

Autoroute Announce and Forwarding Adjacencies For OSPFv3

The Autoroute Announce and Forwarding Adjacencies for OSPFv3 feature advertises IPv6 routes over MPLS/TE IPv4 tunnels. This module describes how to configure the Autoroute Announce and Forwarding Adjacencies for OSPFv3 feature.

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Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table.

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

Prerequisites for Autoroute Announce and Forwarding Adjacencies For OSPFv3

- OSPFv3 must be configured in your network.

- Cisco Express Forwarding (CEF) must be enabled.
- MPLS/TE tunnels must be configured.

Restrictions for Autoroute Announce and Forwarding Adjacencies For OSPFv3

- Autoroute announce and forwarding adjacency cannot be configured together in a same interface.
- When an autoroute announce is used, OSPFv3 does not advertise the tunnel.
- When forwarding adjacencies are used, OSPFv3 advertises the tunnel link in an LSA.

Information About Autoroute Announce and Forwarding Adjacencies For OSPFv3

Overview of Autoroute Announce and Forwarding Adjacencies For OSPFv3

The OSPFv3 support for Forwarding Adjacencies over MPLS Traffic Engineered Tunnels feature adds OSPFv3 support to the Multiprotocol Label Switching (MPLS) Traffic Engineering (TE) tunnels feature, which allows a network administrator to handle a traffic engineering, MPLS tunnel as a link in an Interior Gateway Protocol (IGP) network based on the shortest path first (SPF) algorithm. An OSPFv3 forwarding adjacency can be created between routers in the same area.

OSPFv3 includes MPLS TE tunnels in the OSPFv3 router link-state advertisement (LSA) in the same way that other links appear for purposes of routing and forwarding traffic. The user can assign an OSPFv3 cost to the tunnel to give it precedence over other links. Other networking devices will see the tunnel as a link in addition to the physical link.

OSPFv3 uses Autoroute Announce (AA) or Forwarding Adjacencies (FA) feature to install IPv6 routes over MPLS/TE IPv4 tunnels into the IPv6 routing table . The TE tunnels are created using IPv4, and requires the use of a routing protocol other than OSPFv3. OSPFv2 is used as the IPv4 IGP and provides data which TE uses to create the tunnels.

OSPFv3 is configured on the TE tunnel interfaces for either autoroute-annouce or forwarding-adjacency. It is also must be configured in router mode to advertise the address of the loopback interface which TE is using for the tunnels that terminate on the router. That address is advertised in the TE LSA .

How to Configure Autoroute Announce and Forwarding Adjacencies For OSPFv3

Configuring Autoroute Announce and Forwarding Adjacencies For OSPFv3

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip cef distributed**
4. **interface** *type number*
5. **ip address** *ip-address-mask*
6. **no shutdown**
7. **exit**
8. **interface** *type number*
9. **ospfv3** *pid af* **mpls traffic-eng autoroute announce area** *aid*
10. **ospfv3** *pid af* **mpls traffic-eng autoroute metric** {*metric* | **absolute** *metric* | **relative** *delta*}
11. **ip ospf cost** *cost*
12. **exit**
13. **interface** *type number*
14. **ospfv3** *pid af* **mpls traffic-eng forwarding-adj area***aid*
15. **ospfv3**[*pid* [*af*]] **mpls traffic-eng forwarding-adj** *interface ID* [**local** *ID*] [**nbr** *ID*]
16. **ip ospf cost** *cost*
17. **exit**
18. **router ospfv3** *router-ID*
19. **address-family ipv4 unicast** [**vrf** *vrf-name*]
20. **area** *aid* **mpls traffic-engineering tunnel-tail** *af interface type*
21. **exit**
22. **show ospfv3 database**
23. **show ospfv3 mpls traffic-eng**

DETAILED STEPS

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

	Command or Action	Purpose
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**ip cef distributed** **Example:** `Device(config)# ip cef distributed`	Enables distributed Cisco Express Forwarding operation.
Step 4	**interface** *type number* **Example:** `Device(config)# interface tunnel 0`	Configures an interface type and enters interface configuration mode.
Step 5	**ip address** *ip-address-mask* **Example:** `Device (config-if)# ip address 192.108.1.27 255.255.255.0`	Sets a primary or secondary IP address for the specified interface.
Step 6	**no shutdown** **Example:** `Device (config-if)# no shutdown`	Disables all functions on the specified interface.
Step 7	**exit** **Example:** `Device (config-if)# exit`	Exits interface configuration mode and returns to privileged EXEC mode.
Step 8	**interface** *type number* **Example:** `Device (config)# interface loopback 0`	Enables loopback interface and enters interface configuration mode.
Step 9	**ospfv3** *pid af* **mpls traffic-eng autoroute announce area** *aid* **Example:** `Device(config-if)# ospfv3 1 af mpls traffic-eng autoroute announce area 1`	Enable Open Shortest Path First version 3 (OSPFv3) on an interface with the IP address family (AF).
Step 10	**ospfv3** *pid af* **mpls traffic-eng autoroute metric** {*metric* | **absolute** *metric* | **relative** *delta*} **Example:** `Device(config-if)# ospfv3 1 af mpls traffic-eng autoroute metric 1`	Specifies the MPLS traffic engineering auto route metric value for the SPF calculation.

	Command or Action	Purpose
Step 11	**ip ospf cost** *cost* **Example:** `Device(config-if)# ip ospf cost 60`	Explicitly specifies the cost of sending a packet on an OSPF interface.
Step 12	**exit** **Example:** `Device(config-if)# exit`	Exits interface configuration mode and returns to privileged EXEC mode.
Step 13	**interface** *type number* **Example:** `Device (config)# interface tunnel 1`	Enables tunnel interface and enters interface configuration mode.
Step 14	**ospfv3** *pid af* **mpls traffic-eng forwarding-adj area***aid* **Example:** `Device(config-if)# ospfv3 1 af mpls traffic-eng forwarding-adj area 1`	Configure an MPLS traffic engineering forwarding adjacency.
Step 15	**ospfv3**[*pid* [*af*]] **mpls traffic-eng forwarding-adj** *interface ID* [**local** *ID*] [**nbr** *ID*] **Example:** `Device(config-if)# ospfv3 1 af mpls traffic-eng forwarding-adj 1`	Specifies the MPLS traffic engineering forwarding adjacency for the SPF calculation.
Step 16	**ip ospf cost** *cost* **Example:** `Device(config-if)# ip ospf cost 55`	Explicitly specifies the cost of sending a packet on an OSPF interface.
Step 17	**exit** **Example:** `Device(config-if)# exit`	Exits interface configuration mode and returns to privileged EXEC mode.
Step 18	**router ospfv3** *router-ID* **Example:** `Device(config)# router ospfv3 18`	Enters OSPFv3 router configuration mode.
Step 19	**address-family ipv4 unicast** [**vrf** *vrf-name*] **Example:** `Device(config-router)# address-family ipv4 unicast`	Configures the IPv4 address family in the OSPFv3 process and enters IPv4 address family configuration mode.

	Command or Action	Purpose
Step 20	**area** *aid* **mpls traffic-engineering tunnel-tail** *af interface type* **Example:** `Device(config-router-af)# area 1 mpls traffic-engineering tunnel-tail af loopback`	Configures OSPFv3 on the tail end of the traffic engineering tunnels.
Step 21	**exit** **Example:** `Device(config-router-af)# exit`	Exits address family configuration mode and returns to global configuration mode.
Step 22	**show ospfv3 database** **Example:** `Device(config)# show ospfv3 database`	(Optional) Displays list of information related to the OSPFv3 database for a specific router.
Step 23	**show ospfv3 mpls traffic-eng** **Example:** `Device(config)# show ospfv3 mpls traffic-eng`	(Optional) Displays autoroute announce, forwarding adjacency, and tunnel-tail information related to OSPFv3.

Configuration Examples for Autoroute Announce and Forwarding Adjacencies For OSPFv3

Example: Configuring Autoroute Announce and Forwarding Adjacencies For OSPFv3

```
!
ip cef distributed
interface tunnel 0
 ip address 192.108.1.27 255.255.255.0
 no shutdown

interface loopback 0
 ospfv3 1 af mpls traffic-eng autoroute announce area 1
 ospfv3 1 af mpls traffic-eng autoroute metric 1
 ip ospf cost 60

interface tunnel 1
 ospfv3 1 af mpls traffic-eng forwarding-adj area 1
 ospfv3 1 af mpls traffic-eng forwarding-adj nbr 1
 ip ospf cost 55

router ospfv3 18
 address-family ipv4 unicast
```

```
   area 1 mpls traffic-engineering tunnel-tail af loopback

  !
 !
!
```

Additional References for Autoroute Announce and Forwarding Adjacencies For OSPFv3

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Command List, All Releases
Configuring OSPF features	IP Routing: OSPF Configuration Guide

Standards and RFCs

Related Topic	Document Title
Advertising a Router's Local Addresses in OSPF Traffic Engineering (TE) Extensions	RFC5786
Traffic Engineering Extensions to OSPF Version 3	RFC5329
Traffic Engineering (TE) Extensions to OSPF Version 2	RFC3630

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/support

Feature Information for Autoroute Announce and Forwarding Adjacencies For OSPFv3

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

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Table 1: Feature Information for Autoroute Announce and Forwarding Adjacencies For OSPFv3

Feature Name	Releases	Feature Information
Autoroute Announce and Forwarding Adjacencies For OSPFv3	Cisco IOS XE Release 3.12S	The Autoroute Announce and Forwarding Adjacencies For OSPFv3 feature advertises IPv6 routes over MPLS/TE IPv4 tunnels. The following commands were introduced or modified: **ospfv3 af mpls traffic-eng autoroute announce area** , **ospfv3 mpls traffic-eng autoroute metric**, **ospfv3 mpls traffic-eng forwarding-adj area** .