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## 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

Refer to [Cisco Technical Tips Conventions](#) for more information on document conventions.

## Configure

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

### 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

### Router 2.2.2.2

## Verify

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

The [Cisco CLI Analyzer](#) (registered customers only) supports certain **show** commands. Use the Cisco CLI Analyzer 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 & Documentation - Cisco Systems](#)