



# IPv6 Routing: Route Redistribution

IPv6 route redistribution supports redistributing routes into an IPv6 IS-IS routing process and redistributing IPv6 IS-IS routes between IS-IS levels.

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## Information About IPv6 Routing: Route Redistribution

### IS-IS Enhancements for IPv6

IS-IS in IPv6 functions the same and offers many of the same benefits as IS-IS in IPv4. IPv6 enhancements to IS-IS allow IS-IS to advertise IPv6 prefixes in addition to IPv4 and OSI routes. Extensions to the IS-IS command-line interface (CLI) allow configuration of IPv6-specific parameters. IPv6 IS-IS extends the address families supported by IS-IS to include IPv6, in addition to OSI and IPv4.

IS-IS in IPv6 supports either single-topology mode or multiple topology mode.

### IPv6 IS-IS Route Redistribution

IS-IS for IPv6 supports redistributing routes into an IPv6 IS-IS routing process and redistributing IPv6 IS-IS routes between IS-IS levels.

### Preserving Metrics During Redistribution

When ISIS redistributes a route, the prefix can be preserved as the original route installed in the routing information base (RIB) by using the options **rib-metric-as-external** or **rib-metric-as-internal** for the **metric-type** keyword in the **redistribute** command. The options are allowed when ISIS redistributes routes from any routing process, including another ISIS process.

# How to Configure IPv6 Routing: Route Redistribution

## Redistributing Routes into an IPv6 IS-IS Routing Process

### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **router isis** *area-tag*
4. **address-family ipv6** [**unicast**]
5. **redistribute** *source-protocol* [*process-id*] [**metric** *metric-value*] [**metric-type** *type-value*] [**route-map** *map-tag*]
6. **end**

### DETAILED STEPS

	Command or Action	Purpose
<b>Step 1</b>	<b>enable</b> <b>Example:</b> Device> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
<b>Step 2</b>	<b>configure terminal</b> <b>Example:</b> Device# configure terminal	Enters global configuration mode.
<b>Step 3</b>	<b>router isis</b> <i>area-tag</i> <b>Example:</b> Device(config)# router isis area2	Enables IS-IS for the specified IS-IS routing process, and enters router configuration mode.
<b>Step 4</b>	<b>address-family ipv6</b> [ <b>unicast</b> ] <b>Example:</b> Device(config-router)# address-family ipv6	Specifies the IPv6 address family, and enters address family configuration mode. <ul style="list-style-type: none"> <li>• <b>unicast</b>—(Optional) Specifies the unicast IPv6 unicast address family. This is the default option.</li> </ul>
<b>Step 5</b>	<b>redistribute</b> <i>source-protocol</i> [ <i>process-id</i> ] [ <b>metric</b> <i>metric-value</i> ] [ <b>metric-type</b> <i>type-value</i> ] [ <b>route-map</b> <i>map-tag</i> ] <b>Example:</b> Device(config-router-af)# redistribute bgp 64500 metric 100 route-map isismap	Redistributes routes from the specified protocol into the IS-IS process. <ul style="list-style-type: none"> <li>• <i>source-protocol</i>—Can be one of the following: <b>bgp</b>, <b>connected</b>, <b>isis</b>, <b>rip</b> or <b>static</b>.</li> <li>• <i>process-id</i>—(Optional) Routing process name.</li> <li>• <b>metric</b> <i>metric-value</i>—Redistributes routes based on the metric value.</li> <li>• <b>metric-type</b> <i>type-value</i>—Specifies the link type, which can be the following: <b>external</b> to set an external ISIS</li> </ul>

	Command or Action	Purpose
		metric type, <b>internal</b> to set an internal ISIS metric type, <b>rib-metric-as-external</b> to set metric type to external and use the RIB metric, and <b>rib-metric-as-internal</b> to set metric type to internal and use the RIB metric.
<b>Step 6</b>	<b>end</b> <b>Example:</b> Device(config-router-af)# end	Exits address family configuration mode and returns to privileged EXEC mode.

## Redistributing IPv6 IS-IS Routes Between IS-IS Levels

Perform this task to redistribute IPv6 routes learned at one IS-IS level into a different level.

### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **router isis** *area-tag*
4. **address-family ipv6** [**unicast**]
5. **redistribute isis** [*process-id*] {**level-1** | **level-2**} **into** {**level-1** | **level-2**} **distribute-list** *list-name*
6. **end**

### DETAILED STEPS

	Command or Action	Purpose
<b>Step 1</b>	<b>enable</b> <b>Example:</b> Device> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
<b>Step 2</b>	<b>configure terminal</b> <b>Example:</b> Device# configure terminal	Enters global configuration mode.
<b>Step 3</b>	<b>router isis</b> <i>area-tag</i> <b>Example:</b> Device(config)# router isis area2	Enables IS-IS for the specified IS-IS routing process, and enters router configuration mode.
<b>Step 4</b>	<b>address-family ipv6</b> [ <b>unicast</b> ] <b>Example:</b> Device(config-router)# address-family ipv6	Specifies the IPv6 address family, and enters address family configuration mode. <ul style="list-style-type: none"> <li>• <b>unicast</b>—(Optional) Specifies the unicast IPv6 unicast address family. This is the default option.</li> </ul>

	Command or Action	Purpose
<b>Step 5</b>	<p><b>redistribute isis</b> [<i>process-id</i>] {<b>level-1</b>   <b>level-2</b>} <b>into</b> {<b>level-1</b>   <b>level-2</b>} <b>distribute-list</b> <i>list-name</i></p> <p><b>Example:</b></p> <pre>Device(config-router-af)# redistribute isis level-1 into level-2</pre>	<p>Redistributes IPv6 routes from one IS-IS level into another IS-IS level.</p> <ul style="list-style-type: none"> <li>By default, the routes learned by Level 1 instances are redistributed by the Level 2 instance.</li> </ul> <p><b>Note</b> The <i>protocol</i> argument must be <b>isis</b> in this configuration of the <b>redistribute</b> command. Only the arguments and keywords relevant to this task are specified here.</p>
<b>Step 6</b>	<p><b>end</b></p> <p><b>Example:</b></p> <pre>Device(config-router-af)# end</pre>	<p>Exits address family configuration mode and returns to privileged EXEC mode.</p>

## Verifying IPv6 IS-IS Configuration and Operation

### SUMMARY STEPS

- enable**
- show ipv6 protocols** [*summary*]
- show isis** [*process-tag*] [**ipv6** | \*] **topology**
- show clns** [*process-tag*] **neighbors** *interface-type interface-number* [*area*] [*detail*]
- show clns** *area-tag* **is-neighbors** [*type number*] [*detail*]
- show isis** [*process-tag*] **database** [**level-1**] [**level-2**] [**l1**] [**l2**] [*detail*] [*lspid*]
- show isis ipv6 rib** [*ipv6-prefix*]

### DETAILED STEPS

	Command or Action	Purpose
<b>Step 1</b>	<p><b>enable</b></p> <p><b>Example:</b></p> <pre>Device&gt; enable</pre>	<p>Enables privileged EXEC mode.</p> <ul style="list-style-type: none"> <li>Enter your password if prompted.</li> </ul>
<b>Step 2</b>	<p><b>show ipv6 protocols</b> [<i>summary</i>]</p> <p><b>Example:</b></p> <pre>Device# show ipv6 protocols</pre>	<p>Displays the parameters and current state of the active IPv6 routing processes.</p>
<b>Step 3</b>	<p><b>show isis</b> [<i>process-tag</i>] [<b>ipv6</b>   *] <b>topology</b></p> <p><b>Example:</b></p> <pre>Device# show isis topology</pre>	<p>Displays a list of all connected routers running IS-IS in all areas.</p>

	Command or Action	Purpose
Step 4	<b>show clns</b> [ <i>process-tag</i> ] <b>neighbors</b> <i>interface-type</i> <i>interface-number</i> [ <i>area</i> ] [ <i>detail</i> ] <b>Example:</b> Device# show clns neighbors detail	Displays end system (ES), intermediate system (IS), and multitopology IS-IS (M-ISIS) neighbors.
Step 5	<b>show clns</b> <i>area-tag</i> <b>is-neighbors</b> [ <i>type number</i> ] [ <i>detail</i> ] <b>Example:</b> Device# show clns is-neighbors detail	Displays IS-IS adjacency information for IS-IS neighbors. <ul style="list-style-type: none"> <li>• Use the <b>detail</b> keyword to display the IPv6 link-local addresses of the neighbors.</li> </ul>
Step 6	<b>show isis</b> [ <i>process-tag</i> ] <b>database</b> [ <i>level-1</i> ] [ <i>level-2</i> ] [ <i>l1</i> ] [ <i>l2</i> ] [ <i>detail</i> ] [ <i>lspid</i> ] <b>Example:</b> Device# show isis database detail	Displays the IS-IS link-state database. <ul style="list-style-type: none"> <li>• In this example, the contents of each LSP are displayed using the <b>detail</b> keyword.</li> </ul>
Step 7	<b>show isis ipv6 rib</b> [ <i>ipv6-prefix</i> ] <b>Example:</b> Device# show isis ipv6 rib	Displays the IPv6 local RIB.

## Configuration Examples for IPv6 Routing: Route Redistribution

### Example: Redistributing Routes into an IPv6 IS-IS Routing Process

The following example redistributes IPv6 BGP routes into the IPv6 IS-IS Level 2 routing process:

```
router isis
 address-family ipv6
  redistribute bgp 64500 metric 100 route-map isismap
 exit
```

### Example: Redistributing IPv6 IS-IS Routes Between IS-IS Levels

The following example redistributes IPv6 IS-IS Level 1 routes into the IPv6 IS-IS Level 2 routing process:

```
router isis
 address-family ipv6
  redistribute isis level-1 into level-2
```

## Example: Configuring IS-IS for IPv6

In the following example, output information about the parameters and current state of that active IPv6 routing processes is displayed using the **show ipv6 protocols** command:

```
Device# show ipv6 protocols
IPv6 Routing Protocol is "connected"
IPv6 Routing Protocol is "static"
IPv6 Routing Protocol is "isis"
  Interfaces:
    GigabitEthernet0/0/3
    GigabitEthernet0/0/1
    Serial1/0/1
    Loopback1 (Passive)
    Loopback2 (Passive)
    Loopback3 (Passive)
    Loopback4 (Passive)
    Loopback5 (Passive)
  Redistribution:
    Redistributing protocol static at level 1
  Address Summarization:
    L2: 2001:DB8:33::/16 advertised with metric 0
    L2: 2001:DB8:44::/16 advertised with metric 20
    L2: 2001:DB8:66::/16 advertised with metric 10
    L2: 2001:DB8:77::/16 advertised with metric 10
```

In the following example, output information about all connected routers running IS-IS in all areas is displayed using the **show isis topology** command:

```
Device# show isis topology
IS-IS paths to level-1 routers
System Id      Metric  Next-Hop      Interface      SNPA
0000.0000.000C
0000.0000.000D  20     0000.0000.00AA Se1/0/1        *HDLC*
0000.0000.000F  10     0000.0000.000F GE0/0/1        0050.e2e5.d01d
0000.0000.00AA  10     0000.0000.00AA Se1/0/1        *HDLC*
IS-IS paths to level-2 routers
System Id      Metric  Next-Hop      Interface      SNPA
0000.0000.000A  10     0000.0000.000A GE0/0/3        0010.f68d.f063
0000.0000.000B  20     0000.0000.000A GE0/0/3        0010.f68d.f063
0000.0000.000C  --
0000.0000.000D  30     0000.0000.000A GE0/0/3        0010.f68d.f063
0000.0000.000E  30     0000.0000.000A GE0/0/3        0010.f68d.f063
```

In the following example, output information to confirm that the local router has formed all the necessary IS-IS adjacencies with other IS-IS neighbors is displayed using the **show clns is-neighbors detail** command. To display the IPv6 link-local addresses of the neighbors, specify the **detail** keyword.

```
Device# show clns is-neighbors detail
System Id      Interface      State  Type  Priority  Circuit Id      Format
0000.0000.00AA Se1/0/1        Up     L1    0         00              Phase V
  Area Address(es): 49.0001
  IPv6 Address(es): FE80::YYYY:D37C:C854:5
  Uptime: 17:21:38
0000.0000.000F Et0/0/1        Up     L1    64     0000.0000.000C.02 Phase V
  Area Address(es): 49.0001
  IPv6 Address(es): FE80::XXXX:E2FF:FEE5:D01D
  Uptime: 17:21:41
0000.0000.000A Et0/0/3        Up     L2    64     0000.0000.000C.01 Phase V
```

```

Area Address(es): 49.000b
IPv6 Address(es): FE80::ZZZZ:F6FF:FE8D:F063
Uptime: 17:22:06

```

In the following example, detailed output information that displays both end system (ES) and intermediate system (IS) neighbors is displayed using the **show clns neighbors** command with the **detail** keyword.

```

Device# show clns neighbors detail
System Id      Interface  SNPA          State  Holdtime  Type Protocol
0000.0000.0007 GE3/3      aa00.0400.6408 UP      26        L1  IS-IS
Area Address(es): 20
IP Address(es): 172.16.0.42*
Uptime: 00:21:49
0000.0C00.0C35 GE3/2      0000.0c00.0c36 Up      91        L1  IS-IS
Area Address(es): 20
IP Address(es): 192.168.0.42*
Uptime: 00:21:52
0800.2B16.24EA GE3/3      aa00.0400.2d05 Up      27        L1  M-ISIS
Area Address(es): 20
IP Address(es): 192.168.0.42*
IPv6 Address(es): FE80::2B0:8EFF:FE31:EC57
Uptime: 00:00:27
0800.2B14.060E GE3/2      aa00.0400.9205 Up      8         L1  IS-IS
Area Address(es): 20
IP Address(es): 192.168.0.30*
Uptime: 00:21:52

```

In the following example, detailed output information about LSPs received from other routers and the IPv6 prefixes they are advertising is displayed using the **show isis database** command with the **detail** keyword specified:

```

Device# 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
  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:DB8::/32
  Metric: 10  IPv6 (MT-IPv6) 2001:DB8::/64
  Metric: 5   IS-Extended cisco.03
  Metric: 10  IS-Extended cisco1.03
  Metric: 10  IS (MT-IPv6) cisco.03
IS-IS Level-2 Link State Database:
LSPID          LSP Seq Num  LSP Checksum  LSP Holdtime  ATT/P/OL
0000.0000.000A.00-00 0x00000059  0x378A        949           0/0/0
  Area Address: 49.000b
  NLPID: 0x8E
  IPv6 Address: 2001:DB8:1:1:1:1:1
  Metric: 10  IPv6 2001:DB8:2:YYYY::/64
  Metric: 10  IPv6 2001:DB8:3:YYYY::/64

```

```

Metric: 10          IPv6 2001:DB8:2:YYYY::/64
Metric: 10          IS-Extended 0000.0000.000A.01
Metric: 10          IS-Extended 0000.0000.000B.00
Metric: 10          IS-Extended 0000.0000.000C.01
Metric: 0           IPv6 11:1:YYYY:1:1:1:1:1/128
Metric: 0           IPv6 11:2:YYYY:1:1:1:1:1/128
Metric: 0           IPv6 11:3:YYYY:1:1:1:1:1/128
Metric: 0           IPv6 11:4:YYYY:1:1:1:1:1/128
Metric: 0           IPv6 11:5:YYYY:1:1:1:1:1/128
0000.0000.000A.01-00 0x00000050 0xB0AF 491 0/0/0
Metric: 0           IS-Extended 0000.0000.000A.00
Metric: 0           IS-Extended 0000.0000.000B.00

```

The following example shows output from the **show isis ipv6 rib** command. An asterisk (\*) indicates prefixes that have been installed in the primary IPv6 RIB as IS-IS routes. Following each prefix is a list of all paths in order of preference, with optimal paths listed first and suboptimal paths listed after optimal paths.

```
Device# show isis ipv6 rib
```

```

IS-IS IPv6 process "", local RIB
 2001:DB8:88:1::/64
   via FE80::210:7BFF:FEC2:ACC9/GigabitEthernet2/0/0, type L2 metric 20 LSP [3/7]
   via FE80::210:7BFF:FEC2:ACCC/GigabitEthernet2/1/0, type L2 metric 20 LSP [3/7]
* 2001:DB8:1357:1::/64
   via FE80::202:7DFF:FE1A:9471/GigabitEthernet2/1/0, type L2 metric 10 LSP [4/9]
* 2001:DB8:45A::/64
   via FE80::210:7BFF:FEC2:ACC9/GigabitEthernet2/0/0, type L1 metric 20 LSP [C/6]
   via FE80::210:7BFF:FEC2:ACCC/GigabitEthernet2/1/0, type L1 metric 20 LSP [C/6]
   via FE80::210:7BFF:FEC2:ACC9/GigabitEthernet2/0/0, type L2 metric 20 LSP [3/7]
   via FE80::210:7BFF:FEC2:ACCC/GigabitEthernet2/1/0, type L2 metric 20 LSP [3/7]

```

## Additional References for IPv6 Routing: Route Redistribution

### Related Documents

Related Topic	Document Title
Cisco IOS commands	<a href="#">Cisco IOS Master Commands List, All Releases</a>
IPv6 commands	<a href="#">Cisco IOS IPv6 Command Reference</a>
IP Routing ISIS commands	<a href="#">Cisco IOS IP Routing: ISIS Command Reference</a>
Cisco IOS IPv6 features	<a href="#">Cisco IOS IPv6 Feature Mapping</a>
IPv6 addressing and connectivity	<a href="#">IPv6 Configuration Guide</a>
ISIS overview	<a href="#">IS-IS Overview and Basic Configuration</a>



**Standards and RFCs**

Standard/RFC	Title
RFCs for IPv6	<i>IPv6 RFCs</i>

**Technical Assistance**

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	<a href="http://www.cisco.com/cisco/web/support/index.html">http://www.cisco.com/cisco/web/support/index.html</a>

## Feature Information for IPv6 Routing: Route Redistribution

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

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

