OSPF LSA and Area Types

OSPF relies on several types of Link State Advertisements (LSAs) to communicate link state information between neighbors. A brief review of the most applicable LSA types:

- **Router LSA (Type 1)** – Contains a list of all links local to the router, and the status and "cost" of those links. Type 1 LSAs are generated by all routers in OSPF, and are flooded to all other routers within the local area.
- **Network LSA (Type 2)** – Generated by all Designated Routers in OSPF, and contains a list of all routers attached to the Designated Router.
- **Network Summary LSA (Type 3)** – Generated by all ABRs in OSPF, and contains a list of all destination networks within an area. Type 3 LSAs are sent between areas to allow inter-area communication to occur.
- **ASBR Summary LSA (Type 4)** – Generated by ABRs in OSPF, and contains a route to any ASBRs in the OSPF system. Type 4 LSAs are sent from an ABR into its local area, so that Internal routers know how to exit the Autonomous System.
- **External LSA (Type 5)** – Generated by ASBRs in OSPF, and contain routes to destination networks outside the local Autonomous System. Type 5 LSAs can also take the form of a default route to all networks outside the local AS. Type 5 LSAs are flooded to all areas in the OSPF system.
- **Type 7 NSSA External LSAs** - Used in stub areas in place of a type 5 LSA

NOTE : LSA types 1 and 2 are found in all areas, and are never flooded outside of an area.

OSPF Area Configurations:

Stub Area

For an area to become a stub, all routers belonging to it must be configured to operate as such. Stub routers and non-stub routers will not form adjacency.

Router(Config)#router OSPF 1
Router(config-router)# area 10 stub

Totally Stubby Areas

Like stub areas, totally stubby areas do not receive type 4 or 5 LSAs from their ABRs. However, they also do not receive type 3 LSAs; all routing out of the area relies on the single default route injected by the ABR.A stub area is extended to a totally stubby area by configuring all of its ABRs with the no-summary parameter

Router(Config)#router OSPF 1
Router(config-router)# area 10 stub no-summary

To designate a normal (stub) NSSA, all routers in the area must be so configured:

Router(Config)#router OSPF 1
Router(config-router)# area 10 nssa
Type 3 LSAs will pass into and out of the area. Unlike a normal stub area, the ABR will not inject a default route into an NSSA unless explicitly configured to do so. As traffic cannot be routed to external destinations without a default route, you'll probably want to include one by appending default-information-originate
Router(config-router)# area 10 nssa default-information-originate
To expand an NSSA to function as a totally stubby area, eliminating type 3 LSAs, all of its ABRs must be configured with the no-summary parameter:
Router(Config)#router OSPF 1
Router(config-router)# area 10 nssa no-summary
Summary

- Type 1 - Represents a router
- Type 2 - Represents the designated router for a multiaccess link
- Type 3 - A network link summary (internal route)
- Type 4 - Represents an ASBR
- Type 5 - A route external to the OSPF domain
- Type 7 - Used in stub areas in place of a type 5 LSA

Standard areas can contain LSAs of **type 1, 2, 3, 4, and 5**, and may contain an ASBR. The backbone is considered a standard area.
Stub areas can contain type **1, 2, and 3** LSAs. A default route is substituted for external routes.
Totally stubby areas can only contain type **1 and 2** LSAs, and **a single type 3 LSA**. The type 3 LSA describes a default route, substituted for all external and inter-area routes.
Not-so-stubby areas implement stub or totally stubby functionality yet contain an ASBR. Type 7 LSAs generated by the ASBR are converted to type 5 by ABRs to be flooded to the rest of the OSPF domain.

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