default is 40. |
| **lowest-backup-path-metric** | Configures LFAs with the lowest metric to the protected destination. The default is 30. |
| **node-protecting** | Configures LFAs that protect the primary next hop. The default is 50. |
| **primary-path** | Configures the repair path from the Equal Cost Multipath (ECMP) set. The default is 20. |
| **secondary-path** | Configures the non-ECMP repair path. |
| **srlg-disjoint** | Configures LFAs that do not share the same Shared Risk Link Group (SRLG) ID as the primary path. The default is 10. |
| *priority-number* | Priority number. Valid values are from 1 to 255. |

**Command Default**    Tiebreaking is enabled by default.

**Command Modes**    Router configuration (config-router)

## Command History

| Release | Modification |
|---------|-------------|
| 15.1(2)S | This command was introduced. |
| Cisco IOS XE Release 3.4S | This command was integrated into Cisco IOS XE Release 3.4S. |

## Usage Guidelines

You must configure the **router isis** command before you can configure the **fast-reroute tie-break** command.

Tiebreaking configurations are applied per IS-IS instance per address family. The lower the configured priority value, the higher the priority of the rule. The same attribute cannot be configured more than once in the same address family.

The default tiebreaking rules have a priority value of 256. Hence, the tiebreaking rules that you configure will always have a higher priority than the default rule.

Load sharing equally distributes the prefixes that use the same protected primary path over the available LFAs. An LFA is a next hop that helps a packet reach its destination without looping back.

## Examples

The following example shows how to set a tiebreaking priority of 5 for Level 2 packets:

```
Router(config)# router isis
Router(router-config)# fast-reroute tie-break level-1 downstream 150
Router(router-config)# end
```

## Related Commands

| Command | Description |
|---------|-------------|
| **router isis** | Enables the IS-IS routing protocol and specifies an IS-IS process. |

# hello padding

To reenable IS-IS hello padding at the router level, enter the **hello padding**command in router configuration mode. To disable IS-IS hello padding, use the **no** form of this command.

**hello padding**

**no hello padding**

**Syntax Description**     This command has no arguments or keywords.

**Command Default**     IS-IS hello padding is enabled.

**Command Modes**     Router configuration (config-router)

**Command History**

| Release | Modification |
|---------|--------------|
| 12.0(5)T | This command was introduced. |
| 12.0(5)S | This command was integrated into Cisco IOS Release 12.0(5)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. |
| 15.1(2)S | This command was integrated into Cisco IOS Release 15.1(2)S. |

**Usage Guidelines**     Intermediate System-to-Intermediate System (IS-IS) hellos are padded to the full maximum transmission unit (MTU) size. The benefit of padding IS-IS hellos to the full MTU is that it allows for early detection of errors that result from transmission problems with large frames or errors that result from mismatched MTUs on adjacent interfaces.

You can disable hello padding in order to avoid wasting network bandwidth in case the MTU of both interfaces is the same or, in case of translational bridging. While hello padding is disabled, Cisco routers still send the first five IS-IS hellos padded to the full MTU size, in order to maintain the benefits of discovering MTU mismatches.

To disable hello padding for all interfaces on a router for the IS-IS routing process, enter the **no hello padding** command in router configuration mode. To selectively disable hello padding for a specific interface, enter the **no isis hello padding** command in interface configuration mode.

**Examples**     In the following example the **no hello padding** command is used to turn off hello padding at the router level:

```
Router(config)# router isis
Router(config-router)# no hello padding
Router(config-router)# end
```

The **show clns interfaces** command is entered to show that hello padding has been turned off at router level:

```
Router# show clns interface e0/0
Ethernet0/0 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 4 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: Router_B.01
    Level-1 IPv6 Metric: 10
    Number of active level-1 adjacencies: 1
    Level-2 Metric: 10, Priority: 64, Circuit ID: Router_B.01
    Level-2 IPv6 Metric: 10
    Number of active level-2 adjacencies: 1
    Next IS-IS LAN Level-1 Hello in 6 seconds
!   No hello padding
    Next IS-IS LAN Level-2 Hello in 2 seconds
!   No hello padding
```

When the **debug isis adj packets** command is entered, the output will show the IS-IS hello protocol data unit (PDU) length when a hello packet has been sent to or received from an IS-IS adjacency. In the following example the IS-IS hello PDU length is 1497:

```
Router# debug isis adj packets e0/0
IS-IS Adjacency related packets debugging is on
Router_A#
*Oct 11 18:04:17.455: ISIS-Adj: Sending L1 LAN IIH on Ethernet0/0, length 55
*Oct 11 18:04:19.075: ISIS-Adj: Rec L2 IIH from aabb.cc00.6600 (Ethernet0/0), cir type L1L2,
 cir id 0000.0000.000B.01, length 1497
```

**Related Commands**

| Command | Description |
|---|---|
| **debug isis adj packets** | Displays information on all adjacency-related activity such as hello packets sent and received and IS-IS adjacencies going up and down. |
| **isis hello padding** | Reenables IS-IS hello padding at the interface level. |
| **show clns interface** | Lists the CLNS-specific information about each interface. |

# hostname dynamic

To enable IS-IS dynamic hostname capability on the router, use the **hostname dynamic** command in router configuration mode. To disable the dynamic hostname feature, use the **no** form of this command.

**hostname dynamic**

**no hostname dynamic**

**Syntax Description**     This command has no arguments or keywords.

**Command Default**     The dynamic hostname feature is enabled by default.

**Command Modes**     Router configuration

**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 system-ID-to-router-name mapping table.

The dynamic hostname mechanism uses link-state protocol (LSP) flooding to distribute the router-name-to-system-ID mapping information across the entire network. Every router on the network will try to install the system ID-to-router name mapping information in its routing table.

If a router that has been advertising the dynamic name type, length, value (TLV) on the network suddenly stops the advertisement, the mapping information last received will remain in the dynamic host mapping table for up to one hour, allowing the network administrator to display the entries in the mapping entry table during a time when the network experiences problems. Entering the **show isis hostname** command displays the entries in the mapping table.

**Note**     Locally defined mappings are always preferred over dynamicly learned mappings. If you have already configured the **clns host** command to overwrite network advertised name mappings from LSPs, the **clns host** command will take precedence over the dynamic hostname feature.

**Examples**

The following example changes the hostname from Router to RouterA and assigns the NET 49.0001.0000.0000.000b.00 to RouterA. The dynamic hostname feature is disabled by entering the **no hostname dynamic**command. The dynamic hostname feature is then reeanabled by entering the **hostname dynamic**command.

```
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 * symbol signifies that this is the hostname for the local router. The dynamic host mapping table confirms that system ID 0000.0000.000B belongs to a router with the dynamic hostname RouterA. This router is running the IS-IS process named CompanyA.

```
Router# show isis hostname
Level  System ID      Dynamic Hostname    (CompanyA)
    * 0000.0000.000B RouterA
```

**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. |
| **net** | Configures an IS-IS NET for a CLNS or IS-IS routing process. |
| **show isis hostname** | Displays the entries of the dynamic host mapping table. |

# ip fast-convergence

**Note**   Effective with Release 12.3(7)T, the **ip fast-convergence**command is replaced by the **fast-flood** command. See the **fast-flood** command for more information.

To reduce packet loss when the metric of a path is changed, or to fast-flood Intermediate System-to-Intermediate System (IS-IS) link-state packets (LSPs), use the **ip fast-convergence** command in router configuration mode. To disable packet loss reduction or fast-flooding, use the **no** version of this command.

**ip fast-convergence**

**no ip fast-convergence**

**Syntax Description**   This command has no arguments or keywords.

**Command Default**   This command is disabled by default.

**Command Modes**   Router configuration

**Command History**

| Release | Modification |
|---|---|
| 12.2(8)T | This command was introduced to reduce packet loss. |
| 12.2(10)T | This command was modified to enable fast-flooding. |
| 12.3(7)T | This command was replaced by the **fast-flood** command. |

**Usage Guidelines**   To reduce packet loss when the metric of a path is changed, use the **ip fast-convergence** command. Entering the **ip fast-convergence** command is especially helpful when Multiprotocol Label Switching (MPLS) traffic engineering with Fast Reroute (FRR) is deployed.

If you are running Cisco IOS Release 12.2(11)T or a later release, you can enter the **ip fast-convergence** command to configure the router to flood the first five LSPs that invoke shortest path first (SPF) before running SPF. When you speed up the LSP flooding process, you improve overall network convergence time. We recommend that you enable the fast-flooding of LSPs before the router runs the SPF computation, in order to achieve a faster convergence time.

**Examples**   In the following example, the **ip fast-convergence** command is entered to configure the router to flood the first five LSPs that invoke SPF, before the SPF computation is started. When the **show running-configuration** command is entered, the output confirms that fast-flooding has been enabled on the router.

```
Router> enable
```

```
Router# configure terminal
Router(config)# router isis
Router(config-router)# ip fast-convergence
Router(config-router)# end
Router# show running-config
fast-flood
```

**Related Commands**

| Command | Description |
|---|---|
| **incremental-spf** | Enables incremental SPF. |

# ip route priority high

To assign a high priority to an Integrated Intermediate System-to-Intermediate System (IS-IS) IP prefix, use the **ip route priority high**command in router configuration mode. To remove the IP prefix priority, use the **no** form of this command.

**ip route priority high tag** *tag-value*

**no ip route priority high tag** *tag-value*

**Syntax Description**

| | |
|---|---|
| **tag** *tag-value* | Assigns a high priority to IS-IS IP prefixes with a specific route tag in a range from 1 to 4294967295. |

**Command Default**

No IP prefix priority is set.

**Command Modes**

Router configuration

**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**

When you use the **ip route priority high** command to tag higher priority IS-IS IP prefixes for faster processing and installation in the global routing table, you can achieve faster convergence. For example, you can help Voice over IP (VoIP) gateway addresses get processed first to help VoIP traffic get updated faster than other types of packets.

**Examples**

The following example uses the **ip route priority high** command to assign a tag value of 100 to the IS-IS IP prefix:

```
Router>
enable
Router# configure terminal
```

```
Router(config)# interface Ethernet 0
Router(config-if)# ip router isis
Router(config-if)# isis tag 100
!
Router(config)# router isis
Router(config-router)# ip route priority high tag 100
!
```

**Related Commands**

| Command | Description |
|---|---|
| **debug isis rib** | Displays debug information for IP Version 4 routes within the global or IS-IS local RIB. |
| **show isis rib** | Displays paths for routes in the IP Version 4 IS-IS local RIB. |

# ip router isis

To configure an Intermediate System-to-Intermediate System (IS-IS) routing process for IP on an interface and to attach an area designator to the routing process, use the **ip router isis** command in interface configuration mode. To disable IS-IS for IP, use the **no**form of the command.

**ip router isis** *area-tag*

**no ip router isis** *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 (CLNS) router processes for a given router. |
| --- | --- |
| | Required for multiarea IS-IS configuration. Optional for conventional IS-IS configuration. |
| | **Note**     Each area in a multiarea configuration should have a nonnull area tag to facilitate identification of the area. |

**Command Default**

No routing processes are specified.

**Command Modes**

Interface configuration (config-if)

**Command History**

| Release | Modification |
| --- | --- |
| 10.0 | This command was introduced. |
| 12.0(5)T | Multiarea functionality was added, changing the way the *tag* argument (now *area-tag*) 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. |
| 12.2(33)SRB | Support for IPv6 was added. |
| 12.2(33)SB | Support for IPv6 was added. |
| 12.2(33)SXI | This command was integrated into Cisco IOS Release 12.2(33)SXI. |
| 15.1(2)S | This command was integrated into Cisco IOS Release 15.1(2)S. |

**Usage Guidelines**

Before the IS-IS routing process is useful, a network entity title (NET) must be assigned with the **net** command and some interfaces must have IS-IS enabled.

If you have IS-IS running and at least one International Organization for Standardization 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 process to perform Level 2 (interarea) routing. If Level 2 routing is configured on any process, all additional processes are automatically configured as Level 1. You can configure this process to perform intra-area (Level 1) routing at the same time. You can configure up to 29 additional processes as Level 1-only processes. Use the **is-type** command to remove Level 2 routing from a router instance. You can then use the **is-type** command to enable Level 2 routing on some other IS-IS router instance.

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.

**Examples**

The following example specifies IS-IS as an IP routing protocol for a process named Finance, and specifies 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 an IS-IS configuration with two Level 1 areas and one Level 1-2 area:

```
ip routing
.
.
.
interface Tunnel529
 ip address 10.0.0.5 255.255.255.0
 ip router isis BB
interface Ethernet1
 ip address 10.1.1.5 255.255.255.0
 ip router isis A3253-01
!
interface Ethernet2
 ip address 10.2.2.5 255.255.255.0
 ip router isis A3253-02
.
.
.
! Defaults to "is-type level-1-2"
router isis BB
 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 IS-IS routing process. |
| **net** | Configures an IS-IS NET for a CLNS routing process. |
| **router isis** | Enables the IS-IS routing protocol. |

# isis advertise-prefix

To allow the advertising of IP prefixes of connected networks in link-state packet (LSP) advertisements per Intermediate System-to-Intermediate System (IS-IS) interface, use the **isis advertise-prefix** command in interface configuration mode. To prevent IP prefixes of connected networks from being advertised, use the **no** form of this command.

**isis advertise-prefix**

**no isis advertise-prefix**

**Syntax Description**   This command has no arguments or keywords.

**Command Default**   Enabled; IP prefixes are advertised.

**Command Modes**   Interface configuration

**Command History**

| Release | Modification |
|---|---|
| 12.0(22)S | This command was introduced. |
| 12.3(2)T | This command was integrated into Cisco IOS Release 12.2(27)SBC. |
| 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**   The **no isis advertise-prefix** command is an IS-IS mechanism to exclude IP prefixes of connected networks from LSP advertisements, thereby reducing IS-IS convergence time.

Configuring the **no** form of this command per IS-IS interface is a small-scale solution to reduce IS-IS convergence time because fewer prefixes will be advertised in the router nonpseudonode LSP.

An alternative the **isis advertise-prefix** command is the **advertise-passive-only** command. The latter command is a scalable solution because it is configured per IS-IS instance.

**Examples**   The following example uses the **no isis advertise-prefix** command on Ethernet interface 0. Only the IP address of loopback interface 0 is advertised.

```
!
interface loopback 0
```

```
 ip address 192.168.10.1 255.255.255.255
 no ip directed-broadcast
!
interface Ethernet 0
 ip address 192.168.20.1 255.255.255.0
 no ip directed-broadcast
 ip router isis
 no isis advertise-prefix
!
.
.
.
!
router isis
 passive-interface loopback 0
 net 47.0004.004d.0001.0001.0c11.1111.00
 log-adjacency-changes
!
```

**Related Commands**

| Command | Description |
|---|---|
| **advertise-passive-only** | Configures the IS-IS instance to advertise only prefixes that belong to passive interfaces. |

# isis authentication key-chain

To enable authentication for an Intermediate System-to-Intermediate System (IS-IS) interface, use the **isis authentication key-chain** command in interface configuration mode. To disable such authentication, use the **no** form of this command.

**isis authentication key-chain** *name-of-chain* [**level-1**| **level-2**]

**no isis authentication key-chain** *name-of-chain* [**level-1**| **level-2**]

**Syntax Description**

| *name-of-chain* | Enables authentication and specifies the group of keys that are valid. |
|---|---|
| **level-1** | (Optional) Enables authentication for Level 1 packets only. |
| **level-2** | (Optional) Enables authentication for Level 2 packets only. |

**Command Default**

No key chain authentication is configured for a specific IS-IS interface, although it might be configured at the IS-IS instance level.

**Command Modes**

Interface configuration

**Command History**

| Release | Modification |
|---|---|
| 12.0(21)ST | This command was introduced. |
| 12.2(11)S | This command was integrated into Cisco IOS Release 12.2(11)S. |
| 12.0(22)S | This command was integrated into Cisco IOS Release 12.0(22)S. |
| 12.2(13)T | This command was integrated into Cisco IOS Release 12.2(13)T. |
| 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**

If no key chain is configured with the **key chain** command, no key chain authentication is performed.

Only one authentication key chain is applied to an IS-IS interface at one time. That is, if you configure a second **isis authentication key-chain** command, the first is overridden.

If neither the **level-1**nor **level-2**keyword is configured, the chain applies to both levels.

You can specify authentication for an entire instance of IS-IS instead of at the interface level by using the authentication key-chain command.

**Examples**

The following example configures Ethernet interface 0 to accept and send any key belonging to the key chain named second:

```
interface Ethernet0
 ip address 10.1.1.1 255.255.255.252
 ip router isis real_secure_network
 isis authentication mode md5 level-1
 isis authentication key-chain second level-1
```

**Related Commands**

| Command | Description |
|---|---|
| **authentication key-chain** | Enables authentication for IS-IS at the instance level. |
| **key chain** | Enables authentication for routing protocols. |

# isis authentication mode

To specify the type of authentication used for an Intermediate System-to-Intermediate System (IS-IS) interface, use the **isis authentication mode** command in interface configuration mode. To restore clear text authentication, use the **no** form of this command.

**isis authentication mode** {**md5**| **text**} [**level-1**| **level-2**]

**no isis authentication mode**

**Syntax Description**

| md5 | Message Digest 5 (MD5) authentication. |
|-----|-----|
| text | Clear text authentication. |
| level-1 | (Optional) Enables the specified authentication on the interface for Level 1 packets only. |
| level-2 | (Optional) Enables the specified authentication on the interface for Level 2 packets only. |

**Command Default**

No authentication is provided for IS-IS packets on an interface level, although authentication could be provided at the IS-IS instance level by several means.

**Command Modes**

Interface configuration

**Command History**

| Release | Modification |
|---------|--------------|
| 12.0(21)ST | This command was introduced. |
| 12.2(11)S | This command was integrated into Cisco IOS Release 12.2(11)S. |
| 12.0(22)S | This command was integrated into Cisco IOS Release 12.0(22)S. |
| 12.2(13)T | This command was integrated into Cisco IOS Release 12.2(13)T. |
| 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**

If neither the **level-1**nor **level-2**keyword is configured, the mode applies to both levels.

If you had clear text authentication configured by using the **area-password** or **domain-password** command, the **authentication mode** command overrides both of those commands.

If you configure the **isis authentication mode** command and subsequently try to configure the **area-password** or **domain-password** command, you will not be allowed to do so. If you truly want to configure clear text authentication using the **area-password** or **domain-password** command, you must use the **no isis authentication mode** command first.

You can specify the type of authentication and the level to which it applies for the entire IS-IS instance, rather than per interface, by using the authentication mode command.

**Examples**     The following example configures IS-IS Level 2 packets to use MD5 authentication on Ethernet interface 0:

```
interface Ethernet0
 ip address 10.1.1.1 255.255.255.252
 ip router isis real_secure_network
 isis authentication mode md5 level-2
 isis authentication key-chain cisco level-2
```

**Related Commands**

| Command | Description |
|---|---|
| **area-password** | Configures the IS-IS area authentication password. |
| **authentication mode** | Specifies the type of authentication used in IS-IS packets for the IS-IS instance. |
| **domain-password** | Configures the IS-IS routing domain authentication password. |
| **key chain** | Enables authentication for routing protocols. |

# isis authentication send-only

To specify that authentication is performed only on packets being sent (not received) on a specified Intermediate System-to-Intermediate System (IS-IS) interface, use the **isis authentication send-only** command in interface configuration mode. To restore the default value, use the **no** form of this command.

**isis authentication send-only** [**level-1**| **level-2**]

**no isis authentication send-only**

**Syntax Description**

| level-1 | (Optional) Authentication is performed only on Level 1 packets that are being sent (not received). |
|---------|---------------------------------------------------------------------------------------------------|
| level-2 | (Optional) Authentication is performed only on Level 2 packets that are being sent (not received). |

**Command Default**

If MD5 authentication is configured at the interface level, it applies to IS-IS packets being sent and received over all interfaces.

**Command Modes**

Interface configuration

**Command History**

| Release | Modification |
|---------|--------------|
| 12.0(21)ST | 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**

Use this command before configuring the authentication mode and authentication key chain so that the implementation of authentication goes smoothly. That is, the routers will have more time for the keys to be configured on each router if authentication is inserted only on the packets being sent, not checked on packets being received. After all of the routers that must communicate are configured with this command, enable the authentication mode and key chain on each router. Then specify the **no isis authentication send-only** command to disable the send-only feature.

If neither the **level-1**nor **level-2**keyword is configured, the send-only feature applies to both levels.

**Examples**     The following example configures IS-IS Level-1 packets to use MD5 authentication on packets being sent (not received) on Ethernet interface 0:

```
interface Ethernet0
 ip address 10.1.1.1 255.255.255.252
 ip router isis real_secure_network
 isis authentication send-only level-1
 isis authentication mode md5 level-1
 isis authentication key-chain cisco level-1
```

**Related Commands**

| Command | Description |
|---|---|
| **isis authentication key-chain** | Enables authentication for IS-IS packets and specifies the set of keys that can be used on an interface. |
| **isis authentication mode** | Specifies the type of authentication used in IS-IS packets for the interface. |
| **key chain** | Enables authentication for routing protocols. |

# isis bfd

To enable or disable Bidirectional Forwarding Detection (BFD) on a specific interface configured for Intermediate System-to-Intermediate System (IS-IS), use the **isis bfd**command in interface configuration mode. To disable BFD on the IS-IS interface, use the **disable** keyword. To remove the **isis bfd** command, use the **no** form of this command.

**isis bfd [disable]**

**no isis bfd**

**Syntax Description**

| disable | (Optional) Disables BFD for IS-IS on a specified interface. |
|---------|------------------------------------------------------------|

**Command Default**

When the **disable** keyword is not used, the default behavior is to enable BFD support for IS-IS on the interface.

**Command Modes**

Interface configuration

**Command History**

| Release | Modification |
|---------|--------------|
| 12.2(18)SXE | This command was introduced. |
| 12.0(31)S | This command was integrated into Cisco IOS Release 12.0(31)S. |
| 12.4(4)T | This command was integrated into Cisco IOS Release 12.4(4)T. |
| 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |

**Usage Guidelines**

Enter the **isis bfd** command in interface mode to configure an IS-IS interface to use BFD for failure detection. If you have used the **bfd-all interfaces** command in router configuration mode to globally configure all IS-IS interfaces for an IS-IS process to use BFD, you can enter the **isis bfd** command with the **disable** keyword in interface configuration mode to disable BFD for a specific IS-IS interface.

Entering the **no isis bfd** command will remove the command. In that case, whether or not an IS-IS interface for a particular IS-IS process is registered with the BFD protocol will depend on whether or not you have entered the **bfd all-interfaces** command in router configuration mode for the specific IS-IS process.

**Examples**

In the following example, the interface associated with OSPF, Fast Ethernet interface 3/0, is configured for BFD:

```
Router> enable
Router# configure terminal
```

```
Router(config)# interface fastethernet 3/0
Router(config-if)# isis bfd
Router(config-if)# end
```

**Related Commands**

| Command | Description |
|---------|-------------|
| **bfd all-interfaces** | Enables BFD for all interfaces for a BFD peer. |

# isis ipv6 bfd

To enable or disable IPv6 Bidirectional Forwarding Detection (BFD) on a specific interface configured for Intermediate System-to-Intermediate System (IS-IS), use the **isis ipv6 bfd** command in interface configuration mode. To remove the IPv6 BFD configuration from the interface, use the **no** form of this command.

**isis ipv6 bfd[disable]**

**noisis ipv6 bfd[disable]**

**Syntax Description**

| | |
|---|---|
| **disable** | (Optional) Disables IPv6 BFD for IS-IS on a specified interface. |

**Command Default**

IPv6 BFD support for IS-IS is enabled on the interface.

**Command Modes**

Interface configuration (config-if)#

**Command History**

| Release | Modification |
|---|---|
| Cisco IOS XE Release 3.7S | This command was introduced. |
| 15.2(4)S | This command was integrated into Cisco IOS Release 15.2(4)S. |

**Usage Guidelines**

Enter the **isis ipv6 bfd** command in interface configuration mode to configure an IS-IS interface to use IPv6 BFD for failure detection. If you have used the **bfd all-interfaces** command in router configuration mode to globally configure all IS-IS interfaces for an IS-IS process to use BFD, you can enter the **isis ipv6 bfd** command with the **disable** keyword in interface configuration mode to disable BFD for a specific IS-IS interface.

Entering the **no isis ipv6 bfd** command will remove the configuration from this IS-IS interface. In this case, whether or not an IS-IS interface for a particular IS-IS process is registered with the BFD protocol will depend on whether or not you have entered the **bfd all-interfaces** command in router configuration mode for the specific IS-IS process.

**Examples**

The following example enables IPv6 BFD on an IS-IS interface:

```
Device(config)# interface GigabitEthernet 0/0/1
Device(config-if)# isis ipv6 bfd
```

**Related Commands**

| Command | Description |
| --- | --- |
| **ipv6 route priority high** | Assigns a high priority to an IS-IS IPv6 prefix. |
| **redistribute isis** (IPv6) | Redistributes IPv6 routes from one routing domain into another, using IS-IS as both the target and source protocol. |
| **show isis database verbose** | Displays additional information about the IS-IS database. |
| **summary-prefix** (IPv6 IS-IS) | Configures aggregate IPv6 prefixes for IS-IS. |

# isis circuit-type

To configure the type of adjacency , use the **isis circuit-type**command in interface configuration mode. To reset the circuit type to Level l and Level 2, use the **no**form of this command.

**isis circuit-type** [**level-1**| **level-1-2**| **level-2-only**]

**no isis circuit-type**

**Syntax Description**

| level-1 | (Optional) Configures a router for Level 1 adjacency only. |
|---|---|
| level-1-2 | (Optional) Configures a router for Level 1 and Level 2 adjacency. |
| level-2-only | (Optional) Configures a router for Level 2 adjacency only. |

**Command Default**

A Level 1 and Level 2 adjacency is established.

**Command Modes**

Interface 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**

Normally, this command need not be configured. The proper way is to configure a router as a Level 1-only, Level 1-2, or Level 2-only system. Only on routers that are between areas (Level 1-2 routers) should you configure some interfaces to be Level 2-only to prevent wasting bandwidth by sending out unused Level 1 hello packets. Note that on point-to-point interfaces, the Level 1 and Level 2 hellos are in the same packet.

A Level 1 adjacency may be established if there is at least one area address in common between this system and its neighbors. Level 2 adjacencies will never be established over this interface.

A Level 1 and Level 2 adjacency is established if the neighbor is also configured as **level-1-2** and there is at least one area in common. If there is no area in common, a Level 2 adjacency is established. This is the default.

Level 2 adjacencies are established if the other routers are Level 2 or Level 1-2 routers and their interfaces are configured for Level 1-2 or Level 2. Level 1 adjacencies will never be established over this interface.

**Examples**

In the following example, other routers on Ethernet interface 0 are in the same area. Other routers on Ethernet interface 1 are in other areas, so the router will stop sending Level 1 hellos.

```
interface ethernet 0
ip router isis
interface ethernet 1
 isis circuit-type level-2-only
```

# isis csnp-interval

To configure the Intermediate System-to-Intermediate System (IS-IS) complete sequence number PDUs (CSNPs) interval, use the **isis csnp-interval**command in interface configuration mode. To restore the default value, use the **no**form of this command.

**isis csnp-interval** *seconds* [**level-1**| **level-2**]

**no isis csnp-interval** [**level-1**| **level-2**]

**Syntax Description**

| | |
|---|---|
| *seconds* | Interval of time between transmission of CSNPs on multiaccess networks. This interval only applies for the designated router. The default is 10 seconds. The range is from 0 to 65535. |
| **level-1** | (Optional) Configures the interval of time between transmission of CSNPs for Level 1 independently. |
| **level-2** | (Optional) Configures the interval of time between transmission of CSNPs for Level 2 independently. |

**Command Default**

10 seconds Level 1 and Level 2

**Command Modes**

Interface 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**

It is very unlikely you will need to change the default value of this command.

This command applies only for the designated router (DR) for a specified interface. Only DRs send CSNP packets in order to maintain database synchronization. The CSNP interval can be configured independently for Level 1 and Level 2. Configuring the CSNP interval does not apply to serial point-to-point interfaces. It does apply to WAN connections if the WAN is viewed as a multiaccess meshed network.

For multiaccess WAN interfaces such as ATM, Frame Relay, and X.25, we highly recommend that you configure the nonbroadcast multiaccess (NBMA) cloud as multiple point-to-point subinterfaces. Doing so will make routing much more robust if one or more permanent virtual circuits (PVCs) fails.

The **isis csnp-interval** command on point-to-point subinterfaces should be used only in combination with the IS-IS mesh-group feature.

**Examples**
The following example configures Ethernet interface 0 for sending CSNPs every 30 seconds:

```
interface ethernet 0
 isis csnp-interval 30 level-1
```

# isis display delimiter

To make output from multiarea displays easier to read by specifying the delimiter to use to separate displays of information, use t he **isis display delimiter** command in global configuration mode. To disable this output format, use the **no** form of the command.

**isis display delimiter** [**return** *count*| *character count*]

**no isis display delimiter** [**return** *count*| *character count*]

**Syntax Description**

| **return** | (Optional) Delimit with carriage returns. |
|---|---|
| *count* | (Optional) Number of carriage returns or length of string to use for the delimiter. |
| *character* | (Optional) Character to use for the delimiter string. |

**Command Default**

The **isis display delimiter** command is disabled by default.

**Command Modes**

Global 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**

Use this command to customize display output when the IS-IS multiarea feature is used. The **isis display delimiter** command displays the output from different areas as a string or additional white space.

**Examples**

The following command causes different areas in multiarea displays (such as **show** command output) to be delimited by a string of dashes (-):

```
isis display delimiter - 14
```

With three IS-IS neighbors configured, this command displays the following output from the **show clns neighbors** command:

```
Router# show clns neighbors
--------------
Area L2BB:
System Id       Interface   SNPA                State  Holdtime  Type Protocol
0000.0000.0009 Tu529       172.21.39.9         Up     25        L1L2 IS-IS
--------------
Area A3253-01:
System Id       Interface   SNPA                State  Holdtime  Type Protocol
0000.0000.0053 Et1         0060.3e58.ccdb      Up     22        L1   IS-IS
0000.0000.0003 Et1         0000.0c03.6944      Up     20        L1   IS-IS
--------------
Area A3253-02:
System Id       Interface   SNPA                State  Holdtime  Type Protocol
0000.0000.0002 Et2         0000.0c03.6bc5      Up     27        L1   IS-IS
0000.0000.0053 Et2         0060.3e58.ccde      Up     24        L1   IS-IS
```

**Related Commands**

| Command | Description |
|---------|-------------|
| **show clns es-neighbors** | Lists the ES neighbors that this router knows. |
| **show clns is-neighbors** | Displays IS-IS related information for IS-IS router adjacencies. |
| **show clns neighbors** | Displays both ES and IS neighbors. |
| **show isis database** | Displays the IS-IS link-state database. |
| **show isis routes** | Displays the IS-IS Level 1 forwarding table for IS-IS learned routes. |
| **show isis spf-log** | Displays how often and why the router has run a full SPF calculation. |
| **show isis topology** | Displays a list of all connected routers in all areas. |

# isis hello padding

To reenable Intermediate System-to-Intermediate System (IS-IS) hello padding at the interface level, enter the **isis hello padding**command ininterface configuration mode. To disable IS-IS hello padding, use the **no** form of this command.

**isis hello padding**

**no isis hello padding**

**Command Default**    IS-IS hello padding is enabled.

**Command Modes**    Interface configuration

**Command History**

| Release | Modification |
|---------|--------------|
| 12.0(5)T | This command was introduced. |
| 12.0(5)S | This command was integrated into Cisco IOS Release 12.0(5)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**    Intermediate System-to-Intermediate System (IS-IS) hellos are padded to the full maximum transmission unit (MTU) size. The benefit of padding IS-IS hellos to the full MTU is that it allows for early detection of errors that result from transmission problems with large frames or errors that result from mismatched MTUs on adjacent interfaces.

You can disable hello padding in order to avoid wasting network bandwidth in case the MTU of both interfaces is the same or, in case of translational bridging. While hello padding is disabled, Cisco routers still send the first five IS-IS hellos padded to the full MTU size, in order to maintain the benefits of discovering MTU mismatches.

To selectively disable hello padding for a specific interface, enter the **no isis hello padding** command in interface configuration mode. To disable hello padding for all interfaces on a router for the IS-IS routing process, enter the **no hello padding** command in router configuration mode.

**Examples**    To turn off hello padding at the interface level for the Ethernet interface 0/0, enter the **no isis hello padding** command in interface configuration mode:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# interface e0/0
```

```
Router(config-if)# no isis hello padding
Router(config-if)# end
```

When the **show clns neighbor** command is entered for Ethernet interface 0/0, the output confirms that hello padding has been turned off for both Level 1 and Level 2 circuit types:

```
Router# show clns interface e0/0
Ethernet0/0 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 47 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: Router_B.01
    Level-1 IPv6 Metric: 10
    Number of active level-1 adjacencies: 1
    Level-2 Metric: 10, Priority: 64, Circuit ID: Router_B.01
    Level-2 IPv6 Metric: 10
    Number of active level-2 adjacencies: 1
    Next IS-IS LAN Level-1 Hello in 2 seconds
!   No hello padding
    Next IS-IS LAN Level-2 Hello in 2 seconds
!   No hello padding
```

When the **debug isis adj packets** command is entered, the output will show the IS-IS hello protocol data unit (PDU) length when a hello packet has been sent to or received from an IS-IS adjacency. In the following example the IS-IS hello PDU length is 1497:

```
Router# debug isis adj packets e0/0
IS-IS Adjacency related packets debugging is on
Router#
*Oct 11 18:04:17.455: ISIS-Adj: Sending L1 LAN IIH on Ethernet0/0, length 55
*Oct 11 18:04:19.075: ISIS-Adj: Rec L2 IIH from aabb.cc00.6600 (Ethernet0/0), cir type L1L2,
 cir id 0000.0000.000B.01, length 1497
```

**Related Commands**

| Command | Description |
|---|---|
| **hello padding** | Reenables IS-IS hello padding at the router level. |
| **debug isis adj packets** | Displays information on all adjacency-related activity such as hello packets sent and received and IS-IS adjacencies going up and down. |
| **show clns interface** | Lists the CLNS-specific information about each interface. |

# isis hello-interval

To specify the length of time between hello packets that the Cisco IOS software sends, use the **isis hello-interval** command in interface configuration mode. To restore the default value, use the **no** form of this command.

**isis hello-interval** {*seconds*| **minimal**} [**level-1**| **level-2**]

**no isis hello-interval** [**level-1**| **level-2**]

**Syntax Description**

| | |
|---|---|
| *seconds* | Length of time between hello packets, in seconds. By default, a value three times the hello interval *seconds* is advertised as the hold time in the hello packets sent. (Change the multiplier of 3 by specifying the **isis hello-multiplier** command.) With smaller hello intervals, topological changes are detected faster, but there is more routing traffic. The default is 10. The range is from 0 to 65535.<br><br>**Note**  On designated intermediate system (DIS) interfaces, only one third of the configured value is used. The full value of the configured hello intervals is used only by non-DIS interfaces. |
| **minimal** | Causes the system to compute the hello interval based on the hello multiplier (specified by the **isis hello-multiplier** command) so that the resulting hold time is 1 second. |
| **level-1** | (Optional) Configures the hello interval for Level 1 independently. Use this on X.25, Switched Multimegabit Data Service (SMDS), and Frame Relay multiaccess networks. |
| **level-2** | (Optional) Configures the hello interval for Level 2 independently. Use this on X.25, SMDS, and Frame Relay multiaccess networks. |

**Command Default**

The hello interval is 10 seconds for non-DIS interfaces, and 3.333 seconds for DIS interfaces. The hello interval is configured for both Level 1 and Level 2.

**Command Modes**

Interface configuration (config-if)

**Command History**

| Release | Modification |
|---|---|
| 10.0 | This command was introduced. |
| 12.0(5)T | The **minimal** keyword was added. |
| 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 hello interval multiplied by the hello multiplier equals the hold time. If the **minimal** keyword is specified, the hold time is 1 second and the system computes the hello interval based on the hello multiplier.

The hello interval can be configured independently for Level 1 and Level 2, except on serial point-to-point interfaces. (Because only a single type of hello packet is sent on serial links, it is independent of Level 1 or Level 2.) The **level-1** and **level-2** keywords are used on X.25, SMDS, and Frame Relay multiaccess networks or on LAN interfaces.

A faster hello interval gives faster convergence, but increases bandwidth and CPU usage. It might also add to instability in the network. A slower hello interval saves bandwidth and CPU usage. Especially when used in combination with a higher hello multiplier, configuration of the slower hello interval may increase overall network stability. When the hello interval is configured on DIS interfaces, only one third of the interval value is used. Therefore, the hold time (hello interval multiplied by the hello multiplier) for DIS interfaces will also be one third the hold time for non-DIS interfaces.

Although a slower hello interval saves bandwidth and CPU usage, there are some situations when a faster hello interval is preferred. In the case of a large configuration that uses Traffic Engineering (TE) tunnels, if the TE tunnel uses ISIS as the Interior Gateway Protocol (IGP), and the IP routing process is restarted at the router at the ingress point of the network (headend), then all the TE tunnels get resignaled with the default hello interval. A faster hello interval prevents this resignaling. To configure a faster hello interval, you need to increase the ISIS hello interval manually using the **isis hello-interval** command.

It makes more sense to tune the hello interval and hello multiplier on point-to-point interfaces than on LAN interfaces.

**Examples**

The following example configures serial interface 0 to advertise hello packets every 5 seconds. The router is configured to act as a station router. This configuration will cause more traffic than the traffic generated by configuring a longer interval, but topological changes will be detected earlier.

```
interface serial 0
 isis hello-interval 5 level-1
```

**Related Commands**

| Command | Description |
|---|---|
| **isis hello-multiplier** | Specifies the number of IS-IS hello packets that a neighbor must miss before the router should declare the adjacency as down. |

# isis hello-multiplier

To specify the number of Intermediate System-to-Intermediate System (IS-IS) hello packets a neighbor must miss before the router should declare the adjacency as down, use the **isis hello-multiplier** command in interface configuration mode. To restore the default value, use the **no** form of this command.

**isis hello-multiplier** *multiplier* [**level-1**| **level-2**]

**no isis hello-multiplier** [**level-1**| **level-2**]

**Syntax Description**

| | |
|---|---|
| *multiplier* | Integer value from 3 to 1000. The advertised hold time in IS-IS hello packets will be set to the hello multiplier times the hello interval. Neighbors will declare an adjacency to this router down after not having received any IS-IS hello packets during the advertised hold time. The hold time (and thus the hello multiplier and the hello interval) can be set on a per-interface basis, and can be different between different routers in one area. |
| | Using a smaller hello multiplier will give fast convergence, but can result in more routing instability. Increment the hello multiplier to a larger value to help network stability when needed. Never configure a hello multiplier lower than the default value of 3. |
| **level-1** | (Optional) Configures the hello multiplier independently for Level 1 adjacencies. |
| **level-2** | (Optional) Configures the hello multiplier independently for Level 2 adjacencies. |

**Command Default**   *multiplier* : 3 Level 1 and Level 2

**Command Modes**   Interface 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 "holding time" carried in an IS-IS hello packet determines how long a neighbor waits for another hello packet before declaring the neighbor to be down. This time determines how quickly a failed link or neighbor is detected so that routes can be recalculated.

Use the **isis hello-multiplier** command in circumstances where hello packets are lost frequently and IS-IS adjacencies are failing unnecessarily. You can raise the hello multiplier and lower the hello interval (**isis hello-interval** command) correspondingly to make the hello protocol more reliable without increasing the time required to detect a link failure.

On point-to-point links, there is only one hello for both Level 1 and Level 2, so different hello multipliers should be configured only for multiaccess networks such as Ethernet and FDDI. Separate Level 1 and Level 2 hello packets are also sent over nonbroadcast multiaccess (NBMA) networks in multipoint mode, such as X.25, Frame Relay, and ATM. However, we recommend that you run IS-IS over point-to-point subinterfaces over WAN NBMA media.

**Examples**   In the following example, the network administrator wants to increase network stability by making sure an adjacency will go down only when many (ten) hello packets are missed. The total time to detect link failure is 60 seconds. This configuration will ensure that the network remains stable, even when the link is fully congested.

```
interface serial 1
 ip router isis
 isis hello-interval 6 level-1
 isis hello-multiplier 10 level-1
```

**Related Commands**

| Command | Description |
|---|---|
| **isis hello-interval** | Specifies the length of time between hello packets that the Cisco IOS software sends. |

# isis lsp-interval

To configure the time delay between successive Intermediate System-to-Intermediate System (IS-IS) link-state packet (LSP) transmissions, use the **isis lsp-interval** command in interface configuration mode. To restore the default value, use the **no** form of this command.

**isis lsp-interval** *milliseconds*

**no isis lsp-interval**

**Syntax Description**

| *milliseconds* | Time delay between successive LSPs (in milliseconds). |
|---|---|

**Command Default**   The default time delay is 33 milliseconds.

**Command Modes**   Interface configuration

**Command History**

| Release | Modification |
|---|---|
| 11.1 | 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**   In topologies with a large number of IS-IS neighbors and interfaces, a router may have difficulty with the CPU load imposed by LSP transmission and reception. This command allows the LSP transmission rate (and by implication the reception rate of other systems) to be reduced.

**Examples**   The following example causes the system to send LSPs every 100 milliseconds (10 packets per second) on serial interface 0:

```
interface serial 0
 isis lsp-interval 100
```

**Related Commands**

| Command | Description |
|---|---|
| **isis retransmit-interval** | Configures the time between retransmission of each LSP (IS-IS link-state PDU) over point-to-point links. |

# isis mesh-group

To optimize link-state packet (LSP) flooding in nonbroadcast multiaccess (NBMA) networks with highly meshed, point-to-point topologies, use the **isis mesh-group** command in interface configuration mode. To remove a subinterface from a mesh group, use the **no** form of this command.

**isis mesh-group** [*number*| **blocked**]

**no isis mesh-group** [*number*| **blocked**]

## Syntax Description

| *num* ber | (Optional) A number identifying the mesh group of which this interface is a member. |
|-----------|---------------------------------------------------------------------------------------|
| **blocked** | (Optional) Specifies that no LSP flooding will take place on this subinterface. |

## Command Default

The interface performs normal flooding.

## Command Modes

Interface configuration

## Command History

| Release | Modification |
|---------|--------------|
| 12.0 | 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

LSPs that are first received on subinterfaces that are not part of a mesh group are flooded to all other subinterfaces in the usual way.

LSPs that are first received on subinterfaces that are part of a mesh group are flooded to all interfaces except those in the same mesh group. If the blocked keyword is configured on a subinterface, then a newly received LSP is not flooded out over that interface.

To minimize the possibility of incomplete flooding, you should allow unrestricted flooding over at least a minimal set of links in the mesh. Selecting the smallest set of logical links that covers all physical paths results in very low flooding, but less robustness. Ideally, you should select only enough links to ensure that LSP flooding is not detrimental to scaling performance, but enough links to ensure that under most failure scenarios no router will be logically disconnected from the rest of the network. In other words, blocking flooding on

all links permits the best scaling performance, but there is no flooding. Permitting flooding on all links results in very poor scaling performance.

**Examples**     In the following example six interfaces are configured in three mesh groups. LSPs received are handled as follows:

- LSPs received first via ATM 1/0.1 are flooded to all interfaces except ATM 1/0.2 (which is part of the same mesh group) and ATM 1/2.1, which is blocked.

- LSPs received first via ATM 1/1.2 are flooded to all interfaces except ATM 1/1.1 (which is part of the same mesh group) and ATM 1/2.1, which is blocked.

- LSPs received first via ATM 1/2.1 are not ignored, but flooded as usual to all interfaces. LSPs received first via ATM 1/2.2 are flooded to all interfaces, except ATM 1/2.1, which is blocked.

```
interface atm 1/0.1
ip router isis
isis mesh-group 10
interface atm 1/0.2
ip router isis
isis mesh-group 10
interface atm 1/1.1
ip router isis
isis mesh-group 11
interface atm 1/1.2
ip router isis
isis mesh-group 11
interface atm 1/2.1
ip router isis
isis mesh-group blocked
interface atm 1/2.2
ip router isis
```

**Related Commands**

| Command | Description |
|---|---|
| **router isis** | Enables the IS-IS routing protocol and specifies an IS-IS process. |

# isis metric

To configure the value of an Intermediate System-to-Intermediate System (IS-IS) metric, use the **isis metric** command in interface configuration or subinterface mode. To restore the default metric value, use the **no** form of this command.

**isis metric** {*metric-value*| **maximum**} [**level-1**| **level-2**]

**no isis metric** {*metric-value*| **maximum**} [**level-1**| **level-2**]

**Syntax Description**

| | |
|---|---|
| *metric-value* | Metric assigned to the link and used to calculate the cost from each other router via the links in the network to other destinations. You can configure this metric for Level 1 or Level 2 routing. The range is from 1to 16777214. The default value is 10. |
| maximum | Excludes a link or adjacency from the shortest path first (SPF) calculation. |
| **level-1** | (Optional) Specifies that this metric should be used only in the SPF calculation for Level 1 (intra-area) routing. If no optional keyword is specified, the metric is enabled on routing Level 1 and Level 2. |
| **level-2** | (Optional) Specifies that this metric should be used only in the SPF calculation for Level 2 (interarea) routing. If no optional keyword is specified, the metric is enabled on routing Level 1 and Level 2. |

**Command Default**    The default metric value is set to 10.

**Command Modes**    Interface configuration Subinterface configuration

**Command History**

| Release | Modification |
|---|---|
| 10.0 | This command was introduced. |
| 12.1 | The **maximum** keyword was added. |
| 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |
| 12.4(13) | The **maximum** keyword was made available under subinterface configuration mode. |

| Release | Modification |
|---------|-------------|
| 12.4(13)T | The **maximum** keyword was made available under subinterface configuration mode. |
| 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**

Specifying the **level-1** or **level-2** keyword resets the metric only for Level 1 or Level 2 routing, respectively.

We highly recommend that you configure metrics on all interfaces. If you do not do so, the IS-IS metrics are similar to hop-count metrics.

It is strongly recommended to use the **metric-style wide** command to configure IS-IS to use the new-style type, length, value (TLV) because TLVs that are used to advertise IPv4 information in link-state packets (LSPs) are defined to use only extended metrics. Cisco IOS software provides support of a 24-bit metric field, the so-called "wide metric." Using the new metric style, link metrics now have a maximum value of 16777214 with a total path metric of 4261412864.

**Cisco IOS Release 12.4(13) and 12.4(13)T**

Entering the **maximum** keyword will exclude the link from the SPF calculation. If a link is advertised with the maximum link metric, the link will not be considered during the normal SPF calculation. When the link is excluded from the SPF, it will not be advertised for calculating the normal SPF. An example would be a link that is available for traffic engineering, but not for hop-by-hop routing. If a link, such as one that is used for traffic engineering, should not be included in the SPF calculation, enter the **isis metric** command with the **maximum** keyword.

**Note**

The **isis metric maximum** command applies only when the **metric-style wide** command has been entered. The **metric-style wide**command is used to configure IS-IS to use the new-style TLV because TLVs that are used to advertise IPv4 information in link-state packets (LSPs) are defined to use only extended metrics.

**Examples**

The following example configures serial interface 0 for a link-state metric cost of 15 for Level 1:

```
Router(config)# interface serial 0
Router(config-if)# isis metric 15 level-1
```
The following example sets the IS-IS metric for the link to maximum. SPF will ignore the link for both Level 1 and Level 2 routing because neither the **level-1** keyword nor the **level-2** keyword was entered.

```
Router(config)# interface fastethernet 0/0
Router(config-if)# isis metric maximum
```

**Examples**

The following example configures the **isis metric maximum** command on Ethernet subinterface 1/1.9.

```
Router(config)# interface Ethernet 1/1.9
Router(config-subif)# isis metric maximum
```

**Related Commands**

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

# isis network point-to-point

To configure a network of only two networking devices that use broadcast media and the integrated Intermediate System-to-Intermediate System (IS-IS) routing protocol to function as a point-to-point link instead of a broadcast link, use the **isis network point-to-point** command in interface configuration mode. To disable the point-to-point usage, use the **no** form of this command.

**isis network point-to-point**

**no isis network point-to-point**

**Syntax Description**    This command has no arguments or keywords.

**Command Default**    No default behavior or values.

**Command Modes**    Interface configuration (config-if)

**Command History**

| Release | Modification |
|---------|--------------|
| 12.2(8)T | This command was introduced. |
| 12.2(11)S | This command was integrated into Cisco IOS Release 12.2(11)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. |
| 15.1(2)S | This command was integrated into Cisco IOS Release 15.1(2)S. |
| 15.2(2)SNI | This command was implemented on the Cisco ASR 901 Series Aggregation Services Routers. |

**Usage Guidelines**    Use this command only on broadcast media in a network of only two networking devices. The command will cause the system to issue packets point-to-point rather than as broadcasts. Configure the command on both networking devices in the network.

**Examples**    The following example configures a Fast Ethernet interface to act as a point-to-point interface:

```
interface fastethernet 1/0
 isis network point-to-point
```

# isis password

To configure the authentication password for an interface, use the **isis password** command in interface configuration mode. To disable authentication for Intermediate System-to-Intermediate System (IS-IS), use the **no**form of this command.

**isis password** *password* [**level-1**| **level-2**]

**no isis password** [**level-1**| **level-2**]

**Syntax Description**

| *password* | Authentication password you assign for an interface. |
|---|---|
| **level-1** | (Optional) Configures the authentication password for Level 1 independently. For Level 1 routing, the router acts as a station router only. |
| **level-2** | (Optional) Configures the authentication password for Level 2 independently. For Level 2 routing, the router acts as an area router only. |

**Command Default**

This command is disabled by default.

If no keyword is specified, the default is **level-1-2**.

**Command Modes**

Interface 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**

This command enables you to prevent unauthorized routers from forming adjacencies with this router, and thus protects the network from intruders.

The password is exchanged as plain text and thus provides only limited security.

Different passwords can be assigned for different routing levels using the **level-1** and **level-2** keywords.

Specifying the **level-1** or **level-2** keyword disables the password only for Level 1 or Level 2 routing, respectively.

**Examples**     The following example configures a password for Ethernet interface 0 at Level 1:

```
interface ethernet 0
 isis password analyst level-1
```

# isis priority

To configure the priority of designated routers, use the **isis priority** command in interface configuration mode. To reset the default priority, use the **no** form of this command.

**isis priority** *number-value* [**level-1**| **level-2**]

**no isis priority** [**level-1**| **level-2**]

**Syntax Description**

| | |
|---|---|
| *number-value* | Sets the priority of a router and is a number from 0 to 127. The default value is 64. |
| **level-1** | (Optional) Sets the priority for Level 1 independently. |
| **level-2** | (Optional) Sets the priority for Level 2 independently. |

**Command Default**    Priority of 64 Level 1 and Level 2

**Command Modes**    Interface 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**    Priorities can be configured for Level 1 and Level 2 independently. Specifying the **level-1** or **level-2** keyword resets priority only for Level 1 or Level 2 routing, respectively.

The priority is used to determine which router on a LAN will be the designated router or Designated Intermediate System (DIS). The priorities are advertised in the hello packets. The router with the highest priority will become the DIS.

In Intermediate System-to-Intermediate System (IS-IS), there is no backup designated router. Setting the priority to 0 lowers the chance of this system becoming the DIS, but does not prevent it. If a router with a higher priority comes on line, it will take over the role from the current DIS. In the case of equal priorities, the highest MAC address breaks the tie.

**Examples**

The following example shows Level 1 routing given priority by setting the priority level to 80. This router is now more likely to become the DIS.

```
interface ethernet 0
 isis priority 80 level-1
```

# isis protocol shutdown

To disable the Intermediate System-to-Intermediate System (IS-IS) protocol so that it cannot form adjacencies on a specified interface and place the IP address of the interface into the link-state packet (LSP) that is generated by the router, use the **isis protocol shutdown**command in interface configuration mode. To reenable the IS-IS protocol, use the **no** form of this command.

**isis protocol shutdown**

**no isis protocol shutdown**

**Syntax Description**     This command has no arguments or keywords.

**Command Default**     No default behavior or values

**Command Modes**     Interface 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**     The **isis protocol shutdown** command allows you to disable the IS-IS protocol for a specified interface without removing the configuration parameters. The IS-IS protocol will not form any adjacencies for the interface for which the **isis protocol shutdown** command has been configured, and the IP address of the interface will be put into the LSP that is generated by the router.

If you do not want IS-IS to form any adjacency on any interface and clear the IS-IS LSP database, you can enter the **protocol shutdown** command.

**Examples**     The following example disables the IS-IS protocol on Ethernet interface3/1:

```
Router(config)# interface Ethernet 3/1
Router(config-if)# isis protocol shutdown
```

**Related Commands**

| Command | Description |
|---------|-------------|
| **protocol shutdown** | Disables the IS-IS protocol so that it cannot form any adjacency on any interface and clears the IS-IS LSP database. |

# isis retransmit-interval

To configure the amount of time between retransmission of each Intermediate System-to-Intermediate System (IS-IS) link-state packet (LSP) on a point-to-point link, use the **isis retransmit-interval** command in interface configuration mode. To restore the default value, use the **no** form of this command.

**isis retransmit-interval** *seconds*

**no isis retransmit-interval** *seconds*

## Syntax Description

| *seconds* | Time (in seconds) between retransmission of each LSP. It is an integer that should be greater than the expected round-trip delay between any two routers on the attached network. The default is 5 seconds. The range is from 0 to 65535. |
|---|---|

## Command Default

5 seconds

## Command Modes

Interface 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 setting of the *seconds*argument should be conservative, or needless retransmission will result.

This command has no effect on LAN (multipoint) interfaces. On point-to-point links, the value can be increased to enhance network stability.

Retransmissions occur only when LSPs are dropped. So setting the seconds argument to a higher value has little effect on reconvergence. The more neighbors routers have, and the more paths over which LSPs can be flooded, the higher this value can be made.

The value should be higher for serial lines.

**Examples**

The following example configures serial interface 0 for retransmission of IS-IS LSP, every 60 seconds for a large serial line:

```
interface serial 0
 isis retransmit-interval 60
```

**Related Commands**

| Command | Description |
|---------|-------------|
| **isis lsp-interval** | Configures the time delay between successive IS-IS LSP transmissions. |
| **isis retransmit-throttle-interval** | Configures the amount of time between retransmissions of any IS-IS LSPs on a point-to-point interface. |

# isis retransmit-throttle-interval

To configure the amount of time between retransmissions on each Intermediate System-to-Intermediate System (IS-IS) link-state packet (LSP) on a point-to-point interface, use the **isis retransmit-throttle-interval** command in interface configuration mode. To restore the default value, use the **no** form of this command.

**isis retransmit-throttle-interval** *milliseconds*

**no isis retransmit-throttle-interval**

**Syntax Description**

| *milliseconds* | Minimum delay (in milliseconds) between LSP retransmissions on the interface. |
|---|---|

**Command Default**

The delay is determined by the **isis lsp-interval** command.

**Command Modes**

Interface configuration

**Command History**

| Release | Modification |
|---|---|
| 11.1 | 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**

This command may be useful in very large networks with many LSPs and many interfaces as a way of controlling LSP retransmission traffic. This command controls the rate at which LSPs can be re-sent on the interface.

The **isis retransmit-throttle-interval** command is distinct from the rate at which LSPs are sent on the interface (controlled by the **isis lsp-interval** command) and the period between retransmissions of a single LSP (controlled by the **isis retransmit-interval** command). These commands may all be used in combination to control the offered load of routing traffic from one router to its neighbors.

**Examples**

The following example configures serial interface 0 to limit the rate of LSP retransmissions to one every 300 milliseconds:

```
interface serial 0
 isis retransmit-throttle-interval 300
```

**Related Commands**

| Command | Description |
| --- | --- |
| **isis lsp-interval** | Configures the time delay between successive IS-IS LSP transmissions. |
| **isis retransmit-interval** | Configures the amount of time between retransmission of each IS-IS LSPs over a point-to-point link. |

# isis tag

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

**isis tag** *tag-number*

**no isis tag** *tag-number*

**Syntax Description**

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

**Command Default**

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

**Command Modes**

Interface configuration

**Command History**

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

No action occurs on a tagged route until the tag is used, for example, to redistribute routes or summarize routes.

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

**Examples**

In this example, two interfaces are tagged with different tag values. By default, these two IP addresses would have been put into the IS-IS Level 1 and Level 2 database. However, if you use the **redistribute** command with a route map to match tag 110, only IP address 172.16. 0.0 is put into the Level 2 database.

```
interface ethernet 1/0
```

```
 ip address 10.1.1.1 255.255.255.0
 ip router isis
 isis tag 120
interface ethernet 1/1
 ip address 172.16.0.0
 ip router isis
 isis tag 110
router isis
 net 49.0001.0001.0001.0001.00
 redistribute isis ip level-1 into level-2 route-map match-tag
 route-map match-tag permit 10
 match tag 110
```

# isis ipv6 tag

To configure an administrative tag value that will be associated with an IPv6 address prefix and applied to an Intermediate System-to-Intermediate System (IS-IS) link-state packet (LSP), use the **isis ipv6 tag** command in interface configuration mode. To remove a tag from the address prefix, use the **no** form of this command.

**isis ipv6 tag** *tag-value*

**no isis ipv6 tag**

**Syntax Description**

| *tag-value* | The tag value. The range is from 1 to 4294967295. |
|---|---|

**Command Default**    An administrative IPv6 IS-IS tag is not configured.

**Command Modes**    Interface configuration (config-if)

**Command History**

| Release | Modification |
|---|---|
| Cisco IOS XE Release 3.6S | This command was introduced. |
| 15.2(4)M | This command was integrated into Cisco IOS Release 15.2(4)M. |
| 15.2(4)S | This command was integrated into Cisco IOS Release 15.2(4)S. |

**Usage Guidelines**    No action occurs on a tagged route until the tag is used, for example, to redistribute routes or summarize routes.

Configuring the **isis ipv6 tag** command triggers the router to generate new LSPs because the tag is a new piece of information in the packet.

**Examples**    In the following example, the value of an IS-IS IPv6 administrative tag is set to 220:

```
Device(config)# interface GigabitEthernet 0/0/1
Device(config-if)# isis ipv6 tag 220
```

**Related Commands**

| Command | Description |
|---|---|
| **ipv6 route priority high** | Assigns a high priority to an IS-IS IPv6 prefix. |

| Command | Description |
|---|---|
| **redistribute isis** (IPv6) | Redistributes IPv6 routes from one routing domain into another, using IS-IS as both the target and source protocol. |
| **show isis database verbose** | Displays additional information about the IS-IS database. |
| **summary-prefix** (IPv6 IS-IS) | Configures aggregate IPv6 prefixes for IS-IS. |

# ispf

To enable incremental shortest path first (SPF), use the **ispf** command in router configuration mode. To disable incremental SPF, use the **no** form of this command.

**ispf** {**level-1**| **level-2**| **level-1-2**} [ *seconds* ]

**no ispf**

**Syntax Description**

| | |
|---|---|
| **level-1** | Enables incremental SPF for Level 1 packets only. The **level-1** keyword applies only when you have enabled Intermediate System-to-Intermediate System (IS-IS). |
| **level-2** | Enables incremental SPF for Level 2 packets only. The **level-2** keyword applies only when you have enabled IS-IS. |
| **level-1-2** | Enables incremental SPF for Level 1 and Level 2 packets. The **level-1-2** keyword applies only when you have enabled IS-IS. |
| *seconds* | (Optional) Number of seconds after configuring this command that incremental SPF is activated. Value can be in the range from 1 to 600. The default value is 120 seconds. The *seconds* argument applies only when you have enabled IS-IS. |

**Command Default**   Incremental SPF is disabled.*seconds*: 120

**Command Modes**   Router configuration (config-router)

**Command History**

| Release | Modification |
|---|---|
| 12.0(24)S | This command was introduced. |
| 12.3(2)T | This command was integrated into Cisco IOS Release 12.3(2)T. |
| 12.2(18)S | This command was integrated into Cisco IOS Release 12.2(18)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. |

| Release | Modification |
|---|---|
| 12.2(33)SXH | This command was integrated into Cisco IOS Release 12.2(33)SXH. |
| 15.1(2)S | This command was integrated into Cisco IOS Release 15.1(2)S. |

**Usage Guidelines**

Intermediate System-to-Intermediate System (IS-IS) and Open Shortest Path First (OSPF) use Dijkstra's SPF algorithm to compute the shortest path tree (SPT). During the computation of the SPT, the shortest path to each node is discovered. The topology tree is used to populate the routing table with routes to IP networks. When changes to a Type 1 or Type 2 link-state advertisement (LSA) occur in an area, the entire SPT is recomputed. In many cases, the entire SPT need not be recomputed because most of the tree remains unchanged. Incremental SPF allows the system to recompute only the affected part of the tree. Recomputing only a portion of the tree rather than the entire tree results in faster OSPF convergence and saves CPU resources. Note that if the change to a Type 1 or Type 2 LSA occurs in the calculating router itself, then the full SPT is performed.

Incremental SPF computes only the steps needed to apply the changes in the network topology diagram. That process requires that the system keep more information about the topology in order to apply the incremental changes. Also, more processing must be done on each node for which the system receives a new link-state packet (LSP). However, incremental SPF typically reduces demand on CPU.

Incremental SPF is scheduled in the same way as the full SPF. Routers enabled with incremental SPF and routers not enabled with incremental SPF can function in the same internetwork.

Incremental SPF works only for IPv4.

Even if incremental SPF is configured, there are some cases where full SPF is executed; for example, periodic SPF, a calculation change for the routing calculation (such as a change in metric, is-type, and so on), the configuration of the **clear ip route** or **clear isis** commands, or adjacency changes.

**Examples**

The following example enables OSPF incremental SPF:

```
Router(config)# router ospf 1
Router(config-router)# ispf level-1
```
The following examples enables IS-IS incremental SPF for Level 1 and Level 2 packets:

```
Router(config)# router isis
Router(config-router)# ispf level-1-2
```

# is-type

To configure the routing level for an instance of the Intermediate System-to-Intermediate System (IS-IS) routing process, use the **is-type** command in router configuration mode. To reset the default value, use the **no**form of this command.

is-type [**level-1**| **level-1-2**| **level-2-only**]

no is-type [**level-1**| **level-1-2**| **level-2-only**]

**Syntax Description**

| level-1 | (Optional) Router performs only Level 1 (intra-area) routing. This router learns only about destinations inside its area. Level 2 (interarea) routing is performed by the closest Level 1-2 router. |
|---|---|
| level-1-2 | (Optional) Router performs both Level 1 and Level 2 routing. This router runs two instances of the routing process. It has one link-state packet database (LSDB) for destinations inside the area (Level 1 routing) and runs a shortest path first (SPF) calculation to discover the area topology. It also has another LSDB with link-state packets (LSPs) of all other backbone (Level 2) routers, and runs another SPF calculation to discover the topology of the backbone, and the existence of all other areas. |
| level-2-only | (Optional) Routing process acts as a Level 2 (interarea) router only. This router is part of the backbone, and does not communicate with Level 1-only routers in its own area. |

**Command Default**

In conventional IS-IS configurations, the router acts as both a Level 1 (intra-area) and a Level 2 (interarea) router.

In multiarea IS-IS configurations, the first instance of the IS-IS routing process configured is by default a Level 1-2 (intra-area and interarea) router. The remaining instances of the IS-IS process configured by default are Level 1 routers.

**Command Modes**

Router configuration (config-router)

**Command History**

| Release | Modification |
|---|---|
| 10.3 | This command was introduced. |
| 12.0(5)T | This command was modified to include multiarea IS-IS routing. |

| Release | Modification |
|---------|--------------|
| 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. |
| 15.1(2)S | This command was integrated into Cisco IOS Release 15.1(2)S. |

**Usage Guidelines**

We highly recommend that you configure the type of IS-IS routing process. If you are configuring multiarea IS-IS, you *must* configure the type of the router, or allow it to be configured by default. By default, the first instance of the IS-IS routing process that you configure using the **router isis**command is a Level 1-2 router.

If only one area is in the network, there is no need to run both Level 1 and Level 2 routing algorithms. If IS-IS is used for Connectionless Network Service (CLNS) routing (and there is only one area), Level 1 only must be used everywhere. If IS-IS is used for IP routing only (and there is only one area), you can run Level 2 only everywhere. Areas you add after the Level 1-2 area exists are by default Level 1 areas.

If the router instance has been configured for Level 1-2 (the default for the first instance of the IS-IS routing process in a Cisco device), you can remove Level 2 (interarea) routing for the area using the **is-type** command. You can also use the **is-type** command to configure Level 2 routing for an area, but it must be the only instance of the IS-IS routing process configured for Level 2 on the Cisco device.

**Examples**

The following example specifies an area router:

```
router isis
 is-type level-2-only
```

**Related Commands**

| Command | Description |
|---------|-------------|
| **router isis** | Enables the IS-IS routing protocol and specifies an IS-IS process. |
| **show clns neighbor areas** | Displays information about IS-IS neighbors and the areas to which they belong. |

# Integrated IS-IS Commands: L through V

# log-adjacency-changes (IS-IS)

To configure the router to send a syslog message when an Intermediate System to Intermediate System (IS-IS) 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 [all]**

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

**Syntax Description**

| all | (Optional) Includes changes generated by non-IIH (IS-IS Hello) event. |
|-----|----------------------------------------------------------------------|

**Command Default**

This feature is disabled.

**Command Modes**

Router configuration (config-router)

**Command History**

| Release | Modification |
|---------|--------------|
| 10.3T | This command was introduced. |
| 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 IS-IS neighbors going up or down. The **log-adjacency-changes** command is on by default but only changes generated by IIH events are included, unless the **all** keyword is also used.

**Examples**

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

```
Device# enable
Device# configure terminal
Device(config)# router isis ABCD
Device(config-router)# log-adjacency-changes all
```

**Related Commands**

| Command | Description |
|---------|-------------|
| **show isis neighbors** | Displays information about IS-IS neighbors. |

| Command | Description |
|---|---|
| **show isis topology** | Displays IS-IS paths to Intermediate Systems. |

# 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. |

## Command Default

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. |

| Command | Description |
|---------|-------------|
| **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). |

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

**Command Modes**  Router configuration (config-router)

**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. |
| 15.1(2)S | This command was integrated into Cisco IOS Release 15.1(2)S. |

**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). |

## Command Default

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. |

**Command Default**

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. |
| 15.1(2)S | This command was integrated into Cisco IOS Release 15.1(2)S. |
| 15.2(3)T | This command was integrated into Cisco IOS Release 15.2(3)T. |

**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. |

# microloop avoidance

To enable local microloop avoidance, use the **microloop avoidance** command in router configuration mode. To remove this configuration, use the **no** form of this command.

**microloop avoidance**[**disable**| **protected**]

**no microloop avoidance**[**disable**| **protected**]

**Syntax Description**

| | |
|---|---|
| **disable** | (Optional) Disables microloop avoidance in topologies where it is automatically enabled. |
| **protected** | (Optional) Enables microloop avoidance only for prefixes that have valid backup paths. |

**Command Default**

Microloop avoidance is disabled when remote loop-free alternate (RLFA) is not configured but is enabled for protected prefixes when RLFA is configured.

**Command Modes**

Router configuration (router-config)

**Command History**

| Release | Modification |
|---|---|
| Cisco IOS XE Release 3.11S | This command was introduced. |
| 15.4(1)S | This command was integrated into Cisco IOS Release 15.4(1)S. |

**Usage Guidelines**

When RLFA is enabled, microloop avoidance is enabled by default with the **protected** keyword enabled and a default delay of 5000 ms. This automatic enabling affects the operational state of the device but not the configured state. Therefore, this state is not reflected in the output of the **show running-config** command.

**Examples**

When RLFA is enabled, microloop avoidance is enabled by default. The following example shows how to disable microloop avoidance when RLFA is enabled.

```
Device> enable
Device# configure terminal
Device(config)# router isis test
Device(config-router)# microloop avoidance disable
Device(config-router)# end
```

**Related Commands**

| Command | Description |
|---|---|
| **microloop avoidance rib-update-delay** | Configures a RIB-update delay value to avoid microloops. |
| **show running-config** | Displays contents of the currently running configuration file. |

# microloop avoidance rib-update-delay

To configure a Routing Information Base (RIB) update delay value to avoid microloops in a network, use the **microloop avoidance rib-update-delay** command in router configuration mode. To remove this configuration, use the **no** form of this command.

**microloop avoidance** [**rib-update-delay** *delay-time*]

**no microloop avoidance** [**rib-update-delay**]

**Syntax Description**

| | |
|---|---|
| *delay-time* | (Optional) Delay time in milliseconds. The range is from 1-60000. |

**Command Default**

A RIB update delay value is not configured.

**Command Modes**

Router configuration (router-config)

**Command History**

| Release | Modification |
|---|---|
| Cisco IOS XE Release 3.11S | This command was introduced. |
| 15.4(1)S | This command was integrated into Cisco IOS Release 15.4(1)S. |

**Usage Guidelines**

Use this command to enable a device to delay updating its forwarding table in order to avoid traffic from microlooping between devices connected to a failed link.

**Examples**

The following example shows how configure a RIB update delay value.

```
Device> enable
Device# configure terminal
Device(config)# router isis test
Device(config-router)# microloop avoidance rib-update-delay 6000
Device(config-router)# end
```

**Related Commands**

| Command | Description |
|---|---|
| **microloop avoidance** | Enables local microloop avoidance. |
| **show running-config** | Displays contents of the currently running configuration file. |

# net

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

**net** *network-entity-title*

**no net** *network-entity-title*

## Syntax Description

| *network-entity-title* | Area address and the system ID for a CLNS routing process. |
|---|---|

## Command Default

The defaults are as follows:

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

## Command Modes

Router configuration (config-router)

## Command History

| Release | Modification |
|---|---|
| 10.0 | This command was introduced. |
| 12.0(5)T | This command was modified to include multiarea IS-IS routing. |
| 15.1(2)S | This command was integrated into Cisco IOS Release 15.1(2)S. |

## Usage Guidelines

Under most circumstances, one and only one NET must be configured.

A NET is a network service access point (NSAP) where the last byte is always zero. On a Cisco router running IS-IS, a NET can be 8 to 20 bytes. The last byte is always the n-selector and must be zero.

The six bytes directly in front of the n-selector are the system ID. The system ID length is a fixed size and cannot be changed. The system ID must be unique throughout each area (Level 1) and throughout the backbone (Level 2).

All bytes in front of the system ID are the area ID.

Even when IS-IS is used to perform IP routing only (no CLNS routing enabled), a NET must still be configured to define the router system ID and area ID.

A maximum of three NETs per router are allowed. In rare circumstances, it is possible to configure two or three NETs. In such a case, the area this router is in will have three area addresses. There will still be only one area, but it will have an additional maximum of three area addresses.

Configuring multiple NETs can be temporarily useful in the case of network reconfiguration where multiple areas are merged, or where one area is split into additional areas. Multiple area addresses enable you to renumber an area individually as needed.

If you are configuring multiarea IS-IS, the area ID must be unique, but the system ID portion of the NET must be the same for all IS-IS routing process instances.

**Examples**         The following example configures a router with system ID 0000.0c11.1111.00 and area ID 47.0004.004d.0001:

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

The following example shows three IS-IS routing processes with three areas 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
```

**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. |

| Command | Description |
|---------|-------------|
| **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. |

**Command Default**

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). |

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

**Command Modes**
Router configuration (config-router)

**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. |
| 15.1(2)S | This command was integrated into Cisco IOS Release 15.1(2)S. |

**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.

**Command Default**     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. |

**Command Default**

There are no default values for this command.

**Command Modes**

Router configuration (config-router)#

**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. |

| Release | Modification |
| --- | --- |
| 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 3.6S | This command was integrated into Cisco IOS XE Release 3.6S |

**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 |
| --- | --- |
| **ipv6 route priorityhigh** | Assigns a high priority to an IS-IS IPv6 prefix. |
| **isis ipv6 tag** | Configures an administrative tag value that will be associated with an IPv6 address prefix and applied to an IS-IS link-state packet (LSP). |
| **metric-style wide** | Configures a router running IS-IS so that it generates and accepts only new-style type, length, and value. |
| **show isis database verbose** | Displays additional information about the IS-IS database. |

| Command | Description |
|---|---|
| **summary-prefix** (IPv6 IS-IS) | Creates aggregate IPv6 prefixes for IS-IS. |

# redistribute isis (IPv6)

To redistribute IPv6 routes from one routing domain into another routing domain using Intermediate System-to-Intermediate System (IS-IS) as both the target and source protocol, use the **redistribute isis** command in address family configuration mode. To disable redistribution, use the **no** form of this command.

**redistribute isis** [ *process-id* ] {**level-1**| **level-2**} **into** {**level-1**| **level-2**} {**distribute-list** | *list-name*| **route-map** | *map-tag*}

**no redistribute isis** [ *process-id* ] {**level-1**| **level-2**} **into** {**level-1**| **level-2**} {**distribute-list** | *list-name* | **route-map**| *map-tag*}

**Syntax Description**

| | |
|---|---|
| *process-id* | (Optional) A *tag* value that defines a meaningful name for a routing process. You can specify only one IS-IS process per router. Creating a name for a routing process means that you use names when configuring routing. |
| **level-1** | Specifies that IS-IS Level 1 routes are redistributed into other IP routing protocols independently. |
| **level-2** | Specifies that IS-IS Level 2 routes are redistributed into other IP routing protocols independently. |
| **into** | Distributes IS-IS Level 1 or Level 2 routes into Level 1 or Level 2 in another IS-IS instance. |
| **distribute-list** | Specifies the distribute list used for the redistributed route. |
| *list-name* | Specifies the name of the distribute list for the redistributed route. |
| **route-map** *map-tag* | (Optional) Specifies the name of a route map that controls the IS-IS redistribution. You can specify either a distribute list or a route map, but not both. |

**Command Default**

Route redistribution is disabled. No process ID is defined.

**Command Modes**

Address family configuration (config-router-af)

**Command History**

| Release | Modification |
|---|---|
| 12.2(15)T | This command was introduced. |

| Release | Modification |
|---------|--------------|
| 12.2(25)SG | This command was integrated into Cisco IOS Release 12.2(25)SG. |
| Cisco IOS XE Release 2.4 | This command was introduced on Cisco ASR 1000 Aggregation Services Routers. |
| Cisco IOS XE Release 3.6S | This command was modified. Support for the **route-map** keyword was introduced. |

**Usage Guidelines**

Changing or disabling any keyword will not affect the state of other keywords.

A router receiving an IPv6 IS-IS route with an internal metric will consider the cost of the route from itself to the redistributing router plus the advertised cost to reach the destination. An external metric considers only the advertised metric to reach the destination.

IS-IS will ignore any configured redistribution of routes configured with the connected keyword. IS-IS will advertise a prefix on an interface if either IS-IS is running over the interface or the interface is configured as passive.

Routes learned from IPv6 routing protocols can be redistributed into IPv6 IS-IS at Level 1 into an attached area or at Level 2. The **level-1-2** keyword allows both Level 1 and Level 2 routes in a single command.

**Examples**

The following example shows how to redistribute only Level-1 routes with tag 100 to Level 2:

```
router isis
address-family ipv6
redistribute isis level-1 into level-2 route-map match-tag
route-map match-tag
match tag 100
```

**Related Commands**

| Command | Description |
|---------|-------------|
| **default-metric** | Specifies a default metric for redistributed routes. |
| **ipv6 route priority high** | Assigns a high priority to an IS-IS IPv6 prefix. |
| **isis ipv6 tag** | Configures an administrative tag value that will be associated with an IPv6 address prefix and applied to an IS-IS LSP. |
| **metric-style wide** | Configures a router running IS-IS so that it generates and accepts only new-style type, length, and value. |
| **redistribute** (IPv6) | Redistributes IPv6 routes from one routing domain into another routing domain. |
| **show isis database verbose** | Displays details about the IS-IS link-state database, including the route tag. |

| Command | Description |
|---------|-------------|
| **summary-prefix** (IPv6 IS-IS) | Creates aggregate IPv6 prefixes for IS-IS. |

# router isis

To enable the Intermediate System-to-Intermediate System (IS-IS) routing protocol and to specify an IS-IS process, use t he **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. |
| 15.1(2)S | This command was integrated into Cisco IOS Release 15.1(2)S. |

**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. |

| Command | Description |
|---------|-------------|
| **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 s pecify 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. |
|-----------|-----------|----------------------------------------------------------------------------------------------------------------------------|

**Command Default**

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* configuredor 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. |

**Command Default**    The overload bit is not set.

**Command Modes**    Router configuration

**Command History**

| Release | Modification |
|---|---|
| 11.2 | This command was introduced. |

| Release | Modification |
|---------|--------------|
| 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. |
| 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. |
| 15.1(2)S | This command was integrated into Cisco IOS Release 15.1(2)S. |

**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
```

**Examples**

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
```

The table below describes the significant fields shown in the display.

**Table 1: 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. |

| Field | Description |
|---|---|
| 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. |
| 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). |

| Field | Description |
|-------|-------------|
| 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
```
The table below describes significant fields shown in the display.

*Table 2: 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. |
| 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 Connectionless Network Service (CLNS) packets that this router has seen, use the **show clns traffic** command in privileged EXEC mode.

**show clns** *area-tag* **traffic** [**since** {**bootup**| **show**}]

**Syntax Description**

| *area-tag* | (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 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. |
|---|---|
| **since** | (Optional) Displays the CLNS protocol statistics since bootup or the last time the statistics was displayed. |
| **bootup** | Displays the CLNS protocol statistics since bootup. |
| **show** | Displays the CLNS protocol statistics since the last time the statistics was displayed. |

**Command Modes**     Privileged EXEC (#)

**Command History**

| Release | Modification |
|---|---|
| 10.0 | This command was introduced. |
| 12.2(9)T | The **since**, **bootup**,and **show**keywords were introduced. |
| 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |

**Examples**     The following sample output from the **show clns traffic**command lists all the CLNS packets it has seen:

```
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
```

The table below describes the significant fields shown in the display.

**Table 3: 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 seen in CLNS packets. |
| CLNS Segments | Lists the number of packets segmented and the number of failures that occurred because a packet could not be segmented. |
| CLNS Broadcasts | Lists the number of CLNS broadcasts sent and received. |
| Echos | Lists the number of echo request packets and echo reply packets received. The line following this field lists the number of echo request packets and echo reply packets sent. |
| ESIS (sent/rcvd) | Lists the number of End System Hello (ESH), Intermediate System Hello (ISH), and redirects sent and received. |

| Field | Description |
|-------|-------------|
| 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 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 Protocol Data Unit (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 Complete Sequence Number Packets (CSNP) sent and received. |
| IS-IS: Level-2 CSNPs (sent/rcvd) | Lists the number of Level 2 CSNPs sent and received. |
| IS-IS: Level-1 PSNPs (sent/rcvd) | Lists the number of Level 1 Partial Sequence Number Packets (PSNP) 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 the Level 1 shortest-path-first (SPF) tree was computed. |
| IS-IS: Level-2 SPF Calculations | Lists the number of times the Level 2 SPF tree was computed. |

**Related Commands**

| Command | Description |
|---|---|
| **clear clns traffic** | Clears all ISO CLNS statistics that are displayed when you use the **show clns traffic** command. |

# 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. |

| Release | Modification |
|---------|-------------|
| 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. |
| Cisco IOS XE Release 3.3SG | This command was integrated into Cisco IOS XE Release 3.3SG. |

**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
```

The table below describes the significant fields shown in the display.

*Table 4: show isis database Field Descriptions*

| Field | Description |
|-------|-------------|
| Tag tagFirst | Tag name that identifies an IS-IS instance. |

| Field | Description |
|---|---|
| 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. |
| 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. |

| Field | Description |
|-------|-------------|
| 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.

The table below describes the significant fields shown in the display.

*Table 5: 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). |

| Field | Description |
|---|---|
| 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 details about the Intermediate System-to-Intermediate System (IS-IS) link-state 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. |
| Cisco IOS XE Release 3.6S | This command was modified. Support was added for administrative tags in IPv6 prefixes. |

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

```
Device# 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
```

The table below describes the significant fields shown in the display.

*Table 6: 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. |

| Field | Description |
|---|---|
| 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. |
| 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, or b/s). |
| Reservable BW | Amount of reservable bandwidth on this link, in b/s. |
| BW Unreserved | Amount of bandwidth that is available for reservation, in b/s. |

The following example includes a route tag:

```
Device# 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**| **remote-lfa tunnels**}

**Syntax Description**

| | |
|---|---|
| **interfaces** | Displays information about platform support capability for all interfaces running IS-IS. |
| *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. |
| **remote-lfa tunnels** | Displays information about remote loop-free alternate (LFA) tunnels. |

**Command Modes**

User EXEC (>)

Privileged EXEC (#)

**Command History**

| Release | Modification |
|---|---|
| 15.1(2)S | This command was introduced. |
| Cisco IOS XE Release 3.4S | This command was integrated into Cisco IOS XE Release 3.4S. |
| 15.2(2)S | This command was modified. The **remote-lfa tunnels** keyword was added. |
| 15.2(2)SNI | This command was implemented on the Cisco ASR 901 Series Aggregation Services Routers. |

**Usage Guidelines**

The **show isis fast-reroute** command displays whether 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
```
The table below describes the significant fields shown in the display.

*Table 7: show isis fast-reroute interfaces Field Descriptions*

| Field | Description |
|---|---|
| Protectable | Specifies whether an interface is supported by the platform to be protected by FRR. |
| Usable for repair | Specifies whether an interface is supported by the platform to be used as a repair path. |

**Note**     Whether an interface is actually FRR protected or is acting as an FRR repair interface depends on the topology and the configuration. The information in the **show isis fast-reroute interfaces** command shows only the capability of the interface as supported by the platform.

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%
```
The table below describes the significant fields shown in the display.

*Table 8: 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. |

The following is sample output from the **show isis fast-reroute remote-lfa tunnels** command:

```
Router# show isis fast-reroute remote-lfa tunnels
```

```
Tag Null - Fast-Reroute Remote-LFA Tunnels:

  MPLS-Remote-Lfa1: use Et1/0, nexthop 10.0.0.1, end point 24.24.24.24
  MPLS-Remote-Lfa2: use Et0/0, nexthop 10.1.1.2, end point 24.24.24.24
```

**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 dynamicly 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 ip rib

To display the Intermediate System-to-Intermediate System (IS-IS) IPv4 local routing information base (RIB), use the **show isis ip rib** command in user EXEC or privileged EXEC mode.

**show isis ip rib** [*ipv4-prefix*]

**Syntax Description**

| ipv4-prefix | (Optional) IPv4 address prefix. |
|---|---|

**Command Modes**

User EXEC (>)

Privileged EXEC (#)

**Command History**

| Release | Modification |
|---|---|
| 15.3(3)M | This command was introduced in a release earlier than Cisco IOS Release 15.3(3)M. This command was modified. Filtered routes are now represented with a hyphen (-). |

**Usage Guidelines**

When the optional *ipv4-prefix* argument is not used, the complete IS-IS IPv4 RIB is displayed. When an optional IPv4 prefix is supplied, only the entry matching that prefix is displayed.

Only the optimal paths will be installed in the master IPv4 RIB as IS-IS routes.

**Examples**

The following is sample output from the **show isis ip rib** command. All route paths appear in order of preference, with optimal paths listed first and suboptimal paths listed after optimal paths. A hyphen (-) following any route path indicates routes that are filtered out. In the following example, 2.2.2.2/32 is filtered out.

```
Device# show isis ip rib

1.1.1.1/32
  [115/L2/20] via 30.30.30.20(Serial3/0), from 2.2.2.2, tag 0, LSP[3/3]
  [115/L2/20] via 100.100.100.20(Ethernet0/0), from 2.2.2.2, tag 0, LSP[3/3]

2.2.2.2/32
  [115/L1/20] via 30.30.30.20(Serial3/0), from 2.2.2.2, tag 0, LSP[4/2] -
  [115/L1/20] via 100.100.100.20(Ethernet0/0), from 2.2.2.2, tag 0, LSP[4/2] -
  [115/L2/20] via 30.30.30.20(Serial3/0), from 2.2.2.2, tag 0, LSP[3/3] -
  [115/L2/20] via 100.100.100.20(Ethernet0/0), from 2.2.2.2, tag 0, LSP[3/3] -

20.20.20.0/24
  [115/L1/20] via 30.30.30.20(Serial3/0), from 2.2.2.2, tag 0, LSP[4/2]
  [115/L1/20] via 100.100.100.20(Ethernet0/0), from 2.2.2.2, tag 0, LSP[4/2]
  [115/L2/20] via 30.30.30.20(Serial3/0), from 2.2.2.2, tag 0, LSP[3/3]
  [115/L2/20] via 100.100.100.20(Ethernet0/0), from 2.2.2.2, tag 0, LSP[3/3]
```

The table below describes the significant fields shown in the display.

*Table 9: show isis ip rib Field Descriptions*

| Field | Description |
|---|---|
| 1.1.1.1/32 | IP prefix that is stored within the IS-IS local RIB. |
| [115/L2/20] | Administrative distance/type/metric for the routing path to reach the next hop of the router. Type of path: <br>• L1—Level 1 <br>• L2—Level 2 |
| via 100.100.100.20(Ethernet0/0) | IP address of the next hop—in this instance, Ethernet0/0. |
| tag | Priority of the IP prefix. All prefixes have a tag 0 priority unless otherwise configured. |
| LSP[3/3] | Link-state packet (LSP). The numbers following LSP indicate the LSP index and LSP version, respectively. |
| - | Route paths that are filtered out. |

**Related Commands**

| Command | Description |
|---|---|
| **distribute-list in (IP)** | Filters routes received in incoming updates. |
| **show isis ipv6 rib** | Displays the IS-IS IPv6 local RIB. |
| **redistribute (IP)** | Redistributes routes from one routing domain into another routing domain. |

# 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
```
The table below describes the fields shown in the display.

*Table 10: 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: <br><br> • AREASET--Active area set changed. <br><br> • ATTACHFLAG--Attached bit changed state. <br><br> • CLEAR--Some form of manual **clear** command was issued. <br><br> • CONFIG--Any configuration change. <br><br> • DELADJ--Adjacency went down. <br><br> • DIS--DIS changed or pseudonode changed. <br><br> • ES--End System adjacency changed. <br><br> • HIPPITY--LSPDB overload bit changed state. <br><br> • IF_DOWN--Needs a new LSP. <br><br> • IP_DEF_ORIG--Default information originate changed. <br><br> • IPDOWN--Directly connected IP prefix down. <br><br> • IP_EXTERNAL--Redistributed IP route appeared or gone. <br><br> • IPIA--Interarea IP route appeared or gone. <br><br> • IPUP--Directly connected IP prefix up. <br><br> • NEWADJ--New adjacency came up. <br><br> • REDIST--Redistributed level-2 CLNS route changed. <br><br> • 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 Multitopology 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. |
| 12.2(33)SRE | This command was integrated into Cisco IOS Release 12.2(33)SRE. |
| Cisco IOS XE Release 2.5 | This command was integrated into Cisco IOS XE Release 2.5. |

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

**Examples**    In Release 12.0(29)S, the **show isis neighbors** command is entered to display information about the IS-IS neighbor Device1.

```
Device5# 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
```

The **show isis neighbors detail** command is entered to display more detailed information about the IS-IS neighbor Device1.

```
Device5# 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
```

In Release 12.2(33)SRB, the **show isis neighbors detail** command is entered to verify the status of the IS-IS neighbor Device1 for a network that has MTR configured. For each of the topologies - unicast, DATA and VOICE, the interface information is displayed.

```
Device5# 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
```

The table below describes the significant fields shown in the display.

*Table 11: 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 device. |
| Interface | Interface from which the system was learned. |
| IP Address | IP address of the neighbor device. |
| State | Indicates whether the state of the IS-IS neighbor is up or down. |

| Field | Description |
|---|---|
| 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 device that indicates how it is connected to the local device. |
| Area Address(es) | Reachable area addresses from the device. For Level 1 LSPs, these are the area addresses configured manually on the originating device. For Level 2 LSPs, these are all the area addresses for the area to which this device belongs. |
| SNPA | Subnetwork point of attachment. This is the data-link address. |
| State Changed | State change. |
| LAN Priority | Priority of the LAN. |
| Remote TID | Neighbor device topology IDs. |
| Local TID | Local device topology IDs. |

# show isis nsf

To display current state information regarding Intermediate System-to-Intermediate System (IS-IS) Cisco nonstop forwarding (NSF), use the **s how 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 table below describes the significant fields shown in the display.

**Table 12: show isis nsf Field Descriptions**

| Field | Description |
|---|---|
| NSF enabled, mode 'cisco' | NSF is enabled in the default cisco mode. |
| RP is ACTIVE, standby ready, bulk sync complete | Status of the active RP, standby RP, and the synchronization process between the two. |
| NSF interval timer expired (NSF restart enabled) | NSF interval timer has expired, allowing NSF restart to be active. |
| Checkpointing enabled, no errors | Status of the checkpointing process. |
| Local state:ACTIVE, Peer state:STANDBY HOT, Mode:SSO | State of the local RP, the peer RP, and the operating mode these RPs are using. |

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. |
| 15.1(2)S | This command was integrated into Cisco IOS Release 15.1(2)S. |
| 15.2(2)SNI | This command was implemented on the Cisco ASR 901 Series Aggregation Services Routers. |

## 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]
```

The table below describes the significant fields shown in the display.

*Table 13: 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 shows 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 ======
```

| Field | Description |
|---|---|
| 10.3.3.0/24 [Connected/0] external | Indicates 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. |
| 10.0.18.48/28 [Connected/0] external | Indicates that the prefix 10.0.18.48 with a mask 28 was redistributed from the connected routing protocol into IS-IS as a level 1 route, cost 0, with a metric type 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** command in privileged EXEC mode.

**show isis** [ *area-tag* ] [**ipv6**| *** ] **spf-log** [**topology** {**ipv6**| *topology-name*| ***}]

**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 the IS-IS multitopology for IPv6 SPF log. |
| *** | (Optional) Displays the SPF logs of all address families. |
| **topology** | (Optional) Specifies the Multiple Transport Stream Receiver (MTR) topology. |
| *topology-name* | (Optional) The IS-IS multitopology SPF log for the specified topology name. |

**Command Modes**    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. |

| Release | Modification |
|---------|--------------|
| 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 Aggregation Services Routers. |

**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
```

The table below describes the significant fields shown in the display.

*Table 14: 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. |

| Field | Description |
|---|---|
| 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 the table below. |

The table below lists possible triggers of a full SPF calculation.

*Table 15: Possible Triggers of Full SPF Calculation*

| Trigger | Description |
|---|---|
| ADMINDIST | Another administrative distance was configured for the IS-IS process on this router. |
| AREASET | Set of learned area addresses in this area changed. |
| ATTACHFLAG | This router is now attached to the Level 2 backbone or it has just lost contact to the Level 2 backbone. |
| 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. |
| 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. |

| Trigger | Description |
| --- | --- |
| 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 type length values (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** [ *hostname* ] [**level-1**| **level-2**| **l1**| **l2**]

## 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. |
| *hostname* | (Optional) Hostname or the Network Service Access Point (NSAP) address of the router. |
| **level-1** | (Optional) Specifies paths to all level one routers in the area. |
| **level-2** | (Optional) Specifies paths to all level two routers in the domain. |
| **l1** | (Optional) Abbreviation for the **level-1** keyword. |
| **l2** | (Optional) Abbreviation for the **level-2** keyword. |

## Command Modes

Privileged EXEC (#)

## Command History

| OS Release | Modification |
|---|---|
| 12.0(26)S | This command was integrated into Cisco IOS Release 12.0(26)S. |
| 12.0(29)S | This command was modified. The *process-tag* argument was added. |

| OS Release | Modification |
|---|---|
| S Release | Modification |
| 12.2(18)S | This command was integrated into Cisco IOS Release 12.2(18)S. |
| SB Release | Modification |
| 12.2(28)SB | This command was integrated into Cisco IOS Release 12.2(28)SB. |
| SG Release | Modification |
| 12.2(25)SG | This command was integrated into Cisco IOS Release 12.2(25)SG. |
| SX Release | Modification |
| 12.2(33)SXH | This command was integrated into Cisco IOS Release 12.2(33)SXH. |
| Mainline and T Release | Modification |
| 12.0(5)T | This command was introduced. |
| 12.2(15)T | This command was modified. Support was added for IPv6. |
| XE Release | Modification |
| Cisco IOS XE Release 2.4 | This command was introduced on Cisco ASR 1000 Series Routers. |
| Cisco IOS XE Release 3.3SG | This command was integrated into Cisco IOS XE Release 3.3SG. |

**Usage Guidelines**

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

If you are running Cisco IOS Release 12.2(33)SRB or a later release, use the **show isis topology**(MTR) command.

**Examples**

The following is sample 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
```

The table below describes the significant fields shown in the display.

***Table 16: 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. |

**Related Commands**

| Command | Description |
|---------|-------------|
| **show clns es-neighbors** | Lists the ES neighbors that this router knows. |
| **show clns is-neighbors** | Displays IS-IS related information for IS-IS router adjacencies. |
| **show clns neighbors** | Displays the ES, IS, and M-ISIS neighbors. |
| **show clns neighbor areas** | Displays information about IS-IS neighbors and the areas to which they belong. |
| **show clns route** | Displays one or all of the destinations to which the router knows how to route CLNS packets. |

# 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. |

| Release | Modification |
|---------|--------------|
| 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** | Spec ifies the r ecipient 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). |

**Command Default**    *spf-max-wait* : 10 seconds*spf-initial-wait*: 5500 milliseconds*spf-second-wait*: 5500 milliseconds

**Command Modes**    Router configuration (config-router)

**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. |

| Release | Modification |
|---------|--------------|
| 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. |
| 15.1(2)S | This command was integrated into Cisco IOS Release 15.1(2)S. |

**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. |

| Release | Modification |
|---|---|
| 12.3(2)T | The following keywords and arguments were added: <br><br> • **tag** *tag-number* <br><br> • **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. |
| Cisco IOS XE Release 3.3SG | This command was integrated into Cisco IOS XE Release 3.3SG. |

## 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. |