



Integrated IS-IS Commands

Use the commands in this chapter to configure and monitor IS-IS. For IS-IS configuration information and examples, refer to the “Configuring Integrated IS-IS” chapter of the *Network Protocols Configuration Guide, Part 1*.

area-password

To configure the IS-IS area authentication password, use the **area-password** router configuration command. To disable the password, use the **no** form of this command.

```
area-password password  
no area-password [password]
```

Syntax Description

password Password you assign.

Default

No area password is defined and area password authentication is disabled.

Command Mode

Router configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

Using the **area-password** command on all routers in an area will prevent unauthorized routers from injecting false routing information into the linkstate 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) link state PDUs (LSPs), complete sequence number PDUs (CSNPs), and partial sequence number PDUs (PSNP).

Example

The following example assigns an area authentication password:

```
router isis  
  area-password angel
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

domain-password

isis password

default-information originate (IS-IS)

To generate a default route into an IS-IS routing domain, use the **default-information originate** router configuration command. 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.

Default

Disabled

Command Mode

Router configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

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 LSPs.

Without a route-map, the default is only advertised in L2 LSPs. For L1 routing, there is another mechanism to find the default route, which is to look for the closest L1L2 router. The closest L1L2 router can be found by looking at the attached-bit (ATT) in L1 LSPs.

A route-map can be used for two things: 1) make the router generate default in its L1 LSPs. 2) 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.

Example

In the following example, the software is forced 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 100.105.0.0  
access-list 2 permit 100.105.0.0 0.0.255.255
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

```
redistribute  
show isis database
```

domain-password

To configure the IS-IS routing domain authentication password, use the **domain-password** router configuration command. To disable a password, use the **no** form of this command.

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

Syntax Description

password Password you assign.

Default

No password is specified and no authentication is enabled for exchange of L2 routing information.

Command Mode

Router configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

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) link state PDUs (LSPs), complete sequence number PDUs (CSNPs), and partial sequence number PDUs (PSNPs).

Example

The following example assigns an authentication password to the routing domain:

```
router isis
 domain-password flower
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

area-password
isis password

ip router isis

To configure an IS-IS routing process for IP on an interface, use the **ip router isis** interface configuration command. To disable IS-IS for IP, use the **no** form of this command.

```
ip router isis [tag]  
no ip router isis [tag]
```

Syntax Description

tag (Optional) Defines a meaningful name for a routing process. If not specified, a null tag is assumed. It must be unique among all IP router processes for a given router. Use the same text for the argument *tag* as specified in the **router isis** global configuration command.

Default

No routing processes are specified.

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

Before the IS-IS router process is useful, a NET must be assigned with the **net** command and some interfaces must be enabled with IS-IS.

If you have IS-IS running and at least one ISO-IGRP process, the IS-IS process and the ISO-IGRP process cannot both be configured without a tag. The null tag can be used by only one process. Therefore, if you do not use ISO-IGRP, the IS-IS tag should be null. If you run ISO-IGRP and IS-IS, a null tag can still be used for IS-IS, but not for ISO-IGRP at the same time.

Example

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 interfaces Ethernet 0 and serial 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
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

net
router isis

isis circuit-type

To configure the type of adjacency, use the **isis circuit-type** interface configuration command. To reset the circuit type to Level 1 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	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.
level-1-2	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-only	Level 2 adjacencies are established if the other routers are L2 or L1L2 routers and their interfaces are configured for L1L2 or L2. Level 1 adjacencies will never be established over this interface.

Default

A Level 1 and Level 2 adjacency is established.

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

Normally, this command does not need to be configured. The proper way is to configure a router as an L1-only, L1L2 or L2-only system. Only on routers that are between areas (L1L2 routers) should you configure some interfaces to be L2-only to prevent wasting bandwidth by sending out unused L1 hellos. Note that on point-to-point interfaces, the L1 and L2 hellos are in the same packet.

Example

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 L1 hellos.

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

isis csnp-interval

To configure the IS-IS complete sequence number PDUs (CSNP) interval, use the **isis csnp-interval** interface configuration command. 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

<i>seconds</i>	Interval of time between transmission of CSNPs on multiaccess networks. This interval only applies for the designated router. The default is 10 seconds.
level-1	Configures the interval of time between transmission of CSNPs for Level 1 independently.
level-2	Configures the interval of time between transmission of CSNPs for Level 2 independently.

Default

10 seconds

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

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

This command only applies 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. This feature 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 multi-access WAN interfaces (such as ATM, Frame Relay, and X.25), it is highly recommended you configure the NBMA cloud as multiple point-to-point subinterfaces. Doing so will make routing much more robust if one or more PVCs fail.

The **isis csnp-interval** command on point-to-point subinterfaces only makes sense when using it in combination with the IS-IS mesh-group feature.

Example

In the following example, Ethernet interface 0 is configured for transmitting CSN PDUs every 30 seconds.

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

isis hello-interval

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

```
isis hello-interval seconds {level-1 | level-2}  
no isis hello-interval {level-1 | level-2}
```

Syntax Description

<i>seconds</i>	An integer value. By default, a value three times the hello interval <i>seconds</i> is advertised as the <i>holdtime</i> in the hello packets transmitted. (That multiplier of 3 can be changed 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 seconds.
level-1	Configures the hello interval for Level 1 independently. Use this on X.25, SMDS, and Frame Relay multiaccess networks.
level-2	Configures the hello interval for Level 2 independently. Use this on X.25, SMDS, and Frame Relay multiaccess networks.

Default

10 seconds

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

The hello interval can be configured independently for Level 1 and Level 2, except on serial point-to-point interfaces. (Because there is only a single type of hello packet 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 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. Especially when used in combination with a higher hello multiplier, this may increase overall network stability.

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

Example

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

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

Related Commands

You can use the master indexes or search online to find documentation of related commands.

isis hello-multiplier

isis hello-multiplier

To specify the number of IS-IS hello packets a neighbor must miss before the router should declare the adjacency as down, use the **isis hello-multiplier** interface configuration command. 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

<i>multiplier</i>	Integer value. The advertised holdtime in IS-IS hellos 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 hellos during the advertised holdtime. The holdtime (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	Configures the hello multiplier independently for Level 1 adjacencies.
level-2	Configures the hello multiplier independently for Level 2 adjacencies.

Default

multiplier is 3

Command Mode

Interface configuration

Usage Guidelines

On point-to-point links, there is only one hello for both Level 1 and Level 2. So configuring different hello-multipliers only make sense for multi-access networks, such as Ethernet, FDDI, etc. Separate Level 1 and Level 2 hellos are also sent over NBMA networks in multipoint mode, such as X.25, Frame Relay and ATM. However, it is recommended to run IS-IS over point-to-point subinterfaces over WAN NBMA media.

Example

In the following example, the network administrator wants to increase network stability by making sure an adjacency will go down only when many (10) hellos are missed. The total time to detect link failure is 60 seconds. This 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
```

isis lsp-interval

To configure the time delay between successive IS-IS link state packet transmissions, use the **isis lsp-interval** interface configuration command. To restore the default value, use the **no** form of this command.

```
isis lsp-interval milliseconds  
no isis lsp-interval
```

Syntax Description

milliseconds Interval between successive link state packets, in milliseconds.

Default

33 milliseconds

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1.

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

Example

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

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

Related Commands

You can use the master indexes or search online to find documentation of related commands.

isis retransmit-interval

isis metric

To configure the metric for an interface, use the **isis metric** interface configuration command. To restore the default metric value, use the **no** form of this command.

```
isis metric default-metric {level-1 | level-2}  
no isis metric {level-1 | level-2}
```

Syntax Description

<i>default-metric</i>	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 0 to 63. The default value is 10.
level-1	This metric should be used only in the SPF calculation for L1 (intra-area) routing.
level-2	This metric should be used only in the SPF calculation for L2 (inter-area) routing.

Default

default-metric = 10

If **level-1** or **level-2** is not specified, **level-1** is assumed.

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

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

It is highly recommended to configure metrics on all interfaces. If you do not do so, the IS-IS metrics are simply hop-count like metrics.

Example

In the following example, serial interface 0 is configured for a default link-state metric cost of 15 for Level 1:

```
interface serial 0  
  isis metric 15 level-1
```

isis password

To configure the authentication password for an interface, use the **isis password** interface configuration command. To disable authentication for 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

<i>password</i>	Authentication password you assign for an interface.
level-1	Configures the authentication password for Level 1 independently. For Level 1 routing, the router acts as a station router only.
level-2	Configures the authentication password for Level 2 independently. For Level 2 routing, the router acts as an area router only.

Default

Disabled

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

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

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** keyword arguments.

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

Example

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

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

isis priority

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

```
isis priority value {level-1 | level-2}  
no isis priority {level-1 | level-2}
```

Syntax Description

<i>value</i>	Sets the priority of a router and is a number from 0 to 127. The default value is 64.
level-1	Sets the priority for Level 1 independently.
level-2	Sets the priority for Level 2 independently.

Default

Priority of 64

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

Priorities can be configured for Level 1 and Level 2 independently. Specifying the **level-1** or **level-2** keywords 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 hellos. The router with the highest priority will become the DIS.

In 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.

Example

The following example shows Level 1 routing given priority by setting the priority level to 50. This router is now more likely to become the DIS.

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

isis retransmit-interval

To configure the time between retransmission of each LSP (IS-IS link-state PDU) over point-to-point links, use the **isis retransmit-interval** interface configuration command. 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.

Default

5 seconds

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

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 only occur when LSPs are dropped. So setting this 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 larger for serial lines.

Example

The following example configures serial interface 0 for retransmission of IS-IS LSP every 10 seconds for a large serial line:

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

Related Commands

You can use the master indexes or search online to find documentation of related commands.

isis lsp-interval
isis retransmit-throttle-interval

isis retransmit-throttle-interval

To configure the amount of time between retransmissions of any IS-IS link-state PDUs (LSPs) on a point-to-point interface, use the **isis retransmit-throttle-interval** interface configuration command. To restore the default value, use the **no** form of this command.

```
isis retransmit-throttle-interval milliseconds  
no isis lsp-interval
```

Syntax Description

<i>milliseconds</i>	Minimum delay (in milliseconds) between LSP retransmissions on the interface.
---------------------	---

Default

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

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1.

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 retransmitted on the interface.

The **isis retransmit-throttle-interval** command is distinct from the rate at which LSPs are transmitted 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.

Example

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

You can use the master indexes or search online to find documentation of related commands.

isis lsp-interval
isis retransmit-interval

is-type

To configure the IS-IS level at which the Cisco IOS software operates, use the **is-type** router configuration command. 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	Router acts as a station router. This router will only learn about destinations inside its area. For inter-area routing, it depends on the closest L1/L2 router.
level-1-2	Router acts as both a station router and an area router. This router will run two instances of the routing algorithm. It will have one linkstate database (LSDB) for destinations inside the area (L1 routing) and run an SPF calculation to discover the area topology. It will also have another LSDB with LSPs of all other backbone (L2) routers and run another SPF calculation to discover the topology of the backbone, and the existence of all other areas.
level-2-only	Router acts as an area router only. This router is part of the backbone, and does not talk to L1-only routers in its own area.

Default

Router acts as both a station router and an area router.

Command Mode

Router configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.3.

It is highly recommended that you configure the type of an IS-IS router.

If there is only one area, there is no need to run two copies of the same algorithm. You have the option to run L1-only or L2-only everywhere. If IS-IS is used for CLNS routing, L1-only must be used everywhere. If IS-IS is used for IP routing, only, it is slightly preferred to run L2-only everywhere, as this allows easy addition of other areas later.

Example

The following example specifies an area router:

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

net

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

```
net network-entity-title  
no net network-entity-title
```

Syntax Description

<i>network-entity-title</i>	NET that specifies the area address and the system ID for an IS-IS routing process. This argument can be either an address or a name.
-----------------------------	---

Default

No NET is configured and the IS-IS process will not start. A NET is mandatory.

Command Mode

Router configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

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

A NET is an 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 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 (L1) and throughout the backbone (L2).

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

Even when IS-IS is used to do IP routing only (no CLNS routing enabled), a NET must still be configured. This is needed to instruct the router about its system ID and area ID.

Multiple NETs per router are allowed, with a maximum of three. 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 more 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 in the process of being split into more areas. Multiple area addresses enable you to renumber an area slowly, without the need of a flag day.

Example

The following example configures a router with system ID 0000.0c11.11 and area ID 47.0004.004d.0001:

```
router isis Pieinthesky  
net 47.0004.004d.0001.0000.0c11.1111.00
```

router isis

To enable the IS-IS routing protocol and to specify an IS-IS process for IP, use the **router isis** global configuration command. To disable IS-IS routing, use the **no** form of this command.

```
router isis [tag]  
no router isis [tag]
```

Syntax Description

tag (Optional) 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 router processes for a given router.

Default

Disabled

Command Mode

Global configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

This command is needed to configure a NET and configure an interface with **clsns router isis** or **ip router isis**.

You can specify only one IS-IS process per router. Only one IS-IS process is allowed whether you run it in integrated mode, ISO CLNS only, or IP only.

Example

The following example configures IS-IS for IP routing, with system ID 0000.0000.0002 and area ID 01.0001, and enables IS-IS to form adjacencies on Ethernet 0 and serial 0 interfaces. The IP prefix assigned to Ethernet 0 will be advertised to other IS-IS routers:

```
router isis  
  net 01.0001.0000.0000.0002.00  
  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
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

cls router isis

ip router isis

net

set-overload-bit

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

```
set-overload-bit
no set-overload-bit
```

Syntax Description

This command has no arguments or keywords.

Default

The overload bit is not set.

Command Mode

Router configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

This command forces the router to set the overload bit (also known as the hippity bit) in its non-pseudonode 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 CLNS prefixes directly connected to this router will be still be reachable.

This command can be useful when you want to connect a router to an ISIS network, but don't want real traffic flowing through it under any circumstances. Examples are:

- A test router in the lab, connected to a production network.
- A router configured as an LSP flooding server, e.g. on an NBMA network, in combination with the mesh-group feature.
- A router that is aggregating 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.

Example

The following example configures the set-over-load bit:

```
router isis
 set-overload-bit
```

show isis database

To display the IS-IS link state database, use the **show isis database** EXEC command.

show isis database [level-1] [level-2] [l1] [l2] [detail] [lspid]

Syntax Description

level-1	(Optional) Displays the IS-IS link state database for Level 1.
level-2	(Optional) Displays the IS-IS link state database for Level 2.
l1	(Optional) Abbreviation for the option level-1 .
l2	(Optional) Abbreviation for the option level-2 .
detail	(Optional) When specified, the contents of each LSP are displayed. Otherwise, a summary display is provided.
lspid	(Optional) Link-state PDU identifier. When specified, the contents of a single LSP is displayed by its ID number.

Command Mode

EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

Each of the options shown in brackets for this command can be entered in an arbitrary string within the same command entry. 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**.

Sample Display

The following is sample output from the **show isis database** command when it is specified with no options or as **show isis database l1 l2**:

```

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
    
```

Table 44 describes significant fields shown in the display.

Table 44 Show IS-IS Database Field Descriptions

Field	Description
LSPID	<p>The LSP identifier. The first six octets form the System ID of the router that originated the LSP.</p> <p>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 so called non-pseudonode LSP. This is similar to a router LSA in OSPF. The LSP will describe the state of the originating router.</p> <p>For each LAN, the designated router for that LAN will create and flood a pseudonode LSP, describing all systems attached to that LAN.</p> <p>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.</p>
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 holdtime of zero indicates that this LSP was purged and is being removed from all routers' LSDB. The value between brackets indicates how long the purged LSP will stay in the LSDB before being completely removed.
ATT	The Attach bit. This indicates that the router is also a Level 2 router, and it can reach other areas. L1-only routers and L1L2 routers that have lost connection to other L2 routers will use the attached bit to find the closest L2 router. They will point a default route to the closest L2 router.
P	The P bit. Detects if the IS is area partition repair capable. Cisco and other vendors do not support area partition repair.
OL	The Overload bit. Determines if the IS is congested. If the Overload bit is set, other routers will not use this system as a transit router when calculating routes. Only packets for destinations directly connected to the overloaded router will be sent to this router.

Sample Display Using Show IS-IS Database Detail

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
--More--
0000.0C00.40AF.00-00* 0x00000009  0x8452        608           1/0/0
  Area Address: 47.0004.004D.0001
  Metric: 10   IS 0800.2B16.24EA.01
```

show isis database

```

Metric: 10   IS 0000.0C00.62E6.03
Metric: 0    ES 0000.0C00.40AF

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        317           0/0/0
  Metric: 0    IS 0000.0C00.0C35.00
  --More--
0000.0C00.3E51.00-00  0x00000009  0xAB98        1182          0/0/0
  Area Address: 39.0004
  Metric: 10   IS 0000.0C00.40AF.00
  Metric: 10   IS 0000.0C00.3E51.05
    
```

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

Table 45 describes the additional fields shown in the display.

Table 45 Show IS-IS Database Detail Field Descriptions

Field	Description
Area Address:	Reachable area addresses from the router. For L1 LSPs, these are the area addresses configured manually on the originating router. For L2 LSPs, these are all the area addresses for the area this route belongs to.
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 ES or a CLNS prefix).

Sample Display Using Show IS-IS Database Detail Displaying IP Addresses

The following is additional sample output from the **show isis database detail** command. This 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 detail 12

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:   160.89.64.17
  Metric: 10   IS 0000.0C00.1111.09
  Metric: 10   IS 0000.0C00.1111.08
  Metric: 10   IP 160.89.65.0 255.255.255.0
  Metric: 10   IP 160.89.64.0 255.255.255.0
  Metric: 0    IP-External 10.0.0.0 255.0.0.0
    
```

Table 46 describes the additional field shown in the display.

Table 46 Show IS-IS Database Detail Field Descriptions Displaying IP Addresses

Field	Description
Various addresses	The “IP” entries are the directly connected IP subnets the router is advertising (with associated metrics). The “IP-External” is a redistribute route.

show isis spf-log

To display how often and why the router has run a full SPF calculation, use the **show isis spf-log EXEC** command.

show isis spf-log

Syntax Description

This command has no arguments or keywords.

Command Mode

User EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

Sample Display

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

```
Router# show isis spf-log
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      milles.00-00  PERIODIC
00:03:54   3144     41     1      milles.01-00  TLVCODE
00:03:49   2908     41     1      milles.01-00  TLVCODE
00:03:28   3148     41     3      bakel.00-00   TLVCODE TLVCONTENT
00:03:15   3054     41     1      milles.00-00  TLVCODE
00:02:53   2958     41     1      mortel.00-00  TLVCODE
00:02:48   3632     41     2      milles.00-00  NEWADJ TLVCODE
00:02:23   2988     41     1      milles.00-01  TLVCODE
00:02:18   3016     41     1      gemert.00-00  TLVCODE
00:02:14   2932     41     1      bakel.00-00   TLVCONTENT
00:02:09   2988     41     2      bakel.00-00   TLVCONTENT
00:01:54   3228     41     1      milles.00-00  TLVCODE
00:01:38   3120     41     3      rips.03-00    TLVCONTENT
```

Table 47 describes the fields in the display.

Table 47 Show IS-IS SPF-Log Field Descriptions

Field	Description
When	How long ago (hh:mm:ss) a full SPF calculation occurred. The last 20 occurrences are logged.
Duration	Number of milliseconds it took to complete this SPF run. Elapsed time is wall clock time, not CPU time.

Table 47 Show IS-IS SPF-Log Field Descriptions (Continued)

Field	Description
Nodes	Number of routers and pseudonodes (LANs) that make up the topology calculated in this SPF run.
Count	Number of events that triggered this SPF run. When there is a topology change, often multiple 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 give 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	<p>A list of all reasons that triggered a full SPF calculation. Possible triggers are:</p> <ul style="list-style-type: none"> • PERIODIC—Typically, every 15 minutes a router runs a periodic full SPF calculation. • NEWSYSID—A new system ID (via NET) was configured on this router. • NEWAREA—A new area (via NET) was configured on this router. • NEWLEVEL—A new level (via is-type) was configured on this router. • RTCLEARED—A clear cns route command was issued on this router. • NEWMETRIC—A new metric was configured on an interface of 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. • ATTACHFLAG—This router is now attached to the L2 backbone or it has just lost contact to the L2 backbone. • ADMINDIST—Another administrative distance was configured for the IS-IS process on this router. • AREASET—Set of learned area-addresses in this area changed. • NEWADJ—This router has created a new adjacency to another router. • DBCHANGED—A clear isis * command was issued on this router. • 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 to run a full SPF run. • NEWLSP—A new router or pseudonode appeared in the topology. • LSPEXPIRED—Some LSP in the LSDB has expired. • LSPHEADER—ATT/P/OL bits or is-type in an LSP header changed. • TLVCODE—TLV code mismatch, indicating that different TLVs are included in the newest version of an LSP. • TLVCONTENT—TLV contents changed. This normally indicates that an adjacency somewhere in the area has come up or gone down. Look at the “Last trigger LSP” to get an indication of where the instability may have occurred.

summary-address

Use the **summary-address** router configuration command to create aggregate addresses for IS-IS or OSPF. The **no summary-address** command restores the default.

```
summary-address address mask {level-1 | level-1-2 | level-2} prefix mask
no summary-address address mask {level-1 | level-1-2 | level-2}
```

Syntax Description

<i>address</i>	Summary address designated for a range of addresses.
<i>mask</i>	IP subnet mask used for the summary route.
level-1	Only routes redistributed into Level 1 are summarized with the configured address/mask value.
level-1-2	The summary router will be applied both when redistributing routes into L1 and L2 IS-IS, and when L2 IS-IS advertised L1 routes reachable in its area.
level-2	Routes learned by Level 1 routing will be summarized into the Level 2 backbone with the configured address/mask value, and redistributed routes into L2 IS-IS will be summarized also.
<i>prefix</i>	IP route prefix for the destination.
<i>mask</i>	IP subnet mask used for the summary route.

Default

All redistributed routes are advertised individually.

Command Mode

Router configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

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 LSPs and thus the Link State Database. It also helps stability because a summary advertisement is depending on many more specific routes. If one more specific route flaps, in most cases this does not cause a flap of the summary advertisement.

The drawback of summary addresses is that other routes might have less information to calculate the most optimal routing table for all individual destinations.

Example

In the following example, we redistribute RIP routes into IS-IS. In the RIP world, there are IP routes for 10.1.1, 10.1.2, 10.1.3, 10.1.4, and so forth. We want to advertise only 10.1.0.0 into our IS-IS Level 1 Link State PDU.

```
router isis
net 01.0000.0000.0001.00
redistribute rip level-1 metric 40
summary-address 10.1.0.0 255.255.0.0 level-1
```