BASIC OSPF - Stub Area

A stub area is an area which is out on a limb with no routers or areas beyond it. A stub area is configured to prevent AS External Link Advertisements (Type 5) being flooded into the Stub area. The benefits of configuring a Stub area are that the size of the Link State Data Base (LSDB) is reduced along with the routing table and less CPU cycles are used to process LSA's. Any router wanting access to a network outside the area sends the packets to the default route (0.0.0.0).

Configuration

Stub areas are areas through which or into which AS external advertisements are not flooded. You might want to create stub areas when much of the topological database consists of AS external advertisements. Doing so reduces the size of the topological databases and therefore the amount of memory required on the internal routers in the stub area.

When an area border router is configured for a stub area, the router automatically advertises a default route in place of the external routes that are not being advertised within the stub area so that routers in the stub area can reach destinations outside the area.

The following restrictions apply to stub areas: you cannot create a virtual link through a stub area, and a stub area cannot contain an AS boundary router.

To create the default route, the ABR of a stub area advertises a default route into the stub area. The default route is flooded to all the routers within the stub area, but not outside the stub area. The default route is used by the routers in a stub area for any destination IP address that is not reachable within the AS.

All routers in a stub area must be configured so that they do not import or flood AS external routes within the stub area. Therefore, all area configurations for all router interfaces within a stub area must be configured for a stub area. Whether or not a router interface is in a stub area is indicated in a special option bit called the E-bit in the OSPF Hello packet. When the E-bit is set to 1, the router is allowed to accept and flood AS external routes. When the E-bit is set to 0, the router is not allowed to accept and flood AS external routes. Routers receiving Hello packets on interfaces verify that the E-bit of the received Hello packet matches their configuration before establishing an adjacency.

Stub areas as defined in the OSPF RFC collapse all external routes into a single default route. Therefore, within a stub area, a router's routing table contains intra-area routes, inter-area routes, and a default route. The Windows 2000 Router also supports the collapsing of all non-intra-area routes into a single default route. This is known as a totally stubby area. A router's routing table within a totally stubby area contains intra-area routes and a default route. The default route summarizes all inter-area routes and all external routes.

Stub areas do not get flooded with external LSAs but do carry a default route, intra-area routes, and interarea routes. The lack of flooding in stub areas reduces the size of the OSPF database for the area and decreases memory usage for external routers in the stub area.

Stub Area

```
NetStepByStep-R3(config-router)# area X stub
```

- Use to configure an area as a stub.
- You must configure each router in a stub area as belonging to the stub area.
- You cannot configure virtual links across a stub area.
- Stub areas cannot contain AS boundary routers.
- Use the no-summary keyword to create a "totally stubby area" and restrict type 3 summary LSAs from entering the stub area. However, type 3 default-route LSAs can continue to flow into the area.
- Use the no version to disable this function.

Verification

```
show ip ospf | begin Area 2
```

- Use to display information about OSPF area on a per-area basis.

- Use the optional begin *areaId* or *areaIdInt* values, in the show ipv6 ospf **command**, to specify an OSPFv3 area ID in either IP or decimal format.

```
NetStepByStep-R3# show ip ospf | begin Area 2
    Area 2
        Number of interfaces in this area is 1
        It is a stub area
          generates stub default route with cost 1
        Area has no authentication
        SPF algorithm last executed 00:00:08.124 ago
        SPF algorithm executed 3 times
        Area ranges are
```

```
        Number of LSA 10. Checksum Sum 0x053DD6
        Number of opaque link LSA 0. Checksum Sum 0x000000
        Number of DCbitless LSA 0
        Number of indication LSA 0
        Number of DoNotAge LSA 0
        Flood list length 0
```

Troubleshoot

```
Debug ip ospf adj
```

- Use to capture the authentication process.
- Use this command before the neighbor relationship is established.
- The output from debug privileged EXEC commands provides diagnostic information concerning a variety of internetworking events relating to protocol status and network activity in general.
- Enabling debugging can disrupt operation of the router when internetworks are experiencing high load conditions. Hence, if logging is enabled, the access server may intermittently freeze up as soon as the console port gets overloaded with log messages.
- Before you start a debug command, always consider the output that this command will generate and the amount of time this may take.

Video Cheat Sheet

R3

```
router ospf 3
 area 2 stub
```

R5

```
router ospf 5
 area 2 stub
```

R6

```
router ospf 6
 area 2 stub
```

R4

```
router ospf 4
 area 2 stub
```