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How OSPF Injects a Default Route into a Stub or Totally Stub Area

Document ID: 47869

Introduction

Prerequisites

- Requirements

- Components Used

- Conventions

Configure

- Network Diagram

- Configurations

Verify

- Examine the OSPF Database in a Stub Area

- Examine the OSPF Database in a Totally Stub Area

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Related Information

Introduction

This document shows how Open Shortest Path First (OSPF) injects a default route into a stub or totally stub area.

Prerequisites

Requirements

There are no specific requirements for this document.

Components Used

This document is not restricted to specific software and hardware versions.

Conventions

For more information on document conventions, see the Cisco Technical Tips Conventions.

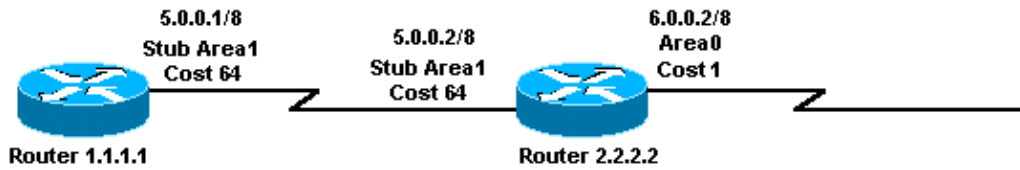
Configure

In this section, you are presented with the information to configure the features described in this document.

Note: To find additional information on the commands used in this document, use the Command Lookup Tool (registered customers only) .

Network Diagram

This document uses the network setup shown in this diagram.



Configurations

This document uses the configurations shown here.

- Router 1.1.1.1
- Router 2.2.2.2

```
Router 1.1.1.1
Current configuration:
hostname r1.1.1.1
interface Loopback0
 ip address 1.1.1.1 255.0.0.0
interface Serial2/1/0
 ip address 5.0.0.1 255.0.0.0
router ospf 2
 network 5.0.0.0 0.255.255.255 area 1
 area 1 stub
end
```

```
Router 2.2.2.2
Current configuration:
hostname r2.2.2.2
interface Loopback0
 ip address 2.2.2.2 255.0.0.0
interface Serial0/1/0
 ip address 5.0.0.2 255.0.0.0
interface ATM1/0.20
 ip address 6.0.0.2 255.0.0.0
router ospf 2
 network 5.0.0.0 0.255.255.255 area 1
 network 6.0.0.0 0.255.255.255 area 0
 area 1 stub
end
```

Verify

This section provides information you can use to confirm your configuration is working properly.

Certain **show** commands are supported by the Output Interpreter Tool (registered customers only) , which allows you to view an analysis of **show** command output.

- **show ip ospf database** Displays a list of the Link State Advertisements (LSAs) and types them into a link state database. This list shows only the information in the LSA header.
- **show ip ospf database summary <link-state id>** Displays the area border router (ABR) summary links.
- **show ip route** Displays the current status of the routing table.

Examine the OSPF Database in a Stub Area

The ABR for the stub area originates a summary LSA with a link ID of 0.0.0.0. It does this even if it does not have a default route. You can see this happen with the **show ip ospf database** command.

```
r2.2.2.2#show ip ospf database
```

```
OSPF Router with ID (2.2.2.2) (Process ID 2)
```

```
Router Link States (Area 0)
```

Link ID	ADV Router	Age	Seq#	Checksum	Link count
2.2.2.2	2.2.2.2	19	0x80000001	0x8F8B	1

```
Summary Net Link States (Area 0)
```

Link ID	ADV Router	Age	Seq#	Checksum
5.0.0.0	2.2.2.2	9	0x80000001	0x8E61

```
Router Link States (Area 1)
```

Link ID	ADV Router	Age	Seq#	Checksum	Link count
1.1.1.1	1.1.1.1	1335	0x80000059	0x56DA	2
2.2.2.2	2.2.2.2	4	0x80000013	0x7FF3	2

```
Summary Net Link States (Area 1)
```

Link ID	ADV Router	Age	Seq#	Checksum
0.0.0.0	2.2.2.2	20	0x80000001	0x75C0
6.0.0.0	2.2.2.2	13	0x80000001	0x2709

```
r2.2.2.2#show ip ospf database summary 0.0.0.0
```

```
OSPF Router with ID (2.2.2.2) (Process ID 2)
```

```
Summary Net Link States (Area 1)
```

```
LS age: 184
```

```
Options: (No TOS-capability, DC)
```

```
LS Type: Summary Links(Network)
```

```
Link State ID: 0.0.0.0 (summary Network Number)
```

```
!--- The ABR (Router 2.2.2.2) injects a default route  
!--- into the stub area.
```

```

Advertising Router: 2.2.2.2
LS Seq Number: 80000001
Checksum: 0x75C0
Length: 28
Network Mask: /0
      TOS: 0 Metric: 1

```

```

r2.2.2.2#show ip route 0.0.0.0
% Network not in table

```

```

!--- The ABR (Router 2.2.2.2) does not have a default route
!--- in its routing table.

```

```

r1.1.1.1#show ip route ospf
O IA 6.0.0.0/8 [110/65] via 5.0.0.2, 00:04:23, Serial2/1/0
O*IA 0.0.0.0/0 [110/65] via 5.0.0.2, 00:04:23, Serial2/1/0

```

Examine the OSPF Database in a Totally Stub Area

If you change area 1 in the stub area example from a stub area to a totally stub area, the ABR still injects the 0.0.0.0 summary LSA into area 1. The only difference is that other summary LSAs are not sent into the totally stub area.

Note: The only configuration change made was to the ABR. The **no-summary** statement was added to its OSPF configuration: **area 1 stub no-summary**.

This command output shows what the OSPF database looks like in a totally stub area.

```

r2.2.2.2#show ip ospf database

```

```

      OSPF Router with ID (2.2.2.2) (Process ID 2)

```

```

          Router Link States (Area 0)

```

Link ID	ADV Router	Age	Seq#	Checksum	Link count
2.2.2.2	2.2.2.2	617	0x80000001	0x8F8B	1

```

          Summary Net Link States (Area 0)

```

Link ID	ADV Router	Age	Seq#	Checksum
5.0.0.0	2.2.2.2	608	0x80000001	0x8E61

```

          Summary ASB Link States (Area 0)

```

Link ID	ADV Router	Age	Seq#	Checksum
1.1.1.1	2.2.2.2	243	0x80000003	0x8F5E

```

          Router Link States (Area 1)

```

Link ID	ADV Router	Age	Seq#	Checksum	Link count
1.1.1.1	1.1.1.1	1934	0x80000059	0x56DA	2
2.2.2.2	2.2.2.2	247	0x80000015	0x7BF5	2

```

          Summary Net Link States (Area 1)

```

Link ID	ADV Router	Age	Seq#	Checksum
0.0.0.0	2.2.2.2	249	0x80000003	0x71C2

```
!--- Notice that this is the only summary LSA  
!--- in the totally stub area.
```

```
r1.1.1.1#show ip route ospf  
O*IA 0.0.0.0/0 [110/65] via 5.0.0.2, 00:04:11, Serial2/1/0
```

The ABR does not originate a summary LSA for 6.0.0.0/8. As a result, Router 1.1.1.1 no longer has a route for 6.0.0.0/8. The only inter-area route this router has is the default route.

Troubleshoot

There is currently no specific troubleshooting information available for this configuration.

Related Information

- [OSPF Database Explanation Guide](#)
 - [OSPF Support Page](#)
 - [IP Routing Support Page](#)
 - [Technical Support – Cisco Systems](#)
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