OSPFv2 Multiarea Adjacency

This module describes how to configure multiarea adjacency for Open Shortest Path First version 2 (OSPFv2). You can add more than one area to an existing OSPFv2 primary interface. The additional logical interfaces support multiarea adjacency.

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 OSPFv2 Multiarea Adjacency

• Ensure that Open Shortest Path First (OSPF) is configured on the primary interface.

• Ensure that the primary interface type is point-to-point.

Restrictions for OSPFv2 Multiarea Adjacency

A multiarea interface has the following restrictions.

- Operates only if OSPF is configured on the primary interface.

- Exists as a logical construct over a primary interface for OSPF; however, the neighbor state on the primary interface is independent of the multiarea interface.

- Establishes a neighbor relationship with the corresponding multiarea interface on the neighboring device. A mixture of multiarea and primary interfaces is not supported.

- Advertises an unnumbered point-to-point link in the device link-state advertisement (LSA) for the corresponding area when the neighbor state is full.

- Inherits all the OSPF parameters (such as, authentication) from the primary interface. You cannot configure the parameters on a multiarea interface; however, you can configure the parameters on the primary interface.

Information About OSPFv2 Multiarea Adjacency

OSPFv2 Multiarea Adjacency Overview

The Open Shortest Path First (OSPF) protocol allows you to divide a network topology into separate areas. The interface on which OSPF is configured belongs to only one area at any given point of time. This causes suboptimal routing for certain topologies, due to intra-area route preference over the interarea routes.

Open Shortest Path First version 2 (OSPFv2) allows a single physical link to be shared by multiple areas. This creates an intra-area path in each of the corresponding areas sharing the same link. All areas have an interface on which OSPF is configured. One of these interfaces is designated as the primary interface and others as secondary interfaces.

The OSPFv2 Multiarea Adjacency feature allows you to configure a link on the primary interface to enable optimized routing in multiple areas. Each multiarea interface is announced as a point-to-point unnumbered link. The multiarea interface exists as a logical construct over an existing primary interface. The neighbor state on the primary interface is independent of the neighbor state of the multiarea interface. The multiarea interface establishes a neighbor relationship with the corresponding multiarea interface on the neighboring device. You can only configure multiarea adjacency on an interface that has two OSPF speakers. In case of native broadcast networks, the interface must be configured as an OSPF point-to-point type to enable the interface for multiarea adjacency.

Use the **ip ospf multi-area** command to configure multiarea adjacency on the primary OSPFv2 interface.

How to Configure OSPFv2 Multiarea Adjacency

Configuring OSPFv2 Multiarea Adjacency

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number*
4. **ip address** *ip-address mask*
5. **ip ospf** *proces-id* **area** *area-id*
6. **ip ospf network point-to-point**
7. **ip ospf multi-area** *multi-area-id*
8. **ip ospf multi-area** *multi-area-id* **cost** *interface-cost*
9. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**interface** *type number* **Example:** `Device(config)# interface Ethernet 0/0`	Specifies an interface and enters interface configuration mode.

Step 4	**ip address** *ip-address mask*
	
	Example:
	`Device(config)# ip address 10.0.12.1`
	`255.255.255.0`
		Assigns an IP address to this interface.

Step 5	**ip ospf** *proces-id* **area** *area-id* **Example:** `Device (config-if)# ip ospf 10 area 8`	Configures the primary OSPF interface. • The *process-id* argument identifies the OSPF process. The range is from 1 to 65535.

	Command or Action	Purpose
		• The *area-id* argument identifies the OSPF area. The range is from 0 to 4294967295, or you can use an IP address.
Step 6	**ip ospf network point-to-point** **Example:** Device (config-if)# ip ospf network point-to-point	Specifies the primary interface type as point-to-point.
Step 7	**ip ospf multi-area** *multi-area-id* **Example:** Device (config-if)# ip ospf multi-area 11	Configures multiarea adjacency on the interface. • The *multi-area-id* argument identifies the OSPF multiarea. The range is from 0 to 4294967295, or you can use an IP address.
Step 8	**ip ospf multi-area** *multi-area-id* **cost** *interface-cost* **Example:** Device (config-if)# ip ospf multi-area 11 cost 10	(Optional) Specifies the cost of sending a packet on an Open Shortest Path First (OSPF) multiarea interface,
Step 9	**end** **Example:** Device(config-if)# end	Exits interface configuration mode and returns to privileged EXEC mode.

Configuration Examples for OSPFv2 Multiarea Adjacency

Example: Configuring OSPFv2 Multiarea Adjacency

```
Device# enable
Device# configure terminal
Device(config)# interface Ethernet 0/0
Device (config-if)# ip address 10.0.12.1 255.255.255.0
Device (config-if)# ip ospf 1 area 0
Device (config-if)# ip ospf network point-to-point
Device (config-if)# ip ospf multi-area 2
Device (config-if)# ip ospf multi-area 2 cost 10
Device (config-if)# end
```

The following is a sample output from the **show ip ospf 2 multi-area** command.

```
Device# show ip ospf 2 multi-area

OSPF_MA1 is up, line protocol is up
  Primary Interface Ethernet0/0, Area 2
  Interface ID 2
  MTU is 1500 bytes
  Neighbor Count is 1
```

The following is a sample output from the **show ip ospf interface** command.

```
Device# show ip ospf interface

Ethernet0/0 is up, line protocol is up
  Internet Address 10.0.12.1/24, Area 0, Attached via Interface Enable
  Process ID 1, Router ID 10.0.0.2, Network Type POINT_TO_POINT, Cost: 10
  Topology-MTID    Cost    Disabled    Shutdown      Topology Name
        0           10        no          no            Base
  Enabled by interface config, including secondary ip addresses
  Transmit Delay is 1 sec, State POINT_TO_POINT
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    oob-resync timeout 40
    Hello due in 00:00:06
  Supports Link-local Signaling (LLS)
  Cisco NSF helper support enabled
  IETF NSF helper support enabled
  Can be protected by per-prefix Loop-Free FastReroute
  Can be used for per-prefix Loop-Free FastReroute repair paths
  Index 2/2, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 1, maximum is 1
  Last flood scan time is 0 msec, maximum is 0 msec
  Neighbor Count is 1, Adjacent neighbor count is 1
    Adjacent with neighbor 10.0.0.1
  Suppress hello for 0 neighbor(s)
  Multi-area interface Count is 1
    OSPF_MA1 interface exists in area 2 Neighbor Count is 1
OSPF_MA1 is up, line protocol is up
  Interface is unnumbered. Using address of Ethernet0/0 (10.0.12.1), Area 2, Attached via
Multi-area
  Process ID 1, Router ID 10.0.0.2, Network Type POINT_TO_POINT, Cost: 10
  Topology-MTID    Cost    Disabled    Shutdown      Topology Name
        0           10        no          no            Base
  Transmit Delay is 1 sec, State POINT_TO_POINT
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    oob-resync timeout 40
    Hello due in 00:00:06
  Supports Link-local Signaling (LLS)
  Cisco NSF helper support enabled
  IETF NSF helper support enabled
  Can be protected by per-prefix Loop-Free FastReroute
  Can be used for per-prefix Loop-Free FastReroute repair paths
  Index 1/3, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 1, maximum is 2
  Last flood scan time is 0 msec, maximum is 0 msec
  Neighbor Count is 1, Adjacent neighbor count is 1
    Adjacent with neighbor 10.0.0.1
  Suppress hello for 0 neighbor(s)
```

Additional References for OSPFv2 Multiarea Adjacency

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Command List, All Releases
OSPF commands	Cisco IOS IP Routing: OSPF Command Reference
Protocol-independent features that work with OSPF	"Configuring IP Routing Protocol-Independent Features" module

RFCs

RFC	Title
RFC 5185	*OSPF Multi-Area Adjacency*, May 2008

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.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for OSPFv2 Multiarea Adjacency

Table 1: Feature Information for OSPFv2 Multiarea Adjacency

Feature Name	Releases	Feature Information
OSPFv2 Multiarea Adjacency	15.4(1)T	OSPFv2 multiarea adjacency allows you to configure a link on the primary interface in multiple OSPF areas to enable optimized routing. The following commands were modified:**ip ospf multi-area**, **ip ospf multi-area cost**, and **show ip ospf multi-area**.