Introduction

This document shows how Open Shortest Path First (OSPF) injects a default route into a normal area. Default routes injected into a normal area can be originated by any OSPF router. The OSPF router does not, by default, generate a default route into the OSPF domain. In order for OSPF to generate a default route, you must use the `default-information originate` command.

There are two ways to advertise a default route into a normal area. The first is to advertise 0.0.0.0 into the OSPF domain, provided the advertising router already has a default route. The second is to advertise 0.0.0.0 regardless of whether the advertising router already has a default route. The second method can be accomplished by adding the keyword `always` to the `default-information originate` command.

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
Network Diagram

This document uses the network setup shown in this diagram.

![Network Diagram](image)

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.

Certain `show` commands are supported by the [Cisco CLI Analyzer](https://www.cisco.com) (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 external** - Displays information only about the external LSAs.
- **show ip route** - Displays the current status of the routing table.

Examine the OSPF Database

This output displays how the OSPF database looks given this network environment, using 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)

<table>
<thead>
<tr>
<th>Link ID</th>
<th>ADV Router</th>
<th>Age</th>
<th>Seq#</th>
<th>Checksum</th>
<th>Link count</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2.2.2</td>
<td>2.2.2.2</td>
<td>600</td>
<td>0x80000001</td>
<td>0x9583</td>
<td>1</td>
</tr>
</tbody>
</table>
```
Summary Net Link States (Area 0)

<table>
<thead>
<tr>
<th>Link ID</th>
<th>ADV Router</th>
<th>Age</th>
<th>Seq#</th>
<th>Checksum</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.0.0.0</td>
<td>2.2.2.2</td>
<td>600</td>
<td>0x80000001</td>
<td>0x8E61</td>
</tr>
</tbody>
</table>

Router Link States (Area 1)

<table>
<thead>
<tr>
<th>Link ID</th>
<th>ADV Router</th>
<th>Age</th>
<th>Seq#</th>
<th>Checksum</th>
<th>Link count</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1.1.1</td>
<td>1.1.1.1</td>
<td>864</td>
<td>0x8000005E</td>
<td>0xD350</td>
<td>2</td>
</tr>
<tr>
<td>2.2.2.2</td>
<td>2.2.2.2</td>
<td>584</td>
<td>0x8000001E</td>
<td>0xF667</td>
<td>2</td>
</tr>
</tbody>
</table>

Summary Net Link States (Area 1)

<table>
<thead>
<tr>
<th>Link ID</th>
<th>ADV Router</th>
<th>Age</th>
<th>Seq#</th>
<th>Checksum</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.0.0.0</td>
<td>2.2.2.2</td>
<td>585</td>
<td>0x80000004</td>
<td>0xA87C</td>
</tr>
</tbody>
</table>

Type-5 AS External Link States

<table>
<thead>
<tr>
<th>Link ID</th>
<th>ADV Router</th>
<th>Age</th>
<th>Seq#</th>
<th>Checksum</th>
<th>Tag</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0.0.0</td>
<td>2.2.2.2</td>
<td>601</td>
<td>0x80000001</td>
<td>0xD0D8</td>
<td>0</td>
</tr>
</tbody>
</table>

Because it has a default route, Router 2.2.2.2 originates a type 5 LSA with a link ID of 0.0.0.0. This is the result of the `default-information originate` command in its OSPF configuration.

```
r2.2.2.2# show ip ospf database external 0.0.0.0
OSPF Router with ID (2.2.2.2) (Process ID 2)
  Type-5 AS External Link States
  LS age: 650
  Options: (No TOS-capability, DC)
  LS Type: AS External Link
  Link State ID: 0.0.0.0 (External Network Number )
  Advertising Router: 2.2.2.2
  LS Seq Number: 80000001
  Checksum: 0xD0D8
  Length: 36
  Network Mask: /0
    Metric Type: 2 (Larger than any link state path)
    TOS: 0
    Metric: 1
    Forward Address: 0.0.0.0
    External Route Tag: 0
```

```
r2.2.2.2# show ip route 0.0.0.0
S* 0.0.0.0/0 [1/0] via 6.0.0.3, 00:28:00, ATM1/0.20
```

```
r1.1.1.1# show ip route ospf
O IA 6.0.0.0/8 [110/65] via 5.0.0.2, 00:00:18, Serial2/1/0
O*E2 0.0.0.0/0 [110/1] via 5.0.0.2, 00:00:18, Serial2/1/0
```

You can also add the `always` keyword to the `default-information originate` command to make a router originate a 0.0.0.0 type 5 LSA even if the router does not have a default route in its routing table.

Troubleshoot

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

- OSPF Database Explanation Guide
- IP Routing Support Page
- Technical Support - Cisco Systems