A circuit board

Description automatically generated

OSPF LSA Types

Different area configurations

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OSPF areas have different variations that filter out routes, to make routing tables more efficient. This means the network needs less horsepower to route everything, which faster speeds. These OSPF area types are the backbone, standard, stubby, totally stubby, and not so stubby areas. Each performs their specific function, primarily towards filtering routes. All networks use Link-State-Advertisements, or LSA packets, which are used to communicate information about the links between routers. Those are then stored in LSDBs (Link-State Databases) in each router, and OSPF v3 seeks to optimize those databases to minimize the number of packets that each router has to process. These packets have types, encoded as a number ranging 1-5 (with an additional type 7), each serving a specific purpose for OSPF v3 routing, and different OSPF area types can filter out specific packets. A good way to think of OSPF is to imagine it as a way to delegate certain tasks to certain routers instead of making every router do everything, allowing for more efficiency.

LSA type 1 packets are just sharing the location of a router and its connected routes to other routers. In this sense, the purpose of these packets is to build a web of connections so that each router knows where to pass packets along to, and where those destinations are concerning other routers.

Next are the LSA type 2 packets, generated by an area’s DR (designated router). These routers serve as central points for exchanging OSPF routing info, and broadcast that to all other routers in the area so that they know where to send any packets to be processed. Think of them as your local mailbox: you send a letter in, and the letter gets delivered to its destination. The routers know where this mailbox is via LSA type 2 packets.

LSA packet types 3 through 5 packets are pretty similar and have to deal with external networks. LSA type 3 packets are like street signs, they point towards the routes between areas. Type 3 packets tell other routers about the location of Area Border Routers (ABRs) which, as the name implies, are located on the edge of areas. Through type 3 packets, routers can send packets to other areas. LSA type 4 packets are similar to type 3 packets but are for routes connected outside the network. LSA type 4 packets give the location of routers connected to other networks. This way, same as with type 3 packets, if a packet is supposed to go outside the network, the router knows where to send it. Finally, type 5 LSA packets are used to share info about routes from external networks, not routers connected to them. So, instead of a packet going through a router, it just goes through a route to an external location.

Type 7 LSA packets are for a specific purpose that I will cover later, but if a router needs to go through a specific area type without being blocked, it will sort of “wear” this packet type to avoid detection, and after leaving the area the packet will shed this covering.

Now that we’ve gone over the types of packets, areas can be configured to filter out certain packet types from its area.

Backbone areas are the first area created when configuring OSPF, area 0, This area type will not filter out any packet types. This also goes for standard areas, which are areas without any special configurations to them.

Stubby areas block type 5 LSA packets, or external routes. This means that those external routes will turn into default routes. Totally stubby areas block type 3, 4, and 5 LSA packets, or any routes outside its area. All these routes will also turn into default routes.

Combining these two gives a vague idea of Not-so-stubby areas. Not-so-stubby areas will take type 5 packets (external routes) connected to its area and disguises them as type 7 packets. These type 7 packets will pass through the area unchanged and arrive at the backbone area. When they exit the area, they revert to type 5 packets. Confusing, I know. In the following illustration, I’ve shown the conversions. The red arrow shows the conversion from type 5 to type 7, it passes through the NSSA, and the blue arrow shows the conversion from type 7 back to type 5. This way, the NSSA won’t block the type 5 packet. It’s a special case, but it allows for the NSSA to block all routes outside its area in the network, without block routes from other networks.



Here are two tables I created to help simplify things:

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| Area Type | What it does | Blocked LSAs |
| Backbone Area | Required | None |
| Standard Area | Any area beside the backbone area | None |
| Stubby Area | Blocks external routes and converts them into default routes. | Type 5 |
| Totally Stubby Area | Blocks all routes from outside its area, converting them into default routes. | Types 3, 4, and 5 |
| Not-so-Stubby Area | Allows external routes connected to the area to pass through to the backbone area | Disguises type 5 as type 7 inside the area |

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| LSA Type # | LSA Description | Technical Name |
| LSA Type 1 | I'm plugged into these networks, generated by normal routers | Router LSA |
| LSA Type 2 | I'm the designated router (DR) for this network | Network LSA |
| LSA Type 3 | Anytime a route goes between areas, locations of routers that go between areas | OSPF Summary LSA |
| LSA Type 4 | Locations of routers that allow you to leave your system | OSPF ASBR Summary LSA |
| LSA Type 5 | Summary of routes coming in outside the system | OSPF ASBR External LSA |
| LSA Type 7 | Disguises type 5 LSAs as type 7 until they leave the NSSA as to not get blocked, until they get out of the NSSA area. After leaving, they revert to type 5. | OSPF Not So Stubby Area (NSSA) External LSA |